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NIHILIST PERDURANTISM: A NEW ONTOLOGY OF MATERIAL OBJECTS

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NIHILIST PERDURANTISM:
A NEW ONTOLOGY OF MATERIAL OBJECTS

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DISSERTATION

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A dissertation submitted in partial fulfillment of the
Requirements for the degree of Doctor of Philosophy in the
College of Arts and Sciences
at the University of Kentucky

By

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Lexington, Kentucky

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ABSTRACT OF DISSERTATION

NIHILIST PERDURANTISM:
A NEW ONTOLOGY OF MATERIAL OBJECTS

Ordinary material objects, such as guitars and houses, do not seem to pose any serious philosophical problems. However, the nature of the material objects and their part-whole relation raises serious questions about fundamental ontologies. Furthermore, part-whole relations are not necessarily spatial; they can be temporal as well.

My dissertation investigates the problems posed by ordinary material objects, and the different ontological views that attempt to provide answers to these problems. I then present a new and radical view, which I call Nihilist Perdurantism (NP). NP claims that objects have temporal parts, but not spatial parts. I arrive at this view by first exploring and arguing against different views on composition, with a focus on arguments against common sense ontologies of ordinary objects. I then discuss the nature of mereological simples and argue against several views that claim that qualitatively heterogeneous simples are possible (Markosian and McDaniel). Next, I present my arguments against perdurantist, endurantist, and presentist view of persistence. I especially focus on endurantism, and use the aforementioned argument against the possibility of qualitatively heterogeneous simples to construct a similar argument against endurantism. Finally, I argue in favor of my view, NP. This view combines a mereological nihilist view (defended at various times by Unger, Van Inwagen, Merricks, and Sider) about spatial parts with a perdurantist view (defended at various times by Lewis, Hawley, Heller, and Sider) of temporal parts. Therefore, according to NP, there are no guitars, trees, or houses.

The only objects that exist are NP objects; these are line-shaped objects that extend through spacetime. With respect to the three spatial dimensions, these objects have no parts. However, with respect to the temporal dimension, NP objects do have parts in the form of points and line segments. My work shows that NP has better solutions to many of the puzzles and problems posed by material objects, such as the puzzle of change, over the three standard views. Hinchliff argues that change is puzzling because in order for there to be real change, then the following four intuitions must be true: (1) The candle persists through the change. It existed when it was straight, and it exists now when it is bent...(2) Shapes are properties not relations. They are one-placed, not many-placed...(3) The candle itself has the shapes. Not just a part but the candle

itself was straight, and not just a part but the candle itself is bent…(4) The shapes are incompatible. If the shapes were compatible, there need not have been a change. The puzzle of change is the mutual inconsistency of these four intuitions. I argue that perdurantists must deny intuition (3), endurantists must deny intuition (2), and presentists must deny intuition (1). I then argue that only NP can accommodate all four intuitions about both macroscopic and microscopic change while resolving the inconsistency of the four intuitions.

My dissertation presents a new view that provides a fresh perspective on the debate about the nature of material objects. My development of NP touches on a number of other philosophical problems. In Chapter One, I discuss the role of intuitions in metaphysics, and argue that many supposedly "common sense" intuitions are already philosophical positions. In Chapter 2, I argue against Korman's and Markosian's common sense ontologies of ordinary objects. In Chapter 3, I argue that the endurantist view of persistence is inconsistent and should be rejected. In addition to making the case for NP and its solution to the puzzle of change in Chapter 4, I also argue that NP can solve the problem of motion in a homogenous substance. Finally, in Chapter Five, I argue against the possibility of both gunky and junky material objects.

KEYWORDS: Metaphysics, Analytic Philosophy, Material Objects, Mereology, Time

Brian Carlson

July 10, 2017

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TABLE OF CONTENTS

LIST OF FIGURES

Chapter 1: Motivation and Methodology

This dissertation will propose a new view of the nature of material objects and their persistence through time. In this chapter, I will present some puzzles that illuminate some of the basic problems that surround material objects and persistence. These two topics have traditionally been addressed as separate issues. However, in the next section I will argue that if one really wants to have a comprehensive picture of the status of material objects, then composition and persistence must be examined as interrelated issues that address similar concerns with respect to their spatial and temporal makeup.

1.1 Material Objects

In everyday life, you use the concept of 'part' all the time. You can buy car parts at an auto store for your car, you can watch part of a season of a television show, and you can be a part of your family. In each of these cases, the parts are understood in relation to the thing they are a part of: your car, the television show, and your family. You might also sometimes refer to these things with parts as "the whole car", "the whole show" and "the whole family". The whole of the car is made up of all the parts of the car and nothing else. The whole family is made up of all the family members and nothing else.

Since this project will focus on material objects, I will now only consider the use of parts and wholes with respect to material objects. Intuitively, material objects are made of their parts. These parts are in certain relations to each other that unify them as a material object. A car has many parts: a transmission, brake pads, spark plugs, and so on. Each of these parts is physically connected to the other parts of the car, and they all work together to achieve the function of the car: transporting passengers. When discussing the relation between parts and wholes, philosophers typically use the term *composition*. For example, the parts of a car *compose* the car, and the car is a *composite object*. Many other intuitive material objects meet the same conditions. For example, guitars, coffee mugs, houses, trees and humans (or at least their bodies) all have parts

that are physically connected and together fulfill a function. So perhaps a single material object is a united collection of parts that fulfills some function.

However, material objects lose parts all the time. A car's spark plugs are removed. A clumsy person will drop their coffee mug and the handle will break off. Trees shed their leaves in the fall. Human beings lose limbs in accidents. Even though these objects have lost parts, we ordinarily to not cease to think of them as objects. We still refer to a car without spark plugs as a car, and a human with a missing limb as a human. Therefore, the above intuition about the connection between an object and its parts is violated.

Not only does losing parts violate the above intuition that objects are composites of their parts, but it may also violate the intuition that a material object has a specific function. A car without an engine cannot move, and a human being without a limb cannot perform many normal human activities. Yet again, this does not deter us from referring to the car and human as material objects. But there is a point where an object can no longer lose any more parts and remain an object. If a car has its front half cut off and melted down for scrap, then it is no longer a car. When a human being dies and the body decomposes, there is no longer a body. In both cases, the object no longer exhibits its previous unity or its previous function

This brings us to a puzzle: objects can survive the loss of some parts, but objects cannot survive the loss of too many parts. Where then, is the dividing line between object and non-object? Are there essential parts that an object cannot lose? Or is there some number of parts that an object must maintain? In Unger's "I do not exist," Unger uses the sorites of decomposition to show that any attempt to identify a dividing line between object and non-object is arbitrary and *ad hoc*. To show this, Unger uses a thought experiment where atoms are removed from a wooden table one by one. Unger uses *atom* to mean a very small piece. This could be a molecule of cellulose, a standard atom, or

something smaller. My interpretation of Unger's argument is as follows; n is a finite number, and m is a finite number such that $0<m\leq n$:

P1. A table is composed n atoms.
P2. If n atoms compose a table, then $n\text{-}1$ atoms also compose a table.
C1. So $n\text{-}1$ atoms compose a table.
P4. If $n\text{-}1$ atoms compose a table, then $n\text{-}2$ atoms compose a table.
P5. If $n\text{-}2$ atoms compose a table, then $n\text{-}3$ atoms compose a table and so on.
C2. Therefore, $n\text{-}m$ atoms compose a table.
P6. So, $n\text{-}(n\text{-}1)$ atoms compose a table.
P7. If $n\text{-}(n\text{-}1)$ atoms compose a table, then $n\text{-}n$ atoms compose a table.
C3. So, $n\text{-}n$ atoms compose a table.[1]

P2 is supported by the intuitions that removing one atom from a table does not make the table cease to exist, nor does removing two, three, or even 10,000 (there is nothing special about the choice of table; feel free to substitute any material object that you like). P1 and P2 entail C1. After that, modus ponens is simply repeated over and over again. Since modus ponens is valid, it follows that the removal of any of the table's atoms does not make the difference between table and non-table. When the argument is carried to its logical conclusion, it yields the absurd conclusion that a table can be composed of no atoms.

One might try modifying Premise 2 and claim that it holds for a certain number of iterations, but fails after that number is surpassed. In other words, after removing some non-zero quantity of atoms, the removal of a further atom will make the difference between a table and a non-table. This is true; there will be a point where the table falls apart and ceases to exist. In this specific sorites case, there is an atom that made the difference between table and non-table. However, if another table has its pieces removed in a different order, then a different atom will make the difference between table and non-table. Since there are many ways to remove atoms from the table, then it follows that there are many atoms that make the difference between table and non-table.

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[1] See Unger 1979 pp. 176-181. If you don't like atoms, feel free to substitute 'hunks of matter.'

Examining the two following cases of decomposition shows this:

P1. The removal of one atom cannot destroy the table.
P2. In case 1, after the removal of many atoms, atom A is the atom that makes the difference between table and non-table.
C1. Therefore, there is a special atom A such that the removal of A destroys the table.
P3. In case 2, the only atom removed is atom A.
C2. So the table is destroyed by the removal of 1 atom.
C3. C2 contradicts P1; reject C1.

This argument shows that identifying any one atom as the one that makes the difference between table and non-table must be arbitrary. In order to resolve the sorites of decomposition, it seems that one must do one of three things: (1) reject P2 and claim that if an object loses a part, then the object ceases to exist, (2) hold that objects can lose all their parts and continue to exist, or (3) hold that objects do not exist in the first place. The sorites of decomposition shows that that material objects cannot simply be the things that we classify as such. There is a genuine problem here that requires philosophical investigation.

1.2: Material Objects and Persistence

Most people believe that objects persist over time. We attribute properties and relations to past, present, and future objects all the time. For example, we might say "My car was broken, but now it is fixed." The car has the property of past brokenness and present-fixedness. Or we might say "The table was unfinished, but now it is stained." In the past the table lacked the property of being finished and presently has the property of being stained. However, working out an account of just how this is done is not straightforward. This can be illustrated with the puzzle of change.

Most of us believe that we live in a world of change. The sun changes position in the sky, a leaf changes from green to red in the autumn, and shovels rust when exposed to water and air. In each of these examples, a thing changes: the sun, a leaf, and a shovel. But in order for a singular thing to change, it presumably had certain qualities before

and has different qualities now. A leaf is green in the summer and red in the autumn. But the leaf before the change is the same leaf after the change. If the leaf is the same leaf, then the leaf is both green and red. But the leaf cannot be green and red. If change is possible, then there must be an explanation for how these things have incompatible qualities. This is the Puzzle of Change.[2]

There is something genuinely puzzling about change. But just what, exactly, is the puzzling feature of change? Does it result from the identity relation, or from some other feature of change? Mark Hinchliff argues that change is puzzling because our intuitions about change form an inconsistent set of propositions. Consider a candle where at some time t_1 it was straight, and some time later, t_2, the candle has melted and is now bent:

(1) The candle persists through the change. It existed when it was straight, and it exists now when it is bent…
(2) Shapes are properties not relations. They are one-placed, not many-placed.
(3) The candle itself has the shapes. Not just a part, but the candle itself was straight, and not just a part but the candle itself is bent.
(4) The shapes are incompatible. If the shapes were compatible, there need not have been a change.[3]

Here is the argument in the form of a *modus tollens*:

P1. If change is possible, then (i)-(v) will be true:
  (i)   One and the same thing exists before and after the change.
  (ii) The thing that has the properties just plain has them; change involves properties, not relations.
  (iii) The thing that changes has the properties involved in the change, not the things parts.
  (iv) Properties involved in any change are incompatible.
  (v) Nothing can have incompatible properties.
P2. (i)-(v) entail a contradiction.
C. Change is not possible.

If (i) is true, then the candle before the change is identical to the candle after the change.

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[2] See Hinchliff 1996. I will discuss Hinchliff's formulation of the puzzle and his proposed solution later in the paper.
[3] Hinchliff 1996, p 119.

If (ii) and (iii) are true, then the candle itself instantiates the property of 'straight' before the change and the candle itself instantiates the property of 'bent' after the change. If (iv) and (v) are true, then 'straight' and 'bent' are incompatible and nothing can instantiate both properties. Since the bent candle is identical to the straight candle, and objects cannot have incompatible properties, change leads to a contradiction. Either one of the intuitions must be given up or some or some way to resolve them must be found.

The sorites of decomposition and the puzzle of change both are both puzzles about material objects. The first is a puzzle only concerned with the spatial extension of objects, while the second is concerned with the temporal extension as well. These two topics have traditionally been addressed as separate issues. However, in the next section I will argue that if one really wants to have a comprehensive picture of the status of material objects, then composition and persistence must be examined as interrelated issues that address similar concerns with respect to their spatial and temporal makeup.

1.3: Asking the Right Question

There are many questions one could ask about composition or persistence. For instance, one could ask, "Why is a coffee mug an object while a pile of sand is not?" or "Does a house persist in the same way that a human being persists?" These are interesting questions that deserve answers; however, the focus of each question is too specific and our preconceived beliefs about the coffee mug, pile of sand, house, and human will most likely obscure any investigation. For this reason, many contemporary investigations of material composition begin by asking the Special Composition Question:

SCQ: Under what conditions, if any, does composition occur?[4]

The SCQ does not ask for an analysis of composition without reference to mereological concepts. This is because mereological concepts do not have any non-circular analysis.

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[4] Van Inwagen first formulated this in "When Are Objects Parts", 1987. He also discusses it in his *Material Beings*, 1990.

Therefore, there seems to be no answer to the question "What is composition?" (what Van Inwagen calls the General Composition Question). Instead, the SCQ inquires about the necessary and sufficient required for composition to obtain.

There are three broad answers to the SCQ: (1) composition occurs under any conditions; any collection of matter, such as a pile of sand or a human body, composes an object, (2) composition occurs under no conditions; there are no objects that have parts and (3) composition occurs under some conditions; some collections of matter are objects, such as human bodies, while others, such as piles of sand, are not. These answers will be the focus of Chapter 2.

Using the SCQ as a framework, one can formulate an analogous question concerning the persistence of material objects; call this the Special Persistence Question:

SPQ: Under what conditions, if any, do objects persist through time?[5]

Like the SCQ, the SPQ does not attempt to give an analysis of persistence without the use of temporal concepts since there does not seem to be any analysis of these concepts forthcoming. Instead, answers to the SPQ identify the necessary and sufficient conditions for persistence to obtain.

However, trying to frame the answers to the SPQ as analogous to the "under any conditions, under no conditions, under some conditions" approach of the SCQ is not a fruitful approach. In the case of composition, it is open whether composition actually occurs. But even if one denies the existence of composite objects, one does not deny the existence of material objects; one only denies the existence of material objects that have

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[5] As far as I know, my formulation of the STCQ is original (albeit it is inspired and analogous to Van Inwagen's SCQ). Since I will be discussing the problems of composition and persistence together, I find it helpful to state the problems in a similar manner. However, if this incorrectly states the problem, I do not believe that anything important rides on it. In *Four Dimensionalism*, Sider asks a similar question: "Under what conditions does an assignment have a minimal D-fusion?" or less technically, "Under what conditions do things begin and cease to exist?" The main difference between his question and my question is that Sider's question suggests that things do in fact come in and out of existence, while mine does not. By asking about persistence, I can avoid making any assumptions about whether things can genuinely begin or cease to be.

parts.

However, in the case of persistence, almost everyone accepts the primitive fact that all things persist through time, even if they do not agree on a specific definition of persistence.[6] If persistence never occurs, then we either live in a timeless world or in a world of bare temporal structure. In a timeless world, there is no persistence because the world consists of only one instant. In a bare world, there is no persistence because there are no material things. Since our world is in fact not bare, and not timeless, then the "no conditions: answer to the SPQ is a dead end.

The "some conditions" answer to the SPQ is also problematic because it is not analogous to the SCQ's "some conditions" answer. As mentioned above, the sometimes answer to the SCQ counts some collections of matter as objects and others as non-objects. But whether a collection of matter composes an object or not, the matter still remains in existence. But in the case of persistence, there is no intuitive evidence for claiming that some things persist while others do not. We talk about the temporal properties of cars, piles of sand, people, mountains and suns in the same way. While we treat some collections of matter as material objects and not others, we treat all existing things as have the same temporal nature. Since the SPQ's "some conditions" and "no conditions" answers are out of the question, it must be the case all conditions are sufficient for an object to persist. However, this answer does nothing to resolve the puzzles of persistence, such as the puzzle of change discussed above.

Since the SPQ is a non-starter, the right question still needs to be identified. I believe that the best way to do this is in terms of *temporal* composition. While I will explore temporal composition in Chapter 3, a rough idea is needed here. The first step is to think of time as another dimension, just like space. This move is supported by several

[6] Idealists of various types might deny the existence of time and therefore persistence. For instance, Buddhism often makes the claim that time is an illusion. Kant argues that time is just a structure of our experience. Somewhat more recently, McTaggart argued that time is an illusion in McTaggart 1908.

reasons. First, we use similar phrases to describe spatial and temporal locations. For example, "the book is on the table," and, "the robbery occurred on the 14th." Or "I stand before you," and, "Before I go home, I must clean up my office." In each case, the prepositions are used to describe both spatial and temporal relations. Second, we can model temporal relations between objects or events using a three dimensional model (where the events or objects are represented by two-dimensional figures). Third, the idea that space and time are intimately related is not just intuitive. Physicists assume that space and time are a unified substance, spacetime; spacetime is used to explain natural phenomena such as gravity and time dilation when an object is traveling close to or at the speed of light.

If time is extended like space, then objects populate different temporal locations just like they populate different spatial locations. Typically, questions about composition are limited to one instant of time. If I wonder whether the grains of sand compose a pile, then I am thinking about composition across the spatial dimensions. But since objects are located in time as well as space, I might wonder whether there is an object composed of the grain of sand before me right now and the grain of sand that occupied the same spatial location yesterday. With this in mind, the SPQ can be replaced by the following question:

Special Temporal Composition Question (STCQ): Under what conditions, if any, does temporal composition occur?

Unlike the answers to the SPQ, the "all conditions," some conditions," and "no conditions" each provide interesting answers. These answers also map onto existing views of persistence in the literature; this will be discussed in Ch. 3.

Now that the STCQ has replaced the SPQ, the relationship between the STCQ and the SCQ needs to be determined.   There are three possible ways the questions could be combined: (1) the STCQ grounds the SCQ, (2) the SCQ grounds the STCQ, or (3) the

two questions can be unified into a signal question. I will argue that TMC is the best approach. But before this, I will briefly explain some of the problems with (1) and (2). The question formed from 1 is as follows:

(1) Under what conditions, if any, does temporal composition occur and how does this limit and provide the conditions, if any, under which spatial composition occurs?

This question is not promising. If we begin by thinking about temporal composition, then the objects that we use in our investigation are uncertain. This is because we have not settled what counts as a material object yet. Recall the example of the grain of sand above. Before we can ask whether the present grain of sand and the grain of sand from yesterday compose something, we need to know whether there is even a grain of sand before me in the first place. The question formed from (2) has more promise:

(2) Under what conditions, if any, does spatial composition occur and how does this limit and provide the conditions, if any, under which temporal composition occurs?

First, this answer to the SCQ seems to have more at stake than an answer to the STCQ. An answer to the SCQ will tell us whether or not we are mistaken in our beliefs about ordinary objects. When we have the answer, we will know if there are no objects, fewer than we expected, or many more than we expected. Once the SCQ is answered, then we know what the candidates for temporal composition are. If there are no objects, for instance, then we do not need to know the conditions under which tables, amoebas, or people exist. Alternatively, if objects, such as a table, can survive the loss of all of their parts (as suggested by the sorites of decomposition above), then we need to know about the persistence condition of the table before and after its decomposition.

The grounding approach to question (2) has promise. However, I will argue that since both the SCQ and STCQ are framed in terms of composition, the two questions can be in combined into one question. Both the SCQ and the STCQ can be thought of as an investigation of mereological concepts applied to the temporal and the spatial

dimension. Therefore, I suggest the following combined formulation:

Total Mereological Composition Question (TMC): Under what conditions, if any, does mereological composition in concrete entities occur?

I have chosen the phrase "mereological composition" as a term that is neutral as to whether the parts are spatial, temporal, or both.

While there is nothing wrong with investigating the SCQ and STCQ independently, these separate investigations do not offer a full understanding of material objects. I am reminded of the Indian parable about the blind men and the elephant. When several blind men encounter an elephant, they can only describe the parts they touch, never realizing that they are all part of a single phenomenon. This is the problem with the SCQ and the STCQ; while they both are appropriately directed, they focus solely on certain aspects of concrete objects while ignoring others. Solely investigating the spatial or temporal aspects of concrete objects results in an incomplete picture of concrete objects in the same way as the anecdote above. The blind man may learn much about the elephant's trunk but never come to a full understanding until he realizes the role it plays in relation to the other parts of the elephant.

There are several advantages to using TMC instead of separately investigating the SCQ and STCQ. If we investigate the SCQ and STCQ separately, we think that they share no common conceptual ground. By using composition as the driving concept, TMC we can evaluate the various views about composition and persistence with the same standards. Perhaps we can even apply arguments that have traditionally been restricted to only composition or persistence to the other topic.

Another benefit of asking TMC instead of the individual questions is that TMC allows us new ways to evaluate arguments for the various views on the table. Instead of arguing for a view on persistence and a view on composition, we can address them as package deals. A view's stance on spatial composition might further support or weaken

its stance on persistence. Finally, this approach also opens up resources for new views about persistence. There are many more views about the nature of composition than persistence. Asking TMC allows one to easily transfer views about composition to views about persistence. Any view of spatial composition without a temporal analogue could be used as a template for a new view of persistence.

I think these points make a good case for asking questions about persistence and composition in the style of TMC. This does not mean that one cannot focus one of the issues more than the other, or that one may forgo discussing one when discussing specific features about the other. However, it would be a mistake to remain focused on one aspect of the question all of the time. A complete analysis of an object's mereological nature has to account for both its temporal and spatial aspects. In Chapter 2, I will discuss the problem of composition and outline my stance on the nihilist (or eliminativist) answer to the SCQ, while in Chapter 3, I will discuss the problem of persistence and discuss my perdurantist response. This may seem counter-intuitive since I have just argued that answering TMC is better than answering the SCQ and the STCQ alone. However, given the state of the literature on composition and persistence, an independent examination of each issue must occur before my alternative approach can be implemented. Before I begin the dissertation proper, I will briefly discuss my methodology and the basic assumptions that I make in this dissertation.

1.4: Methodology and Assumptions

Within contemporary analytic metaphysics, there are two broad methodological approaches to metaphysics . The first approach has its roots in the work of Carnap, while the second has its roots in the work of Quine. In Carnap's "Empiricism, Semantics, and Ontology," he argues that various parts of our language form closed frameworks over a domain of discourse. Any existential claims within these frameworks are true or false in virtue of the framework itself, not some objective reality. For instance, in the domain of

mathematics, there are propositions that existentially quantify over numbers. These propositions are true because the framework takes them to be true. But Carnap argues that metaphysicians want to know if numbers *really* exist; in other words, do numbers exist outside of the domain of mathematics? Carnap rejects this question as meaningful, since meaning resides within a given domain. Since metaphysicians are asking questions outside of any particular domain, there is nothing to give the metaphysical questions meaning. Therefore, Carnap believes any attempt by a metaphysician to go beyond language and assert things about the world is hopeless.

In contrast, Quine rejects Carnap's claims that language frameworks are domain specific. Instead, Quine models his metaphysical methodology using the language of science. Quine says that if one wants to know what exists, then one must first create a best theory of the world. This theory will unify scientific and philosophical claims about the world. Competing theories will be judged on their explanatory power as well as the parsimony of their ideology and ontology. A theory's ideology is the collection of quantifiers, relations, and properties that the theory uses. The ontology of a theory is the collection of entities that are existentially quantified over by the propositions of the theory. The best theory is the one with the smallest ideology, ontology, and the most explanatory power. Metaphysics, then, is in the business of determining what sorts of entities are needed by the best theory of the world. If the best theory of world requires, quarks, then they exist. If the best theory of the world requires Cartesian mental substances, then mental substances exist. Any existential claims about things that are not quantified over by the best theory of the world are reduced or eliminated.

One might broadly describe Quineans as "realists" since they believe that our metaphysical and scientific enterprises reveal things about the basic structure of reality. In contrast, one might describe Carnapians as "anti-realists," since they believe that what

counts as existence is specific to each language framework. However, being a Carnappian is not equivalent to being an anti-realist. I will define realism and anti-realism as follows:

Realism $=_{\text{def}}$ the entities described by a certain domain of discourse exist independently of human language, beliefs, conceptual frameworks, and so on.

Anti-Realism $=_{\text{def}}$ the entities described by a certain domain of discourse do not exist independently of human language, beliefs, conceptual frameworks, and so on.

From this definition of anti-realism, it follows that all Carnapians are anti-realists about everything because all existential commitments are language dependent.[7] However, a Quinean is not required to be a realist about everything. For instance, one could be a realist about the entities described by physics and an anti-realist about moral properties.

My project is Quinean in spirit. I will assume that we are able to say true things about the mind-external world. I will also assume that explanatory power and parsimony are the main virtues of a good theory. I will be proposing a theory of material objects that aims to achieve these virtues of explanatory power, ideological parsimony, and ontological parsimony. I will determine the success of my view over competing views by weighing and balancing of the features of my view against features of these competing views. Each view will have its advantages and its disadvantages. The success or failure of a view does not depend on the success or failure of any one feature. In order to determine which view is successful, I will compare the theoretical commitments of a view to the theoretical commitments of competing views.

Not all metaphysicians believe this. For instance, Hirsch argues metaphysics should strive to be charitable to seemingly true claims about the world. If there are two candidate interpretations for a sentence that seems to make a true claim about the world, and one interpretation makes the sentence true while the other makes the sentence false,

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[7] Or perhaps they are agnostic about everything.

then the one that makes the sentence true is correct.[8] For instance, if nihilism is true, then the sentence "There is a lamp on the table" is false. Therefore nihilism should be rejected on the grounds that it is uncharitable.

Hirsch assumes that the principle of charity is so important that nihilism's violation of the principle is enough to reject nihilism. However, nihilism's failure to satisfy Hirsch's principle of charity must be taken in the context of its other advantages and disadvantages. Nihilism incurs a disadvantage for failing to satisfy the principle of charity, but it also has other theoretical advantages as well. I will therefore proceed with the assumption that a view cannot be rejected on the grounds of a single argument.

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[8] See Hirsch 1992, p. 104

Chapter 2: Composition

In chapter 1, I discussed how the contemporary composition debate is framed in terms of providing an answer to the Special Composition Question:

   SCQ: Under what conditions, if any, does composition occur?

In this chapter I will provide an overview of the major answers to the SCQ. I will then argue against views that believe that our intuitions about ordinary objects provide the conditions for composition to occur. After have rejected these views, I will explore my favored answer to the SCQ, mereological nihilism. Finally, I will examine the nature of mereological simples (objects with no proper parts) and whether it is possible for simples to have qualitative variation.

2.1: Answers to the SCQ

As mentioned in Ch. 1, there are three broad answers to the SCQ: composition occurs under any conditions, composition occurs under no conditions, and composition occurs under some conditions. The first answer is knows as universalism, or unrestricted mereological composition. Universalists claim that composition occurs under any conditions. Recall the sorites of decomposition discussed in Chapter 1. The problem with the sorites occurs when the reiteration of modus ponens ceases to yield a true conclusion despite being a valid form of argument. The universalist can resolve this inconsistency by appealing to their unrestricted conditions on composition. Let "Table" refer to the matter that occupies all and only some table-sized region of space. After enough pieces have been removed from Table, it will appear to be destroyed. However, the universalist says that since any conditions are sufficient for composition to occur, then the fact that the parts of the table are scattered around the room is as sufficient of a condition as the condition of the parts being attached. Table is an object when its parts are attached, and Table is an object when its parts are scattered. Therefore, if universalism is true, then the

reiterations of modus ponens in the sorites of decomposition never yields a false conclusion.

However, the universalist's solution to the sorites of decomposition highlights one of the bizarre consequences of the view. It might seem plausible that certain scattered things, such as the parts of computer that is taken apart for repair, still compose an object, the computer. But at the end of the sorites, Table is just sawdust. Intuitively, Table cannot be put back together in the same way the computer can be put back together. Yet the universalist must say that the sawdust Table is identical to the attached Table.

Moreover, the universalists cannot constrain composition to just the scattered parts of a single ordinary object. Any ordinary object, no matter how singular it seems, is part of many other scattered objects. For example, the moon and my appendix compose the *moon-my appendix* object.[9] Since both the moon and my appendix satisfy the condition of being made of matter and any conditions met by objects are sufficient for composition, then universalism requires that they compose the *moon-my appendix* object. The universalist ontology allows for our talk of ordinary objects to be true, but it does so at the expense of admitting counter-intuitive scattered objects into its ontology.

The second answer, nihilism (or eliminativism), is the view that composition never occurs. Nihilists reject the existence of composite objects entirely. The only entities in the nihilist ontology are the fundamental, part-less objects that most of the other ontologies already contain. This ontological commitment entails that almost all of our claims about material objects are false and that our beliefs about the material world are mistaken. Nihilism claims that guitars, trucks, this dissertation, and even the people reading it do not exist. Why would anyone endorse such an extreme claim? First, it can

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[9] Here is the logical formulation of the claim that there exists a *moon-my appendix* object (where '«' is the proper part relation: $\exists x \exists y \exists z (M(x) \wedge A(x) \wedge ((x \ll z) \wedge (y \ll z))$

resolve the sorites of decomposition (as well as other puzzles of composition to be discussed later). Since there are no composite objects, then there are no things with removable parts. Second, unlike universalism, it does not admit counterintuitive entities into its ontology.

The final answer, which I will call *sometimesism*, is a family of views that all share the claim that some collections of objects compose a further object, while others do not. For example, some views claim that wood bits that fill a table-sized region compose a further object, a table, while wood bits scattered about a room do not compose anything. Not all sometimesers views accept the existence of ordinary objects. Van Inwagen proposes that only life forms are composite objects, while Merricks claims that only conscious beings are composite objects.[10] Van Inwagen and Merricks are sometimes referred to as nihilists because they reject the existence of ordinary objects like tables and guitars. While these are technically sometimesers views, since they allow for the existence of *some* composite objects, I will nevertheless restrict the term *sometimesism* to indicate ontologies that contain ordinary objects..

A discussion of some of the underlying theory of classical mereology will help clarify the distinction between the three views. Under classical mereology, the concept of *proper part* is taken as primitive. Classical mereology stipulates that a proper part cannot be the same size as the whole in which the part exists. I will follow Simons and symbolize the proper part relation with '«'.[11] The proposition that x is a proper part of y is formalized as '$x \ll y$'. A part (symbolized as '<') can be defined with the primitive proper part:

Part =$_{\text{def}}$ $x < y$ iff $x \ll y$ or $x = y$

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[10] See Van Inwagen 1990b and Merricks 2001.
[11] See Simons 1987 ch.1 for an overview of mereological concepts and their definitions.

The difference between a proper part and an improper part, then, is that a whole is a part of itself. Objects *overlap* when they have a part in common. The formal definition of overlap:

Overlap $=_{\textbf{def}}$ $(\forall x)(\forall y)(O(x,y) \leftrightarrow (\exists(z)(x < y \wedge x < y))$

It will also be helpful to have a formal statement of a *mereological sum* (or *fusion*):

Mereological Sum $=_{\textbf{def}}$ $(\forall x)(\forall y)(\exists(z)(O(z,x) \vee O(z,y) \supset (\exists(z)MS(z,x,y)))$

Suppose universalism is true. Now, consider a knife made of a blade and a handle. Given universalism, there is an object that is the mereological sum of the blade and the handle because there is an object, the knife, which completely overlaps the blade and handle. Suppose that the term "knife" refers to this sum. Now suppose that the knife blade is snapped off of the knife handle. It may seem that the object is destroyed. However, there is still a sum of the blade and the handle. Furthermore, since "knife" refers to this mereological sum, the object has not been destroyed. The sum remains even though knife's parts no are no longer physically connected. While this is strange, the definition of a mereological sum does not require that the parts of a sum have any relationship to each other than simply existing.[12]

Using these mereological concepts, I can alternatively state the three answers to the SCQ. Universalism claims that any mereological sum is an object, while nihilism claims that no mereological sum is an object. One might describe sometimesism as the view that that some mereological sums are objects while others are not. However, sometimesers need not use mereology to understand composite objects. It is more accurate to say that the sometimeser's ontology contains some of the objects indicated by classical mereology, but not all of them. For example, the sometimeser's ontology must distinguish between the sum of the knife blade and knife handle when they are attached

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[12] Proving this point requires a very lengthy discussion of how classical mereology is formulated. See Simons 1987, ch. 1 for the proof.

to each other, and the sum of the knife blade and the knife handle when they are no longer attached.

Mereological concepts can also be used to define an object with no proper parts, a mereological simple:

Simple $=_{\textbf{def}} \forall(x)(S(x)$ iff $(y)\sim(y \ll x))$

Since nihilists claims that there are no objects except for the simples, they must account for propositions that seem to make existential commitments to composite objects. Nihilists typically accomplish this through the use of a paraphrase strategy that allows apparent existential commitments to composite objects to be restated claims that are existentially committed to only simples. For instance, in the sentence, "There is a kettle on the stove," it seems that one is ontologically committed to a kettle and a stove. The intuitive first-order logic translation of this claim shows this through existential introduction:

    P1. K(a) ^ S(b) ^ On(a,b)
    P2. ∃(x)(K(x) ^ S(b) ^ On(x,b))
    C. ∃(x)∃(y)(K(x) ^ S(y) ^ On(x,y))

Nihilists must eliminate the existential quantification over the singular objects "kettle" and "stove" from this formalization. One way to do this is to analyze the terms 'stove' and 'kettle' as referring to some simples arranged *table--wise* and some simples arranged *kettle-wise*. However, first-order logic does not have the resources to quantify over simples arranged table-wise. Van Inwagen suggests that in order to capture 'table-wise' and 'kettle-wise' plural quantification should be added to first-order logic.[13] With plural quantification, the sentence can be expressed as follows:

    P1. K(a) ^ S(b) ^ On(a,b)
    P2. ∃(xs)(K(xs) ^ S(b) ^ On(xs,b))
    C. ∃(xs)E(ys))(K(xs) ^ S(ys) ^ On(xs,ys))

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[13] See Van Inwagen 1990, pp. 25-32

The names *a* and *b* do not refer to one object each. Instead, the name *a* refers to the simples that are located in the kettle-shaped region and the name *b* refers to the simples that are in the table shaped region. The simples filling these each of these regions appear us as a kettle and a stove. For the purposes of this project, I assume plural quantification to be the best strategy for dealing with everyday language.[14]

Throughout this dissertation I will be defending a nihilist answer to the SCQ. The remainder of this chapter will provide a discussion of and arguments against various sometimeser positions that embody a major preliminary objection to nihilism (as well as universalism): that our everyday experience is incompatible with nihilism. With this preliminary objection out of the way, I will then examine several different types of nihilism, as well as discuss the nature of the simples that populate the nihilist's ontology.

I will not be arguing against universalism; giving it a proper rebuttal is beyond the scope of this project. That being said, I can offer some brief comments about why I find universalism unappealing. The first is a simple incredulous stare; I find it much more plausible that there are no objects at all, with the exception of simples, than that there are bizarre objects like the aforementioned *moon-and-my-appendix*. I will be the first to acknowledge that this a flimsy defense at best given my discussion of philosophical intuitions in the first chapter. After all, the nihilist is often subjected to the incredulous stare as well. However, there are other considerations besides intuitions.

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[14] One might about what it means to be "arranged kettle-wise". I analyze arrangement in terms of regions. To be arranged kettle-wise, then, is for all of the simples in a kettle-shaped region of spacetime to instantiate all of the properties that we take a kettle to have, such as mass, density, color, etc. Tallant 2014 argues that this analysis fails because in order to pick out the kettle-shaped region, we must refer to kettles, and there are no kettles (p. 1518). Tallant also goes on to explore various other analyses of 'arranged *f*-wise' and concludes that they all fail. If he is correct about these other analyses, and if he is also correct about the region analysis, then nihilism is in serious trouble. However, Tallant's objection to the regional analyses is misplaced. There are several ways one could reply to Tallant. One option is to use a counterfactual analysis and claim that a kettle-shaped region is a region of space that could be filled by an extended kettle shaped simple (extended simples will be discussed later in this chapter). Alternatively, one could say that the kettle-shaped region as shorthand for the region that appears to be filled with matter and has such and such dimensions. Neither of these moves involves referring to composite objects that do not exist.

One can appeal to parsimony, the claim that simplicity is a theoretical virtue. When compared to a universalist ontology of simples and composite objects, nihilism has the virtue of qualitative parsimony since nihilism only requires one ontological type while universalism requires two (the universalist's ontology could contain atomless gunk instead of simples; gunk is a material substance that can be infinitely decomposed. I will discuss the problems with gunk in Ch. 5).[15] Nihilism also has the virtue of qualitative parsimony with respect to ideology. A given theory's ideology is the collection of primitive, undefined concepts the theory uses in its explanation of a phenomenon.[16] As previously discussed, universalism requires the primitive concept of 'proper part,' while nihilism does not. Therefore, when compared to universalism, nihilism has the virtue of qualitative parsimony with respect to ideology since nihilism requires fewer undefined primitives.

Universalism also requires the existence of objects that have parts that do not appear to have any physical connection with one another, for example, the aforementioned moon-my-appendix object. One could object that material objects cannot lack physical connection between their parts. For instance, one might argue that it is analytic that material objects are physically connected somehow. However, I will not pursue this line of argument since it requires and in-depth discussion of analyticity. Even if this argument from analyticity fails, there is still something strange about a material

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[15] Following Quine, I will assume that qualitative parsimony is a virtue of a theory and not provide a further defense of the claim. See Quine 1948, 1951 section 6, and 1960, chapter 7, 197. Lewis also claims that qualitative parsimony is a theoretical virtue in Lewis 1973; however, Lewis rejects that quantitative parsimony is a theoretical virtue. Nolan 1997 argues that not only is qualitative parsimony a theoretical virtue, but that quantitative parsimony is a virtue as well. Nolan justifies this claim by discussing the discovery of the neutrino. The spin of electrons in a radioactive atom was observed to decrease by ½ during beta decay. To account for this, physicists posited that the decaying electron emitted a neutrino, a particle with 1/2 spin. Nolan notes that physicists could have instead chosen to posit that the electron emits any number of neutrinos with smaller fractions of spin. For example, the electron could emit four neutrinos that each had a spin of 1/8. Nolan claims that while these hypotheses are empirically adequate, the ½ spin neutrino hypothesis is preferable on grounds of quantitative parsimony.
[16] The term ideology originates from Quine. See Quine 1951a. Quine also discusses the idea of ideology in Quine 1948, 1951b, and 1960.

object that has parts that have no physical connection with one another. While this is only a surface treatment of the debate between universalists and nihilists, I think it provides enough motivation for moving on. In the next section, I will discuss sometimesism.

2.2: Sometimeser Answers to the SCQ

Sometimesers are advocates for ontologies that contain the things that we would intuitively classify as objects. Sometimesers might quantify over things like trees, airplanes, and cellos, but they would not quantify over tree-cellos or airplane-trees. While this sort of view may seem plausible, I will argue that sometimeser views face major obstacles and should be rejected. I will first examine the problem with a sometimeser position that attempts to define composition in terms of restrictive conditions. After I have shown that this approach is not fruitful, I will discuss two further ordinary object views that pursue different strategies. Korman attempts to make an argument that a sometimeser ontology is less problematic than alternatives, while Ned Markosian argues for a view where ordinary objects are taken as primitive. I will show that both of these views face serious difficulties and should be rejected.

2.2.1: Common Sense Answers to the SCQ

At first glance, answering the SCQ might not seem that difficult. Isn't it obvious that objects are just hunks of matter that hang together in a certain way? A defender of this intuition might answer the SCQ as follows:

> **Contact:** To get the *x*'s to compose something, one must, and need only, bring them into contact; if the *x*'s are in contact, they compose something and if they are not in contact, they do not compose something.[17]

There are several reasons for rejecting *Contact*. The first is that *Contact* requires an ontology that is populated by many objects that are counter-intuitive. For instance, *Contact* tells us that a pile of pebbles is a composite object. Most people would believe

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[17] Van Inwagen 1987, p. 26

this to be false. It seems that a pile is not an object; it is just a collection of small, loosely organized objects. Call this objection the *counterintuitive objection*. It may seem that this objection does not count against *Contact*. After all, philosophical theories should be informative and not merely confirm what we already believe to be true. One might think that it is desirable that *Contact* should rule out or include objects that aren't predicted by common sense.

While I am sympathetic with this line of reasoning, it fails to apply here. *Contact* is invoked as a common sense solution, yet it defies common sense in many cases. For instance, I have a pile of garbage in my basement. Each piece of garbage is in Contact with the other pieces. However, common sense does not indicate that the pile is a composite object. If one is proposing a common sense solution to a philosophical problem that relies on appeal to intuitions, then the solution should not yield a variety of counter-intuitive cases. Van Inwagen provides another problem for *Contact*: the case of two people shaking hands. If *Contact* is true, when the hands meet in the shake, a new object that has both people as proper parts is brought into existence. Van Inwagen argues that this simply defies belief; there cannot be composite objects with two human persons as proper parts.[18] Therefore, *Contact* as a common sense answer should be rejected.

One might try to argue for *Contact* on grounds other than common sense (although I find it hard to imagine what these grounds could be). Even if this can be done, *Contact* still faces further objections. Since *Contact* allows for the *ex nihilo* creation and destruction of objects, Van Inwagen argues that the defender of *Contact* will

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[18] See Van Inwagen 1990, pp. 25-6. Although this line of thought runs into problems when considering cases of conjoined twins. This will become relevant while examining *Fusion*. It is worth pointing out that using human persons as part of a counterexample typically makes the status of the counterexample more confusing since we must import our intuitions about not only the problem at hand, but our intuitions about personhood. However, since *Contact* is motivated by intuitions, I believe that this a fair use of human persons as counterexamples since our intuitions about persons are part of our intuitions about material objects.

have to answer difficult questions about identity.[19] Suppose Fred and Ted shake hands, then let go, and finally shake hands again. When they first shake hands, Fred and Ted become proper parts of a new object since they come into *Contact*, call this new object Fred-Ted$_1$. When Fred-Ted$_1$ releases the handshake, the object Fred-Ted$_1$ ceases to exist. What happens when Fred and Ted shake hands a second time? *Contact* demands that a new object comes into existence. This object, call it Fred-Ted$_2$, seems a lot like Fred-Ted$_1$. Now it must be decided if Fred-Ted$_1$ is identical to Fred-Ted$_2$. Van Inwagen says that it is hard to imagine how one could even go about deciding this question.[20] Therefore, any proponent of *Contact* has their work cut out for them. Van Inwagen admits these arguments are not a solid defeat of *Contact,* but they provide enough of a reason to pursue other types of answers to the SCQ.

I think that Van Inwagen might have stronger reasons to resist *Contact* than he realizes. The main problem with *Contact,* independent of the issues of common sense, is that it makes the creation and destruction of objects too easy. It seems possible that some godlike entities might have the power to create things *ex nihilo* and annihilate them as well, but it seems that we do not have this power. However, *Contact* gives us the ability to create and destroy some objects *ex nihilo*. We can create and destroy objects by simply shaking hands, or pushing and pulling apart stones. However, it just seems false that we can do such things. After all, the furniture of the universe seems to remain unaffected; the amount of matter and energy remains constant no matter how much hand shaking we do.[21] This yields the simple reductio:

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[19] Ibid, p. 36

[20] This problem is really only a problem for the endurantist, since they must decide whether it is possible for an object to momentarily cease to exist or to have a gap in its timeline. The perdurantist has an easy solution: Fred-Ted$_1$ and Fred-Ted$_2$ are proper temporal parts of some temporally and spatially extended object and therefore are not identical. Perdurantism and Endurantism will be discussed in ch. 3.

[21] One might argue that if eternalism is true (the view that all moments of time have the same existential status; this will be discussed in ch. 3), then we cannot truly "create" anything, since

P1. If *Contact* is true, then we can create and destroy objects *ex nihilo*.
P2. We cannot create or destroy objects *ex nihilo*.
C1. Therefore, *Contact* is false.

Call this the *ex nihilo* objection. I have already argued for P1, but what can be said in defense of P2? Well, we cannot create or destroy *ex nihilo* in the conventional sense. I cannot bring it about that a briefcase full of money appears before me, or that a bothersome student ceases to exist (no matter how much I want either of these things to happen). Since we do not have *ex nihilo* power over ordinary objects, there would have to be another ontological type of object that we do have the power to create and destroy: the strange objects formed by *Contact* like Fred-Ted. However, *Contact* does not make any differentiation between things like Fred and things like Fred-Ted. Stipulating this ontological distinction seems *ad hoc* and it makes for a theory with an ontological commitment to another primitive entity. Therefore, parsimony suggests that *Contact* should be rejected unless it can justify the differing metaphysical status of Fred-Ted type objects without *ad hoc* justification. With the truth of P2 secured, the argument is sound and *Contact* can therefore be rejected not only by appealing to intuitions, but also by support from theoretical parsimony.

When met with these objections, the defender of *Contact* may simply try to switch to a bonding-style SCQ answer that is similar to *Contact* but can hopefully avoid *Contact's* counterexamples while still capturing our intuitions about objects. However, these sorts of answers is susceptible to the counterintuitive objection and the *ex nihilo* objection. As a sample, consider the following two answers that are candidates for replacing *Contact*:[22]

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nothing ever comes into or out of existence. However, we are certainly causally responsible for the existence of these objects in the counterfactual sense that if hadn't shaken hands, for example, than no objects like Fred-Ted would exist. I believe that this is enough to motivate the *ex nihilo* objection.

[22] Van Inwagen also discusses *cohesion* (p. 56). There are probably other concepts of this type that could be analyzed, but they all would share similar problems.

Fastening: To get the x's to compose something, one must, and need only, cause them to be fastened to one another.[23]

Fusion: To get the *x*'s to compose something one need only cause them to fuse.[24]

Van Inwagen uses the handshake counterexample to reject both *Fastening* and *Fusion*. While *Fastening* and *Fusion* keep things like piles of pebbles from counting as objects, they still let in too many things to their ontologies that are intuitively not objects. As a counterexample to Fastening, he supposes that Fred and Ted are briefly paralyzed during their shake. Under *Fastening*, the paralysis of the Fred and Ted causes a new object to form *ex nihilo*, Fred-Ted. Therefore, *Fastening* is susceptible to the counterintuitive objection and *ex nihilo* objection for the same reasons as *Contact*.

As a counterexample to fusion, Van Inwagen imagines that Fred and Ted each have a hand cut off by a mad surgeon who then grafts Fred and Ted together; this makes Fred and Ted artificially conjoined twins and also the object Fred-Ted. The fusion case bears further examination; how does it fare against the counterintuitive objection? Van Inwagen argues that the existence of these artificially conjoined twins is implausible. While Van Inwagen is entitled to his own intuitions, I find *fusion* much more plausible than *Contact* or *Fastening*. First, it seems plausible to judge naturally conjoined twins as one object.[25] Even if one does not find this plausible, changing the subjects of the example from human beings to inanimate objects may greatly reduce how implausible the case seems. Take any two material objects that you wish, a spoon and a plate for

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[23] ibid., p. 56. Van Inwagen says that *Fastening* can be thought of as follows: "Suppose that two objects are in contact and suppose that they are so arranged that, among all the many sequences in which forces of arbitrary directions and magnitudes might be applied to either one or both of them, *at most only a few* would be capable of separating them without breaking or permanently deforming or otherwise damaging either of them."

[24] ibid., p. 58

[25] This, of course, is different than the judgment that they are one *person*. This is where Van Inwagen gets into trouble with using human persons. Also, I don't personally find it plausible to judge the conjoined twins as one object since my commitment to nihilism rejects the existence of composite object.

example, and fuse them together so that it is indeterminate where the spoon begins and the plate ends. It seems plausible to judge this as a composite object.

One might even argue that the problem with the previous answers *Contact* and *Fastening* is that they lacked the strength necessary to force two objects into a new composite object. One might resist the counterintuitive objection, then, by arguing that the supposed counterexamples to *fusion* are no longer counterintuitive enough to be in tension with common sense. However, *fusion* is still susceptible to the *ex nihilo* objection, since *fusion* allows for the same problematic *ex nihilo* creation and destruction of objects found in *Contact* and *Fastening*. Give the implausibility that we possess the power to create and destroy ex nihilo, *fusion* is just as problematic as *Fastening* and *Contact*.

Each of the previously discussed answers involves only one type of relation that analyzes composition. However, Van Inwagen discusses an alternative strategy to these single relation answers. This strategy involves, instead, answers that instead involve multiple relations in their analysis of composition. Van Inwagen calls these "series-style answers" and formulates them as follows:

> **Series**: ($\exists y$ the *xs* compose *y*) if and only if the *xs* are F_1 and stand in R_1, or the *xs* are F_2 and stand in R_2, or..., or the *xs* are F_n and stand in R_n.[26]

In order to explain exactly how the series-style answer works, it will be helpful to consider an example. Consider a simple possible world in which there are three kinds of entities: particles, atoms, and molecules (the molecules are not proper parts of anything, i.e. they compose no further objects). A series-style answer would involve two different composition relations: the *A* relation that makes particles compose atoms, and the *M* relation makes atoms compose molecules. For some molecule *m*, it will be composed of

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[26] Van Inwagen 1990b, *p.* 63. He uses the "*xs*" as a plural variable that stands in for plural referring expressions such as "Sam and Amy," "the band," "the members of Congress". These plural variables are quantified over in the same way as singular variables.

some *a's* (atoms) and this instance of composition obtains by the *M* relation. As for the atoms, each will be composed of *p's*. The *p's* will stand in the *A* relation to some atom *a*.

Van Inwagen thinks that this kind of answer is attractive since it allows for the construction of a series that could undermine his counterexamples involving the hand shakers. In this series-style answer, non-living objects that are in the fusion relation compose a further object, but people (such as the hand shakers who have become artificial conjoined twins) that are in the fusion relation do not, since the fusion relation only brings about composition with non-living things.

However, there is a problem with series-style answers. The first problem is that they suffer from circularity. Consider an answer to the SCQ in our simple world:

> **Series$_t$**: ($\exists y$ the *xs* compose *y*) if and only if the *xs* are particles and are maximally *P*-bonded or if the *xs* are atoms and are maximally *A*-bonded (or there is only one of the *xs*).[27]

Van Inwagen points out that atom can only mean "something composed of particles," and that particle can only mean "something with no proper parts." Remember that any answer to the SCQ must not use any mereological concepts in its analysis in order to remain informative. Therefore, Series$_w$ is not an answer to the SCQ.[28]

The second problem with series-style answers is that they violate one of the two basic axioms of classical mereology: the transitivity of parthood.

> **Transitivity of Parthood**: If *a* is a proper part of *b*, and *b* is a proper part of *c*, then *a* is a proper part of *c*.[29]

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[27] Ibid., p. 64

[28] Van Inwagen considers the possibility that in w, it is impossible for particles to be *A* bonded and for atoms to be *M* bonded. Then one could reformulate Series$_w$ as: ($\exists y$ the xs compose y) if and only if the xs are maximally *M* bonded or if the xs are maximally *A* bonded (or there is only one of the xs) (199b, p. 64). He points out that this fails as well, since it collapses into ($\exists y$ the xs compose y) if and only if the xs are maximally bonded. This is not a series-style answer, but a single predicate answer and subject to the same difficulties as other single predicate answers.

[29] See Simons 1987, p. 26. Here is the Transitivity of Parthood formally stated: $\forall(x)\forall(y)\forall(z)((x \ll y \wedge y \ll z) \supset (x \ll z))$.

In our simple world w, for any molecule m, m will be composed of some a's that are atoms by the M bond. These a's will be in turn be composed of the ps through the A bond. Therefore, the p's are proper parts of their respective a's, that the a's are proper parts of m. By the transitivity of parthood, it follows that the p's are proper parts of m. By Series$_w$ this is impossible; there is no relation that allows particles to compose a molecule.

In this section, I have presented arguments against the answers *Contact*, *Fastening*, and *Fusion* as well as series-style bonding answers. In the next section, I will discuss two sometimeser answers to the SCQ that are more philosophically robust. I will then argue that these answers fail to provide a convincing answer to the SCQ as well.

2.2.1: Korman's Sometimesism

In "Strange Kinds, Familiar Kinds, and the Charge of Arbitrariness," Korman advocates a particularist ontology of ordinary objects that contains all and only the things that we intuitively believe to be objects as objects. Korman explains particularism as the methodological position that "the view that our intuitive judgments about cases in [a] domain are largely correct and that, when intuitive judgments about cases conflict with compelling general principles, the cases should in general be treated as counterexamples to those principles."[30] Korman's sometimesist ontology of material objects relies on the particularist approach.

In contrast, generalism (or non-particularism), is the view that general philosophical principles concerning a given philosophical domain trump our pre-philosophical intuitions about that domain. Furthermore, in cases of conflict between the two, general principles are counterexamples to intuitions. Of course, few philosophers (if any) are strict particularists or strict generalists. These are not two diametrically opposed positions, but can instead be thought of as a continuum. This continuum allows for a

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[30] Korman 2010b, p. 121

middle-of-the-road position where one considers pre-philosophical intuitions about cases and philosophical general principles to be equally important.

One could take a strong methodological stance on the generalist/particularist debate by arguing that one must consistently apply particularism, generalism, or something in between to all philosophical inquiry. One could also take a weaker stance and advocate particularism concerning one domain and generalism concerning another. For example, a philosopher could advocate a particularist approach to epistemology while maintaining a generalist approach to ethics. As an epistemologist, one begins with common-sense intuitions about epistemological cases and attempt to develop a view that can support these intuitions while violating as few of these intuitions as possible.[31] As an ethicist, one could advocate a general ethical principle, such as the utilitarian principle of the greatest good for the greatest number, and attempt to use this principle to undercut conflicting intuitions when they arise. It certainly seems that there is no inconsistency in holding each of these views.

Out of the three methodological approaches just discussed, this generalist approach to the metaphysics of material objects is by far the most popular in the literature. Both nihilism and universalism are examples of the generalist approach. The popularity of the generalist approach is due to what Korman identifies as two types of arguments: rebutting arguments and undercutting arguments. Rebutting arguments "are

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[31] See Hirsch 2002, p. 104. Hirsch believes that the particularist approach described here should be sufficient for the truth of particularism. But since these common sense considerations are not usually enough to convince generalists, he also presents a linguistic argument from the principle of charity. Briefly, Hirsch argues that if there are two candidate interpretations for an utterance, and one interpretation makes the utterance true while the other makes the utterance false, then the one that makes the utterance true is correct. For instance, if nihilism is true, then the utterance "There is a lamp on the table" is false. Therefore nihilism should be rejected. The strength of this argument comes from Hirsch's assumption that the principle of charity is so important that it is not up for negotiation. However, I believe that there are no principles that are not up for negotiation, and therefore believe the principle of charity must be weighed against every other consideration involved. For my part, I believe that the principle of charity is a good one if it is understood to be a cetaris paribus principle. However, in many philosophical situations there are generalist arguments that can override the cetaris paribus principle of charity.

arguments for conclusions that directly contradict some specific range of intuitive judgments about cases," and cites the argument from vagueness and the causal over determination argument as examples.[32] Korman does not attempt to refute any rebutting arguments.[33] He makes the claim that "every philosophical domain has its share of powerful rebutting arguments, yet it is only in material-object metaphysics that such arguments do not typically inspire a Moorean confidence that at least one of the principles that drives the argument must be false."[34] Korman claims that the lack of Moorean responses in this debate can be attributed to the undercutting arguments, arguments that attempt to show that "our intuitive judgments about cases are (probably) unreliable, but that do not purport to demonstrate the falsity of any specific range of intuitive judgments. [35] These undercutting arguments are designed to make the particularist ontology seem implausible. However, Korman believes that defeating the various undercutting arguments may restore some plausibility to the particularist ontology. Korman's general strategy for defending a particularist ontology, then, is as follows: (1) defeat any undercutting arguments, and (2) take a Moorean stance on any rebutting arguments that cannot be argued against.

Korman does not attempt to provide arguments against all the undercutting arguments, but he does provide arguments against a class of undercutting argument, what he calls the argument from arbitrariness:

P1. There is no ontologically significant difference between Ks and K's.
P2. If there is no ontologically significant difference between Ks and K's, then it is objectionably arbitrary to countenance things of kind K but not things of K'
C. So it is objectionably arbitrary to countenance things of kind K but not things of kind K'.[36]

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[32] Korman 121. For examples of the rebutting arguments See Lewis and Sider on the argument from vagueness, and Merricks on the causal over determination argument.
[33] However, he does offer possible ways to resist the argument from vagueness in Korman 2010a.
[34] Ibid., p. 121
[35] Ibid., p. 121
[36] Ibid., p. 124

These sorts of arguments attempt to show that there is no good reason to include some normal everyday object in our ontology while at the same time excluding bizarre objects. In other words, normal kinds and strange kinds stand or fall together: either they both exist, or neither of them exists.

What, then, are some of these counterexamples that support the conclusion that normal kinds and strange kinds stand or fall together? John Hawthorne provides one example. Incars are exactly like normal cars, except that the parts of the incar cease to exist as they cross the threshold of the garage.[37] To an observer not familiar with incars, an incar leaving a garage looks just like a car pulling out of a garage and into a driveway. However, as soon as the incar reaches the garage threshold, it begins to disappear and an outcar grows into existence at the same rate as the shrinking incar on the other side of the threshold. When an outcar pulls into a garage, the process occurs in reverse.

Hawthorne goes on to argue that islands are like incars, because the rising and lowering of the water surrounding the island functions like the garage threshold in the incar example. As the water surrounding the island moves up to cover it, the island shrinks in size until it no longer exists. As the water recedes, the island comes back into existence and grows in size. Since there is no ontologically significant difference between islands and incars, and since P2 is true, then the conclusion follows: both islands and incars are objectionably arbitrary. Presumably, this example could be generalized to other objects as well.

How can Korman defeat this incar version of the argument from arbitrariness? He could attempt to argue against P2. However, this entails a commitment to what Korman calls "deflationary particularism."[38] The deflationary particularist will argue that

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[37] Hawthorne 2006
[38] ibid.

quantification is relative to a conceptual or linguistic scheme.[39] If this is true, then P2 is false; while it is true that there is no ontologically significant difference between islands and incars, it is false that quantifying over islands but not incars is objectionably arbitrary. This is because the deflationary particularist believes that linguistic or conceptual schemes are inherently pragmatic in what they quantify over. We could have chosen a scheme where quantifying over incars and islands is the norm, or quantifying over incars and not islands is the norm. Instead, our scheme quantifies over islands, but not incars.

Korman, however, wants to defend a robust particularist ontology, an ontology that is not committed to these deflationary views about quantification. He attacks P3 by arguing that there is an ontologically significant difference between islands and incars: islands continue to exist when they go underwater, while incars do not continue to exist when they attempt to leave the garage. One might object that anything completely submerged cannot be an island. After all, underwater mountain peaks should not count as islands. Korman points out that this misses the mark; all the objector claims is that islands cease to be islands when they are submerged, not that they cease to exist. Islands and incars are ontologically different because the former continues to exist when submerged while the latter does not continue to exist as it leaves the garage.

The islands/incars example is just one of several that Korman provides. He attempts to show that there are ontologically significant differences between the objects presented by a variety of undercutting arguments, and that revealing each case's difference requires a novel argument. If one wanted to resist Korman's argument, then one must argue against Korman case by case. Korman claims that islands cease to be islands when they are submerged, but that they do not cease to exist. In order to refute

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[39] See Carnap 1956 and Hirsch 2002a and Hirsch 2002b for a defense of deflationary metaphysics.

Korman's argument against Hawthorne's undercutting argument, Korman's ontological commitments need clarification. It seems that Korman is committed to some x that is an island before t and to some y that is an underwater mountain peak after t, and x-before-t = y-after-t. Since Korman is committed to something that changes from an island to an underwater mountain peak, he does not believe *island* or *underwater mountain peak* to be essential properties (if he believes in essential properties at all).

Korman is not clear about how to treat the ontological commitments of island and underwater mountain peak; he simply says islands do not cease to exist when submerged. If Korman's claims are understood as simple existential commitments, then they amount to a contradiction. Islands and underwater mountains exist, and they appear to be identical hunks of matter. However, since islands are not underwater mountains a contradiction follows.

Earlier in his paper, Korman discusses the concepts of phased kinds and individuative kinds. While Korman does not use these concepts to analyze the island/underwater mountain problem, he might be able to use these concepts to resolve the contradiction above. Korman defines phased kind and individuated kind as follows:

> Phased kinds are kinds whose instances can cease to belong to that kind without ceasing to exist. Individuative kinds are kinds whose instances cannot cease to belong without ceasing to exist: they are of that kind as a matter of de re necessity.[40]

Islands, then, must be phased kinds since the matter of the island does not cease to exist when it becomes submerged. Therefore, the ontological difference between incars and islands is that islands are phased kinds while incars are individuated kinds. This difference allows Korman to undercut Hawthorne's argument from arbitrariness.

However, it is questionable whether the island is a phased kind in the first place. While Korman distinguishes between phased kinds and individuative kinds, he does not

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[40] Korman 2010, p. 127

provide any criteria for classifying a thing as one or the other. What reason is there for thinking that an island is a phased kind? Korman's claim that the island is an instance of a phased kind because it does not go out of existence when it is no longer an instance of that kind is only supported by the claim that islands do not go out of existence when submerged. Simply asserting that this is true is not enough to show that islands are significant different from incars.

Furthermore, even if one grants that phased kinds exist, they do not solve the incar problem. Presumably, Korman's view includes things like islands in its ontology. But the fact remains that when an island is submerged, it is no longer an island. Korman wants to have it both ways; islands exist, and they continue to exist when submerged, but they are also no longer islands when submerged. In response, Korman could argue that calling the thing an island is a mistake. Even though I was once a teenager, it does not mean that I am a teenager now. Similarly, the rock may be an island at one time, but it does not always have to be an island. However, this analogy is suspect. When I was a teenager, the composition of my body was different. With the passage of time, my body grew and changed. However, in the case of the island, the island itself does not change. Instead, the environment around the island changes. In other words, nothing about the island *intrinsically* changes. Therefore, islands are not phased kinds since they show none of the transitory nature of phased kinds.

When dealing with the puzzle of the island, instead of an analysis that requires the existence of phased kinds, islands, underwater mountain peaks, and matter that fills the spatial region of the island (and the underwater mountain peak), it would be much simpler to claim that there is only matter that occupies the spatial region of the thing we call 'island' and 'underwater mountain peak'. Both the nihilist and universalist have no need for metaphysically committing phased kinds. The nihilist simply claims there are no islands (or incars for that matter), while the universalist can quantify over both

islands and incars. Therefore, the phased kinds required by particularism about ordinary objects are a theoretical cost.

The arguments of the particularist and generalist both suffer from the same problem: they fail to provide argument for justifying a generalist or particularist approach in the first place. The generalists have typically appealed to rebutting arguments as evidence for their radical ontologies. Rebutting arguments are generally *a priori* and do not simply undermine one's confidence in a claim, but instead show that to show that the claim leads to contradiction. The sorites paradox and the argument from vagueness are two examples of undercutting arguments. In contrast, particularists justify their rejection of radical ontologies by arguing that we have a great deal of knowledge about material objects already

This debate is analogous to the problem of skepticism. Philosophers that take skepticism seriously are moved by rebutting arguments that undermine the possibility of having knowledge, while anti-skeptics reject the skeptical conclusions by arguing that we know that we have a great deal of knowledge about the external world. The general form of the skeptical argument is as follows, where P is any proposition about the external world, and S is a skeptical hypothesis: [41]

P1. I don't know that *not-S*.
P2. If I don't know that *not-S*, then I don't know that *not-P*.
C1. Therefore, I don't know that *not-P*.

While there are many different ways that anti-skeptical philosophers have argued against skepticism, one of the most famous arguments against skepticism is the Moorean argument. Moore argued that if one is given a set of believable propositions that entail an unbelievable conclusion, then one is warranted in rejecting the conclusion if the negation of the conclusion is much more believable than the initial set of propositions

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[41] Examples of skeptical hypotheses include: Descartes' evil demon, brains-in-a-vat, five-minute-old earth, everyone but you is a robot, etc.

combined.[42] The anti-skeptics, then, finds P1 and P2 of the skeptical argument plausible, but not more plausible that the proposition 'I know that *P*'; they argue as follows:

P1′. I know that *P*.
P2′. If I know that *P*, then I know that *not-S*.
C′. Therefore, I know that *not-S*.

The anti-skeptic believes that while the premises of the skeptical argument are plausible, there must be something wrong with at least one of the premises. So the debate between the skeptic and the anti-skeptic comes down to whether the skeptical argument's premises are more or less plausible than the Moorean argument's premises. This is where the dialectic breaks down; either you find the skeptical premises gripping and have serious doubts about epistemology or you do not.

The debate between the particularist and generalist over the metaphysics of ordinary objects makes similar dialectical moves as the debate between the skeptic and anti-skeptic. The generalist uses the following argument:

P1. The rebutting arguments are sound.
P2. If the rebutting arguments are sound, then particularism about the metaphysics of material objects is false.
C. Therefore, particularism about the metaphysics of material objects is false.

The generalist is a defender of rebutting arguments, and accepts P1. Rebutting arguments like the argument from vagueness or the causal over determination argument show that particularist ontologies entail contradictions and should be rejected, hence P2. The generalist argument functions in the same way as the skeptical argument; it begins with philosophical arguments as motivation and proceeds to a counter-intuitive conclusion. The particularist argues as follows:

P1′. Everyday objects exist and strange objects do not exist.
P2′. Since everyday objects exist and strange objects do not exist, then particularism about the metaphysics of material objects is true.

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[42] Moore 1959, 247. See DeRose and Warfield 1999, 5 for this interpretation of Moore. Lycan 2001 presents Moore in a similar manner.

C′. Therefore, particularism about the metaphysics of material objects is true.

The particularist relies on what we intuitively believe to be true about material objects; before philosophical investigation, we all believe that there are tables and chairs and that there are not bizarre kinds. The particularist argument is a Moorean argument; it begins by making the Moorean rejection of the generalist argument's conclusion, and proceeds to confirm the intuitive philosophical view.

Skeptics and Mooreans, then, are at a philosophical standoff; each group finds their premises more believable than their opponent's conclusion. Since the skeptic/anti-skeptic debate is not tractable, one might worry that the generalist/particularist debate about the metaphysics of material objects is equally not tractable. While I do not find the particularists premises gripping with respect to ordinary objects, would be nice to have better reasons to reject particularism.

Earlier, I mentioned that one could argue for the use of particularism or generalism as an approach to philosophy as a whole, or one could argue that the particularism/generalism debate must be settled for each domain of philosophical inquiry. While one could take a strong generalist or particularist stance towards philosophy as a whole, I can think of no good reason to do so. Perhaps one has strong convictions that the universe must be governed by general principles or that no such general principles exist; I do not know of any good arguments that support either of these claims.

However, if the latter approach is the correct one, then there must be some feature of a given philosophical domain (or lack of) that can be used to argue for a particularist or generalist approach. I will argue that whether a domain should be approached through particularism or generalism corresponds to how mind dependent one believes the domain to be. For example, moral realists tend to endorse a generalist approach to moral philosophy since they believe that the existence of moral properties is

not dependent on human beings; in other words, moral properties are not mind dependent. Moral anti-realists, such as normative ethicists, endorse a particularist approach to moral philosophy since they believe that moral properties are socially constructed systems of norms.

Why are each of these positions justified in their approach? Each of these positions begins moral inquiry by first examining our moral intuitions and then developing general principles from these intuitions. Once these principles are established, counterexamples will inevitably be put forward. For example, it might seem that a society holds the moral norm that murder is wrong. However, that same society might also believe that the murder of extreme moral degenerates, such as pedophiles or mass murderers, is morally justified. The normative ethicist is under considerable pressure to revise their general principle that murder is wrong (or reject it all together) because ethical systems are grounded by the moral beliefs of the individuals that make up a society. Each counterexample to a general principle of some normative system possibly shows that the normative ethicist's analysis of a normative system is incorrect. If a society has seemingly immoral beliefs or contradictory moral norms, then the system must be revised to resolve the perceived inconsistency.

In contrast, the moral realist is not under as much pressure to revise their principles if they have good evidence for those general principles. Counterexamples to general moral principles generally attempt to show that if some general moral principle is true, then some clearly immoral act is permitted by the general moral principle. But, a moral realist, for example, could simply claim that a society's belief that some murders are morally justified is flat out wrong. The moral realist can do this because the moral properties independently exist outside of human beings. Since these properties are independent, there is no good reason to think that what we believe to be moral must correspond with what is actually moral; there is the possibility for real moral error.

Therefore, one's stance on the moral realism/anti-realism debate influences one's stance on the generalism/particularism approach to moral philosophy. This same distinction applies to other fields as well. Contemporary epistemology embraces the mind dependence of their inquiry; the standards of knowledge are not mind independent. As a consequence, epistemology is almost universally approached through a particularist methodology.

Metaphysics in general, and the metaphysics of material objects in particular, has its share of realist and anti-realist approaches. The anti-realists are the deflationary accounts of metaphysics advanced earlier and stem from the Carnapian methodological tradition. So whether one should be a particularist or generalist about the metaphysics of material objects has to do with whether one takes an anti-realist or realist approach to metaphysics. This may seem like pushing the bump in the carpet from one location to another. It would be, too, if this argument were used against particularist metaphysics in general. However, remember that Korman emphasizes his rejection of the deflationary approaches to the metaphysics of material objects. This means that Korman and his generalist opponents are on the same realist side of the coin. In order to strengthen his case for particularism, Korman would need to be an anti-realist. However, since he is placing himself in the realist camp, he is under the same pressure faced by realists about metaphysics to endorse generalism.

If one believes that there are mind independent facts about the metaphysics of material objects, then one should believe that there is a good chance that human beings everyday intuitions get those facts wrong. Perhaps the world conforms to what we believe, and perhaps it does not. The purpose of the generalist's rebutting arguments is to show that the latter is the case and that these arguments cannot be ignored with a Moorean inspired move. This move would be plausible for an anti-realist deflationary account of metaphysics, but it is not advisable for any realist account. Therefore, even

though Korman may be able to diffuse the undercutting arguments, he cannot make the Moorean move to overcome the rebutting arguments and his view remains susceptible to them.

2.2.2: Brutal Composition

The final sometimeser answer to the SCQ that I will discuss is Ned Markosian's Brutal Composition. Rather than appealing to our intuitions about composition or attempting to find a specific relation that governs composition, Markosian argues that there is no answer to the SCQ. However, Markosian holds that our common sense intuitions about ordinary objects are largely correct; tables, chairs, and people exist and are composed of parts. This view rests on two claims, Brutal Composition (BC) and the Brutality of Compositional Facts (BCF):

> **BC:** There is no true, non-trivial, and finitely long answer to the SCQ.

> **BCF:** For any *xs*, if there is an object composed of the *xs*, then it is a brute fact that there is an object composed of the *xs*.[43]

These two claims do not entail a common-sense ontology of ordinary objects. This ontology would require the additional assumption that there are genuine composite objects, and our common sense objects are among them. Notice that BC does not rule out infinitely long answers to the SCQ. If BC did not have this stipulation, then one could answer the SCQ by simply listing off every possible case of composition. Markosian does not consider this a legitimate answer, presumably because it is *ad hoc*, uninformative and impractical.

BC and BCF complement each other. If facts about composition are brute, then there is no answer to the SCQ. Any attempt to answer the SCQ would result in an infinite list of all these brute facts, and this provides no real insight into why certain aggregations of matter are objects while others are not. Therefore, BCF entails BC. However, BC does

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[43] Markosian 1998, p.214-5

not entail BCF. As McDaniel points out, one could hold a brutal view like BC and maintain that there are still informative sufficient conditions about when composition occurs; perhaps something like *fusion* would count as one of these sufficient conditions.[44] If there are informative sufficient conditions about composition, then not all of the facts about composition are brutal. However, BC makes BCF plausible at the very least, since BCF offers a uniform explanation for the lack of necessary and sufficient conditions about composition.

One might worry that if facts about composition are brute, then they must float free from the other facts of a world. Markosian is quick to reject this idea; he holds that the brutal compositional facts of a world globally supervene on the non-mereological facts of a world. Therefore, Markosian's view is the following four claims: BC is true, BCF is true, composition globally supervenes, and there are composite objects. From here on out, I will refer to Markosian's view as "Brutal Composition" and refer to the thesis that the SCQ has no finite, non-trivial answer as "BC." Markosian notes that his view is similar to certain kinds of views about normative properties. He says, "it is natural to think that the following claims about goodness could all be true: (i) there is no true, non-trivial, and finitely long sentence of the form 'x is good iff,' (ii) facts about goodness are all brute facts; and (iii) the set goodness supervenes globally on some set of non-axiological universals."[45] Notice that these three claims are just BC, BCF, and global supervenience re-tooled for use with goodness instead of composition.[46] Markosian thinks that if these three claims about goodness can plausibly be held together, then so can brutal composition's three similar claims. These three claims about goodness outline moral anti-reductionist position popularized by Moore. Moore held that goodness was a

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[44] McDaniel 2007, p. 236

[45] Markosian 1998, p. 216. He also makes this same point about beauty by replacing all instances of "good" and "goodness" with "beauty" and "beautiful".

[46] Historically, this view of goodness preceded Markosian's view.

non-natural property. He also held that goodness globally supervened on the natural properties, but that goodness was not reducible to the natural properties. Moral anti-reductionism meets (i) because goodness can only be analyzed in terms of goodness or as an infinitely conjunctive sentence listing all the things that have the property goodness. When (i) is combined with (iii), they entail an anti-reductionist thesis; if goodness supervenes globally and there is no informative set of necessary and sufficient conditions for goodness, then goodness must be irreducible. Since Markosian already draws the analogy between Brutal Composition and moral anti-reductionism (although he doesn't name it as such), then one can think of Brutal Composition as an anti-reductionist view about the metaphysics of material objects; this means that the compositional facts do not reduce to the non-compositional facts.[47] While Markosian invokes the similarity between moral anti-reductionism and his Brutal Composition as a subtle argument for Brutal Composition, I will argue that he instead makes his view susceptible to a powerful objection made against moral anti-reductionism.

J.L Mackie and Simon Blackburn originally made this objection against Moorean style moral anti-reductionism.[48] As noted earlier, moral anti-reductionism requires a supervenience thesis:

Normative Supervenience (NS): Two entire possible worlds cannot differ in their normative properties without also differing either (a) in their non-normative properties or (b) in their descriptive properties.[49]

Without NS, the moral anti-reductionist would be committed to the possibility of a world w that exactly resembles the actual world with respect to non-normative (or descriptive)

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[47] Moral anti-reductionism is also sometimes called "moral non-naturalism" since its defenders have not only argues that moral properties are irreducible, but that they are non-natural as well. However, the debate between naturalists and non-naturalists usually is about the possibility (or impossibility) of reduction, so moral anti-reductionism is a good catch all term.

[48] See Mackie 1977, Blackburn 1984, 1988.

[49] See Ridge 2007. The disjunct (b) is included since some philosophers deny the normative/non-normative distinction.

properties, but does not resemble the actual world with respect to normative (or non-descriptive) properties. For example, denying NS entails that there is a world where the events of the Holocaust are morally acceptable (or even praiseworthy), even though the events unfolded exactly as they did in the actual world: the same number of people were killed, the same amount of torture was employed, the same amount of emotional suffering resulted, and so on. Since admitting this possibility is tantamount to rejecting the possibility of objective ethical claims, then the anti-reductionist must commit to NS.

However, holding NS is problematic for the familiar Humean reason that there are no necessary connections between distinct existences. The moral anti-reductionist holds that both normative properties and non-normative properties are distinct existences, while at the same time claiming that normative properties necessarily supervene on non-normative properties. This results in a contradiction:

P1. Suppose moral anti-reductionism is true.
P2. Therefore, NS is true and it entails a necessary connection between normative properties and non-normative properties.
P3. However, normative properties and non-normative properties are distinct existences.
P4. There are no necessary connections between distinct existences.
C. Therefore moral anti-reductionism is false.

Like the moral anti-reductionist, Markosian also requires a global supervenience thesis; since Markosian is committed to BCF, his supervenience thesis should be formulated in terms of facts rather than properties:

Compositional Supervenience (CS): Two entire possible worlds cannot differ in their compositional facts without also differing either (a) in their non-compositional facts.

Given the similarity between Markosian's view and moral anti-reductionism, an argument of the same form can be made against Brutal Composition:

P1′. Suppose Brutal Composition is true.
P2′. Therefore, CS is true and it entails a necessary connection between compositional facts and non-compositional facts.

P3′. However, compositional facts and non-compositional facts are distinct existences.
P4′. There are no necessary connections between distinct existences.
C′. Therefore Brutal Composition is false.

One might object to this argument in several ways. The most obvious is to simply deny P3′ and reject the Humean intuitions supporting it. For myself, I find the Humean intuitions incredibly plausible, and do not have anything to say in defense of them. However, even if the Humean principle invoked here is false, the burden of proof still remains on the defenders of Brutal Composition to explain why these necessary conditions exists. Without an explanation of the necessary connection, Brutal Composition lacks the explanatory power of competing views such as nihilism or universalism. The nihilist simply denies the existence of compositional facts, while the universalist can provide plausible arguments (such as the argument from vagueness) for the necessary connection between compositional facts and non-compositional facts.

The defenders of Brutal Composition could attempt to give such an explanation, and I will discuss this strategy in a moment. However, before I do this, there is another strategy that the defenders of Brutal Composition could borrow from the moral anti-realists. They could claim that the argument against Brutal Composition proves too much; the Humean principle employed in the argument rules out the possibility of any supervenient properties (or facts) that are not reducible to the base level properties (or facts). If there are no necessary connections between distinct existences, then the only necessary connections that are possible are ones between existences that are not distinct. Therefore, the mental cannot supervene on the physical without being identical to it, or the normative cannot supervene on the non-normative without being identical to it. By rejecting supervenience in the case of composition, the opponent of Brutal Composition throws out the baby with the bathwater.

Of course, the opponent of Brutal Composition could maintain that this is correct; there are no supervenient properties that do not reduce to the base properties. While I am sympathetic with this position, I do not have the space to argue for it here. Instead, I will argue that with respect to composition, the claim that there can be supervenience without reduction is implausible. In order to understand why CS is implausible, it will be helpful to consider some examples of global supervenience. Perhaps compositional facts are supposed to globally supervene on the non-compositional facts in the same way that the laws of nature at a world globally supervene on the local qualitative character of a world. This Humean supervenience of the laws of nature does not require brute facts about the laws of nature to explain the existence of the laws. The laws of nature are simply the regularities found in the local qualitative properties of the world. If we have all of the facts about the regularities, then we have all the facts about the laws; we don't need an extra fact that says that the law obtains.[50] A given law is nothing more than the regularities of some phenomenon. However, according to Brutal Composition, the facts about composite objects are not just facts about the matter that composes them. Therefore, the compositional facts do not globally supervene on the non- compositional facts in the same way that laws of nature at a world globally supervene on the local qualitative properties of a world.

Brutal Composition makes the facts about composition independent from the rest of the facts of the world. It is this independence that makes the supervenience so implausible. In the previous case, even if one does not think that laws of nature reduce to local qualitative properties, the supervenience is plausible because the supervening properties depend on the base properties in some way. By making composition brute, it

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[50] See Lewis 1986, ix-xii.

no longer depends on anything. Therefore, CS is *ad hoc* in a way that a posited necessary connection between laws and local properties is not. This is the same problem faced by the moral anti-reductionist: if the properties (or facts) in question really are completely independent, then there is no good reason for a NS to hold. Of course, Markosian could simply bite the bullet here. However, I think that biting this particular bullet is a serious cost of his view, especially since maintaining BC already requires biting the bullet. Markosian's view, then, already has a major ideological and ontological cost.

In order for Brutal Composition to be a legitimate view, Markosian needs to answer the following question: why should we think that our concepts and facts about composition are brute? Markosian provides the following three criteria for a brutal concept: "(i) being relatively easy to grasp on an intuitive level, (ii) being such that there seem to be clear-cut cases of both instantiation and non-instantiation, and (iii) being such that no acceptable account of what it is in virtue of which some *xs* instantiate that concept seems to be forthcoming." For example, the facts about the concept 'part' (proper or improper) are taken as a brute in classical mereology. The concept of 'part' meets Markosian's criteria: (i) every competent speaker of English readily understands the concept of 'part', (ii) there are clear cases where something is or is not a part of something, and (iii) an analysis of part that does not invoke any mereological concepts does not seem forthcoming.

Even though 'part' meets Markosian's criteria, it does not follow that 'composition' does, since the concept 'composition' seems more theoretical and less intuitive than the concept 'part'. Markosian thinks that it clearly passes requirements (i) and (ii). I grant that composition satisfies (i); we all seem to intuitively understand what composite objects are.

However, I am suspicious that 'composition' meets (ii). Who is supposed to think that there are clear-cut cases of composition and non-composition? Markosian notes in a

footnote that universalists and nihilists will deny this, so perhaps he has philosophers who reject both universalism and nihilism in mind.[51] However, these are just the philosophers who already accept some form of a moderate answer to the SCQ. If the point of these criteria is to show that 'composition' is a good candidate for a brute concept, then it seems like Markosian is just preaching to the choir. However, if the people believing there are clear-cut cases of composition are supposed to be ordinary people, then I find this interpretation of (ii) problematic.

In chemistry class, we all learned that matter is a made up of a bunch of tiny particles that never come into contact with each other. Since one's everyday experiences with composite objects are devised from common sense approaches such as *Fastening* or fusion, this discovery may undermine one's understanding of ordinary objects. Perhaps it will cause one to doubt the existence of ordinary objects altogether. Therefore, Markosian's claim that composition meets requirement (ii) either begs the question (if it is about philosophers) or most likely false (if it is about non-philosophers). Therefore, Markosian's claim that composition fulfills (ii) is dubious at best. Furthermore, Markosian's reasons for thinking that 'composition' meets requirement (iii) suffer from a similar problem.

Markosian must show that (iii) is true of 'composition'. He does this through an argument by elimination, where he attempts to undermine views that could offer an acceptable account of when the *xs* instantiate composition. The argument is as follows:

P1. The only alternatives to Brutal Composition are nihilism, universalism, and moderate answers to the SCQ.
P2. Nihilism is false.
P3. Universalism is false.
P4. All moderate answers to the SCQ are false.
C. Therefore, Brutal Composition is true.

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[51] Markosian 1998, p. 244

Markosian is quite thorough in his examination of the various answers to the SCQ. I will not discuss his arguments for P4, as I have already discussed sometimeser positions at length and agree that P4 is false. Instead, I will focus on his arguments for Premises 2 and 3.

Markosian's arguments against nihilism and universalism both rest on the same premise: accepting universalism or nihilism is inconsistent with his intuitions. Nihilism offends two of Markosian's intuitions: (i) the intuition that people exist, and (ii) the intuition that things like chairs exist. Markosian offers no reason for holding (i); he simply claims, "We can't have that."[52] I suppose that he finds the truth of (i) to be obvious given the difficulties with eliminating persons from one's ontology. Since he finds both these alternatives unpalatable, Markosian concludes that nihilism cannot be true since it eliminates the self. While many people undoubtedly agree with Markosian on this point, his remark simply begs the question concerning the importance of personhood. However, even if I grant him this argument, it will not save his overall argument for Brutal Composition, as I show when addressing his arguments against Universalism.

Markosian also rejects nihilism because of (ii). He claims, "There simply are far more composite objects in the world than Nihilism allows. This seems to me to be a fatal objection to Nihilism, and I conclude, on the basis of this objection, that Nihilism is not the correct answer to SCQ."[53] Any argument of the form "It seems to me that *P*, therefore any view that entails *not-P* is false" is flimsy at best. While this argument might give one some reason to doubt the truth of nihilism, the argument is not strong enough to be a "fatal" objection to nihilism. Furthermore, the intuition that "there are as many composite objects in the worlds as I believe there to be" does not seem like a good

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[52] Ibid. p. 220
[53] Ibid. p. 221

candidate for a central intuition that motivates a philosophical view[54]. As far as I am concerned, any philosophical intuition is open questioning. If Markosian had to pick an intuition to serve as his central motivating intuition, then it seems he should have picked the intuition that people exist, since it is much more powerful intuition. If one tells a non-philosopher that tables, computers, and trees do not exist, that person will most likely be puzzled. However, if one tells that person that they do not exist, then that person will most likely strongly object. Therefore, I believe that Markosian's argument would be stronger if he could show that these intuitions about the existence of persons entail our intuitions about objects as well.

Markosian's argument against universalism relies on the same strategy as his argument against nihilism. However, it is important to notice that universalism, unlike nihilism is not open to the objection that people do not exist, since every mereological sum has a fusion. These fusions guarantee the existence of an object that corresponds to a person. So even if Markosian can argue that nihilism entails that people do not exist and that this price is too high to pay, he cannot make the same argument against universalism. Therefore, his arguments against both universalism and nihilism stand or fall with his appeal to the intuition that there are ordinary objects, but not bizarre objects. He claims that unlike nihilism, which makes for a world with too few objects, universalism makes for a world where there "are far more composite objects than common sense intuitions can allow."[55] I believe that this argument should be rejected for same sorts of reasons discussed above: these sorts of intuitions are not strong enough to counter the plausibility of universalism.

Markosian's reliance on intuitions connects to the particularist/generalist debate previously discussed. Markosian himself does not take a general stance on particularism

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[54] This seems to be the central motivating claim of both Korman and Markosian's project.
[55] Markosian 1998, p. 228

or generalism with respect to philosophical methodology as a whole, but he claims "my argument involves the claim that the overall theoretical position that best fits standard intuitions about composition and other metaphysical matters – including the intuition that there ought to be an answer to SCQ – is one that incorporates BC."[56] I don't know what else he could mean by this except that he endorses particularism in this specific case. This methodological point, combined with his intuition-based arguments against universalism and nihilism, makes him a particularist, at least with respect to the metaphysics of material objects. I have already argued against particularist ontologies of material objects in my discussion of Korman, and those arguments apply equally here.

I have argued that Brutal Composition fails for two reasons: it cannot explain the necessity of CS, and the argument by elimination is unsound. Furthermore, there is the overall problem that Brutal Composition is the kind of view that would only appeal to people who probably already hold some form of it; it fails to put any pressure on philosophers that reject it or to provide convincing evidence for philosophers that are undecided.

With the dismissal of the sometimeser views, nihilism remains the only plausible open option.[57] However, given my commitment to mereological simples, an examination of the nature of these simples is required in order to present a coherent view. Doing so will reduce the number of objections to my view, since many of these objections target nihilist views that have not made the nature of the simples they are committed to clear. The following sections will address questions such as: (1) must simples be points, or can they have extension?, and (2) If simples can have extension, can they have qualitative variation in their intrinsic properties?

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[56] ibid. 237

[57] Of course, one could insist that universalism is a plausible option, but I do not think so and will not consider it here.

2.3: Three types of Nihilism

In this section, I will briefly discuss the three major options that nihilists have for populating their ontology with simples. These three types of mereological nihilism can be categorized by the scale of their simples. There are other choices that the nihilist must make when creating their ontology, but each of these choices will be informed by the choice of scale. Following Jonathan Schaffer, I will organize these nihilist ontologies into three different groups: minimal nihilism, medial nihilism, and maximal nihilism.[58] The minimal nihilist has an ontology that contains only the fundamental mereological simples; these objects are very small and something like the fundamental particles of physics. This is the sort of the view that is typically attributed to Pre-Socratic philosophers such as Democritus. They pictured the worlds as a swarm of tiny material simples. In contrast, the medial nihilist ontology contains simples that are larger than simples of the minimal nihilist, although they may also contain the minimal nihilist's smaller simples as well. In order to have simples of significant scale, medial nihilists must include simples with extension in their ontology. These are objects that have spatial extension but no proper spatial parts. Finally, maximal nihilists have only one simple in their ontology: the world. Maximal nihilism, then, is equivalent to existence monism.[59] Spinoza famously champions this view in his *Ethics*.[60]

Minimal nihilism is not only minimal with respect to the size of its simples, but also with respect to its ontological commitments since it only requires the existence of tiny simples, whether they are spacetime points, tiny extended substances, or indivisible entities. Therefore, there are different types of minimal nihilism that depend on the choice of small-scale simple. In contrast, medial nihilism entails that extended simples

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[58] Schaffer 2007, p. 181

[59] This is in contrast with Schaffer's priority monism, in which the world is fundamental, but grounds the many objects of our world.

[60] See Spinoza 1985, *Ethics* Part I, Propositions 1-15 for Spinoza's argument for monism.

are possible (unlike minimal nihilism) since medial nihilism requires simples that have real scale, such as a table-shaped simple. This is a claim that is not without controversy (and will be discussed shortly). Maximal nihilism is committed not only to the existence of a single world-sized extended simple, but it is also committed to an ontology that is larger than medial nihilists' ontology. Maximal nihilists have to deal with the problem of qualitative variation. Typically, qualitative variation in objects is explained by appealing to parthood. For example, a guitar is blue and green because it has a blue part and a green part. Since our world obviously has qualitative variation, then if maximal nihilism is true, the maximal nihilist must have some sort of metaphysical machinery for explaining the world-simple's qualitative variation.

The larger one's simples grow in scale, the more ontological commitments one must make. This conclusion could be used to argue that minimal nihilism is the best of the three views. Perhaps this argument could be made, but I am not interested in settling the issue here. In the next section, I will discuss the various attempts to provide an analysis of the necessary and sufficient conditions for something being a material simple.

2.4: The Pointy View

Since nihilism is an ontology of mereological simples, any complete nihilist theory needs to answer the Simple Question:

> **Simple Question:** Under what conditions, if any, is a material objects a mereological simple?[61]

Like the SCQ, one answer to the Simple Question is "always." It then follows that if something is simple under any conditions, then an object like a computer would be a simple. However, a computer has parts. This means that the computer would be both simple and composite, and this is a clear contradiction. The "never" answer to the Simple Question is also unhelpful since it amounts to the denial of the existence of

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[61] See Markosian 2006, p. 214

simples.[62] Therefore, all of the interesting answers to the Simple Question fall into the "sometimes" category. In the remainder of the chapter, I will discuss several of these answers, beginning with the pointy-view.

The Pointy View of Simples claims that simples are point-sized objects:

The Pointy View of Simples (PV): necessarily, x is a simple if and only if x is a point-sized object.[63]

PV is a natural companion for those who take mathematics and scientific research to be good evidence for ontology. Traditional physics has used the geometry of planes and points to model the fundamental particles of physics. On this model, certain subatomic particles occupy only one point in space (an electron, for example, is point-sized). These subatomic objects seem like good candidates for simples.

However, several philosophers object to PV. In his "Simples," Ned Markosian argues that the Pointy View is committed to: (1) the claim that any spatially extended object contains infinitely many objects, and (2) the impossibility of a world where only one spatially extended simple object exists. The argument for (1) is as follows:

P1. Suppose PV is true.
P2. Suppose that there exists an extended spatially continuous object *O*.
P3. If *O* is composed of simples, then *O* must be composed of pointy objects (given P1).
P4. There are an infinite amount of pointy objects in any region of space.
P5. So *O* is composed of an infinite amount of simples.
C. Therefore, *O* contains infinitely many objects.[64]

The conclusion of this argument entails (2); the simple, lonely object has extension, and extension entails an infinite amount of objects. However, given PV, this is impossible.

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[62] Although defenders of gunk, objects for which every part of the object is itself composed of two or more objects, is compatible with the never answer. I will discuss gunk further in chapter 5.
[63] See Markosian 1998 and McDaniel 2007a. Markosian further explains what it means to be a pointy object at p. 216 with the following definitions: (1) Object O occupies region R =df R is the set containing all and only those points that lie within O, and (2) x is a pointy object =df the region occupied by x contains exactly one point in space. This analysis can easily be extended to spacetime points.
[64] Markosian 1998, pp. 218-9

Markosian acknowledges that a defender of PV would most likely accept these consequences.

I do not find this argument compelling because the theoretical cost of accepting (2) is quite low. In fact, defenders of PV could argue that their view tells us something interesting about the world: that extended simples are impossible. After all, I think that one of the reasons for pursuing an answer to the Simple Question is precisely to settle questions about the possibility of extended simples.

Simons also makes several arguments against PV. His first argument appeals to the laws of physics. According to our best physical theories, every particle has some non-zero of quantity mass. If these particles were to be truly point sized, then their mass is instantiated at a region of space that has zero volume. Since the volumetric density of an object is its mass divided by its volume, then PV requires that a point sized object must have infinite density since the density of a point sized object will require dividing its mass by zero. Since this contradicts our best physical theories, then PV ought to be rejected. Simons notes that the physicist might simply write off point-sized particles with infinite density as a consequence of idealizing a physical theory. However, Simons claims that metaphysicians must be more responsible.[65]

This objection could be supplemented by Braddon-Mitchell and Miller's argument that our best physical theory requires quantum physics, and that quantum physics requires that Planck length (10^{-66}cms) sized regions of space to be the smallest units of space that there are.[66] Braddon-Mitchell and Miller argue that these Planck

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[65] See Simons 2004, p. 373 for the argument and the quote.

[66] According to Braddon-Mitchell and Miller, quantum physics requires the Planck length to be a spatial region that contains exactly one unit of entropy (entropy is the amount of disorder in a system, the amount of energy in Joules divided by the absolute temperature Kelvin). This means that for any Planck length, the ratio of energy to temperature is always 1:1. If is possible for activity to occur in a subregion of a Planck length, then there would be an increase in entropy. However, a Planck length with entropy greater than 1 violates quantum physics. Therefore, there can be no activity below the Planck length. Braddon-Mitchell and Miller are (self-admittedly) oversimplifying. However, I find the assumption that the possibility of activity in a region of space

lengths must be simple units of space because physics claims that these regions of space cannot be broken down into further regions of space. [67] It should be noted that this argument only entails that the rejection of PV is nomically necessary, not that point-sized simples are metaphysically impossible. However, if PV is not metaphysically necessary, then it cannot be an answer to the Simple Question.

However, the arguments made by Simons and Braddon-Mitchell and Miller rely on the truth of the current theory of quantum physics. Since scientific theories are often revised, their argument provides only modest support for the rejection of PV. Therefore, one could argue that PV's apparent incompatibility with quantum physics is not strong enough to outweigh the other theoretical benefits of PV and attempt to analyze away quantum physics' apparent ontological commitment to the falsity of PV. As a result, Braddon-Mitchell and Miller's appeal to quantum physics poses a problem for PV, their argument is not a decisive blow to PV.

In contrast with Braddon-Mitchell and Miller's argument, McDaniel offers an *a priori* argument against PV. This argument attempts to show not just that PV is implausible, but that PV is inconsistent. The argument goes as follows:

P1. Co-located point-sized objects are possible.
P2. If co-located point-sized objects are possible, then mereologically complex point-sized objects are also possible.
C. Therefore, mereologically complex point-sized objects are possible.
C2. Therefore, PV is false.[68]

McDaniel offers three pieces of evidence in support of P1. His first piece of evidence is that some philosophers claim that they can conceive of co-located material objects (for example, as a solution to the problem of the statue and clay's varying properties). If one does not endorse the possibility of co-located objects that are made of the same type of matter, McDaniel claims that one can conceive of the possibility that co-location can

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as a constraint on that region exists to be interesting. I am no expert on quantum physics, but this might be an issue worth looking into.
[67] Braddon-Mitchell and Miller 2006, pp. 223-4.
[68] See McDaniel 2007, p. 238-242

occur between two distinct types of matter. In other words, the co-location of material objects is possible if there can be two special kinds of matter that can interpenetrate while belonging to different ontological categories.

His second piece of evidence is that quantum physics postulates particles, such as bosons, that are capable of co-location.[69] Since speculative physics might make use of these particles, they should not be ruled out *a priori*. McDaniel's third piece of evidence stems from his commitment to the Humean principle that there are no necessary connections between distinct existences. McDaniel argues that if one rejects the possibility of co-located objects, then one must reject this Humean principle.

To show this, McDaniel considers a situation where two point particles are approaching each other at a rapid speed. Each of these point-sized particles is a distinct existence because a change in one particle's intrinsic properties does not affect the properties of the other particle. For example, if one particle has negative charge and the other particle has positive charge, then a change in the quantity of charge in one particle will not affect the other particle. If co-located material objects are impossible, then the particles must swerve out of each other's way, cease to move, cease to exist, or undergo some other event that prevents them from becoming co-located.[70] This means that there is in fact a necessary connection between the two particles; the extrinsic relations between the two particles can affect the intrinsic properties of the particles, or even the existential status of the particles. Therefore, anyone who is committed to this Humean Principle should reject the claim that co-located material objects are impossible.[71]

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[69] Bosons are any sub-atomic particle whose spin is an integer; such as a photon that has a spin of +1. They are contrasted with fermions, particles that have a spin that is not an integer. Electrons are fermions since they have a spin of $\frac{1}{2}$. According to the standard theory of particle physics, fermions cannot be in the same place at once (the Pauli Exclusion Principle), while bosons can be in the same place at once.

[70] McDaniel 2007a, pp. 240-1.

[71] Actually, this argument attacks any spatial view of simplicity that claims that point-sized objects are possible, such as the MaxCon view.

In response, philosophers that reject co-located objects could simply claim that it is analytic that material objects cannot be co-located.[72] McDaniels is simply mistaken when he thinks that he is able to concieve of the case above. If this is so, then all material objects necessarily have the property of something like impenetrability. If this is the case, then the particles' behavior is no longer governed by problematic brute necessities. However, anyone who takes this position will need to provide an analysis of why some philosophers believe that they can conceive of material objects that are co-located. In response, Robb suggests that when one conceives of co-located material objects, one is really conceiving of "phony matter," an immaterial substance that affects our perceptual faculties in the same way that real matter does. Because phony matter is not real matter, there is no difficulty in conceiving of the possibility that phony matter can co-locate. Therefore, philosophers who claim that they can conceive of matter that co-locates are mistaken; they are in fact conceiving of phony matter.

However, McDaniel thinks that this appeal to phony matter is unsuccessful. He believes that in order for Robb's counter-argument to work, it must be the case that the phony matter in question is a duplicate of real matter. And since a particle of real matter has the property of belonging to the ontological category of real matter, then any duplicate of that particle will have that property as well. Therefore, the phony matter particle shares all of its intrinsic properties with the real matter particle, with the exception that the phony matter is not in the same ontological category as real matter ontological property. So it seems that there is reason to think that phony matter is in fact real matter. If this is true, then the defender of PV is still stuck with the problematic brute necessities that govern the particles' motion.

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[72] McDaniel notes that Robb made this objection to him; see McDaniel 2007a, p.241 footnote 20 for details.

However, I think that McDaniel's argument misses the point. Robb is not claiming that phony matter is an immaterial duplicate of real matter; that claim is a straightforward contradiction. Phony matter is only a duplicate of real matter in the sense that it produces the same sensory response. Robb's objection is that there is no phenomenological difference between conceiving of a world made of matter and a world made of phony matter except for the stipulation that the matter is real in the first world. If there is no phenomenological difference, it might be the case that whenever one believes they are conceiving of a real-matter world with co-located material objects, one is mistaken. While this point does not show co-located real matter to be impossible, it allows anyone who rejects the possibility of co-located real matter to explain away the apparent conceivability of co-located real matter. In order for McDaniel to defeat this objection, he needs to find a way to make a conceptual distinction between the real matter world and the phony matter world that does not simply stipulate the difference between the two. Without such a difference, McDaniel and his objectors are simply butting heads over intuitions.

As for my position, nothing hinges on whether McDaniel's argument is correct, since my commitment to nihilism does not allow for mereologically complex point-sized objects. I believe that the evidence for nihilism far outweighs challenges from conceivability (this will be further discussed in Ch. 5), and therefore there is no reason to think PV false. In fact, any ontology that has restricted composition can reject P2 of McDaniel's argument as well. Views with restricted composition are usually motivated by a varying degree of appeal to common sense as a guide for what counts as a material object. Since common sense is either silent on the issue of complex, co-located point sized objects or common sense provides evidence against complex, co-located point sized objects, views with restricted composition have ample ground to resist the argument. Before moving on, it is worth noting that McDaniel believes that something being point

sized and not co-located is a sufficient condition for something being a simple; this contrasts Simons, Braddon-Mitchell, and Miller who argue against the possibility of point-sized objects altogether.

There are several other answers to the Simple Question. Ned Markosian proposes a particularly interesting answer that has been controversial; he calls this view "the maximally continuous view of simples," or "MaxCon." In the next section, I will discuss MaxCon, the various arguments against it, and my own arguments against it.

2.5: MaxCon

Ned Markosian answers the Simple Question with his Maximally Continuous View (MaxCon) of simplicity. Intuitively, a maximally continuous simple is supposed to be located at a region of space that is completely filled with matter such that there are no empty regions within the object. Here is MaxCon stated more formally:

> **The Maximally Continuous View of Simples (MaxCon)**: Necessarily, x is a simple iff x is a maximally continuous object.

Where *maximally continuous* is defined as:

> x is a maximally continuous object $=_{df}$ x is a spatially continuous object and there is not a continuous region of space, R, such that (i) the region occupied by x is a proper subset of R, and (ii) every point in R falls within some object or other.[73]

In other words, a simple must be a spatially continuous object that is not a proper part of any other object. In our world, macroscopic objects appear to be maximally continuous, even though they are not. In fact, seemingly continuous hunks of matter are mostly empty space. A true MaxCon simple would have no empty regions of space within it. Furthermore, unlike the very small simples of the Pointy View, MaxCon simples have no inherent restrictions on their extension or size because any region of space completely filled by matter is a MaxCon simple. If MaxCon simples are possible, then they could range from very tiny macroscopic objects to large macroscopic ones.

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[73] Markosian 1998, pp. 221-2.

2.5.1: Extension and Parthood

The MaxCon view might strike one as immediately problematic since extension is typically understood to imply parthood. While a simple objection, it is a powerful one, so Markosian needs a strong argument to show that extension does not entail parthood. He asks us to imagine a solid sphere named Spero. Spero is an extended simple; it has no parts. One might argue that Spero is impossible for the simple reason that if something is a sphere, then it necessarily has parts. The argument goes like this:

> P1. If any object has some extension, then it has two halves.
> P2. If any object has two halves, then it has at least two proper parts.
> P3. Spero has some extension.
> C. Therefore, Spero has at least two proper parts.

The argument is obviously valid. Since the possibility of Spero lacking extension is out of the question, premise 3 does not require examination. This leaves the defender of MaxCon with the choice of rejecting premise 1 or premise 2. Markosian rejects premise 1; he denies that extended objects must have things like halves (or presumably quarters, eighths, and so on.). Notice that denying premise 1 amounts to denying the Doctrine of Arbitrary Undetached Parts:

> **DAUP:** For every material object *M*, if *R* is the region of space occupied by *M* at time *t*, and if *sub-R* is any occupiable sub-region of *R* whatever, there exists a material object that occupies the region *sub-R* at *t*.[74]

Markosian's justification for this denial comes from two sources: (1) it solves Van Inwagen's Descartes and Body-Minus Problem, and, more importantly, (2) it falls naturally out of his commitment to Brutal Composition.[75] Since the BCer already restricts composition in ways that cut out the problematic cases generated by DAUP, then Markosian need only appeal to the fact that not all objects have parts. Therefore, MaxCon implies the falsity of DAUP.

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[74] See Van Inwagen 1981.
[75] Recall 2.2.3

One might think that this is a dismissive move, since it does not explain why it *seems* like Spero has two halves. To make his use of BC more appealing, Markosian argues that there are two referents of "part" and that the confusion is a result of our ambiguous usage. Sometimes, we conceive of parts as "conceptual" parts. These are logical abstractions from the spatiotemporal region that the sphere occupies.[76] So if one were to understand "parts" in the above argument to mean "conceptual parts," then Markosian would agree that the argument is sound. Spero does have two conceptual halves. However, when one says that Spero has parts, one might be making the claim that the parts of Spero are metaphysically robust. In this case, one is saying something false; Spero is an extended simple and has no concrete proper parts. This argument can easily be re-tooled for any shape of extended simple that one desires.

Whether or not this argument succeeds turns on a deeper question: what are the metaphysical commitments of extension, if any? Markosian thinks that extension does not entail mereological structure while his imagined opponent does; neither of these claims has very much in way of support. In his "More Problems for MaxCon," Mark Steen argues that this comes down to simple head butting over intuitions. Markosian thinks that extension and mereology come apart, while others, such as McDaniel, do not. However, this is not only a case of conflicting intuitions. If it is true that extension entails parthood, then this claim is a brute necessity that adds to the cost of a theory. Therefore,

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[76] Presumably the region of space still has parts, just not the matter that fills it (Perhaps this explains the confusion; we are looking at the sphere shaped region, not the sphere itself). Braddon-Mitchell and Miller agree with Markosian. They argue that our concepts of extension and mereology come apart even though they do not usually do so (They refer Markosian's conceptual parts as "Kantian" parts; see Braddon-Mitchell and Miller 2007, pp. 224). The view expressed in Paul's Logical Parts (2002) argues that objects have logical parts, such as color properties, as well as spatial parts. These parts are of a different ontological kind. Since Paul's view is much more fleshed out than the idea of conceptual parts that is presented here, it may be worth examining how her view could be used to supplement the stuff/thing ontology. However, Paul does still view the logical parts as objects. I take it that Markosian would resist this claim. More investigation is needed to see if this is a serious point of contention between the two views.

it seems that any philosopher who claims that extension entails parthood needs to make a strong case for the addition of this brute necessity claim.

McDaniel attempts to make such an argument by beginning with three principles that he believes to be uncontroversial. They are a modification of DAUP, the Portion-Parts Principle, and the Supervenience of Constitution.

PPP: Necessarily, for any material objects x and y, x is a part of y if and only if the matter that constitutes x is a portion of the matter that constitutes y.

SoC: Necessarily, for any portion of matter that constitutes some object z, any qualitative duplicate of that portion of matter constitutes a qualitative duplicate of z.

DAUPO: For every material object, M, if R is the region of space occupied by M, and if *sub-R* is any occupiable sub-region of R whatever, there is a portion of matter that exactly fills the region *sub-R*.[77]

SoC (which Markosian argues is false) asserts that constitution is an intrinsic relation between the portions of matter that make a given object. For instance, if there is a solid sphere and the bottom half is duplicated, then the bottom half of the sphere and the duplicate hemisphere will have the same constitution relation, namely, being half a sphere. DAUPO is DAUP modified to be compatible with Markosian's distinction between stuff and things. McDaniel makes the following argument from these three claims. First he asks us to suppose there are two maximally continuous regions filled with homogenous matter. The first region is spherical, called 'Sphere,' and the second region is a hemisphere half the size of Sphere, called 'Semi'. This means there are two objects that are MaxCon simples; the one occupying Sphere is 'Ball' and the one occupying Semi is 'Drum'.

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[77] These three principles can be found in McDaniel 2003 on p. 270, 271, and 272 respectively.

Region *Sphere* occupied by *Ball*

Upper Hemisphere:

Lower Region Occupied by *Bottom*
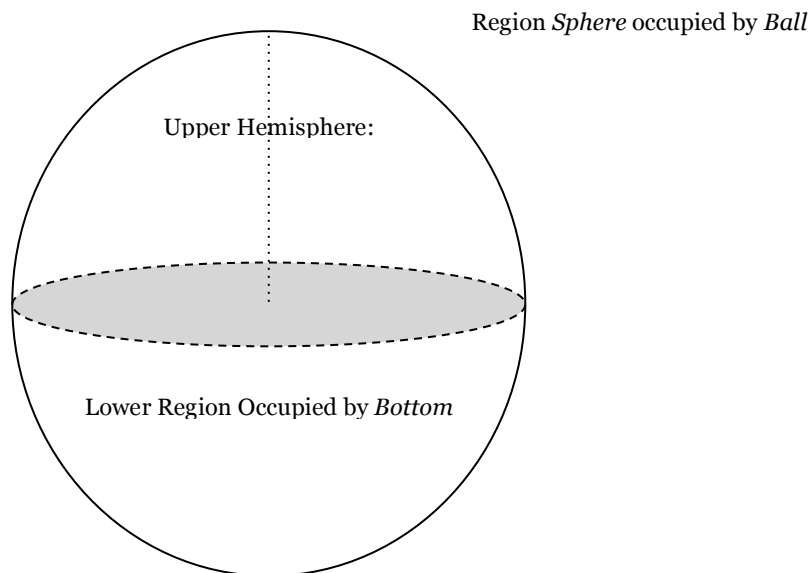
Figure 1

The argument goes as follows:

> P1. Given DAUPO, we know that the lower half of Ball is filled with matter.
> P2. Given SoC, some of the matter in Sphere is a qualitative duplicate of the matter in Drum, which means that there is a third object in Ball, call it 'Bottom'.
> P3. Furthermore, given PPP, Bottom is a proper part of Ball.
> P4. But simples cannot have proper parts.
> P5. Therefore, MaxCon, SoC, or DAUPO is false.
> P6. SoC and DAUPO are not false.
> C. Therefore MaxCon is false.[78]

Markosian replies to this argument by arguing that McDaniel is mistaken in claiming that the three principles form an inconsistent set. Markosian believes that DAUPO has nothing to do with this argument. Instead, he focuses on the inconsistency of holding both SoC and MaxCon.

Markosian responds to McDaniel by a entertaining the possibility of a Joe Montana statue that is also an extended simple.[79] The matter of the right arm is a different kind of matter than the rest of the statue. However, since the Joe Montana shaped region of space is continuous and completely filled with matter, it is a simple (despite the qualitative heterogeneity). If a qualitative duplicate of the matter filling the

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[78] ibid. 271-272
[79] Markosian 2004b, p 336.

region Montana's right arm is added to the example, then one might think that the statue of Joe Montana can no longer be simple. This is because the unattached arm matter is a MaxCon simple, and it is a qualitative duplicate of the arm matter of the Montana statue. Since one arm portion of matter is a simple and the other is not (because the maximally continuous region of space extends beyond it), then MaxCon cannot be true. Instead of accepting this conclusion, Markosian argues that SoC is false. He claims that the support for SoC comes from a commitment to the Supervenience of Composition; that the mereological structure of an object is an intrinsic feature of that object.

Markosian believes that constitution behaves differently from composition because the composition relation and the constitution relation differ in the types of their relata. He needs to distinguish between composition and constitution in order to make sense of his *stuff/thing* ontology. Markosian understands composition as a many-one relation between things of the same ontological type (objects or things). For example, a diamond is composed of carbon atoms and both the diamond and the carbon atoms are of the same ontological type; they are both *things*.[80] In contrast, Markosian explains constitution as a one-one relation between two different ontological types, stuff (matter) and *things* (objects).

By introducing the new ontological category of *stuff*, Markosian has incurred a large theoretical debt. In order for MaxCon to be a viable view, Markosian must show that the paying the price for *stuff* is worthwhile. One benefit of an ontology with stuff is that it might explain the puzzles of constitution. For example, Markosian could claim that the clay of a statue is *stuff*, while the statue is a *thing*. Since the clay and the statue fall into different ontological categories, then they can have diverging properties, such as 'squashable' and so on. However, this analysis fails to capture similar puzzles of

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[80] One might say that composition could be a many-many relation, for example: "The carbon atoms compose diamonds." However, I think there is nothing at stake here; composition has at least one "many" relata while constitution does not have any "many" relata.

constitution. Consider a sculpture that is made of old compact discs. Like the statue, the sculpture cannot survive a major reconfiguration of the compact disks. And like the clay, the compact discs can survive reconfiguration. However, it seems that compact discs must fall into the category of *things*.

I doubt Markosian would deny that a single compact disk is a *thing*. Assuming that compact discs are *things*, then if some compact discs are made into a sculpture they must (1) be *things*, (2) cease to be *things* and become *stuff*, (3) or they must be *things* and *stuff* simultaneously. Since *things* fall into mereological relations, then the first option fails to solve the puzzle of constitution. The third option is out of the question since it collapses the ontological distinction between *stuff* and *things*. Therefore, Markosian's *stuff/thing* theory must allow for entities to change ontological categories. Markosian could claim that this is a bizarre, but tolerable consequence of his view. However, if ontological categories are genuine categories that cut the world at the joints, then it seems that they must have their extensions necessarily. Otherwise, there would be nothing to prevent one entity from changing categories. But if an entity changes categories, then the categories themselves do not truly cut nature at the joints and are therefore not real ontological categories.

Therefore, Markosian's *stuff/thing* ontology already fails to solve puzzles of constitution. I think that this is already a strong reason for rejecting the *stuff/thing* ontology, since these sorts of ontologies are meant to solve problems like the puzzles of constitution. However, Markosian could argue that MaxCon is the best answer to the Simple Question and that the *stuff/thing* ontology provides the metaphysical support for MaxCon. In what follows, I will discuss the relationship between the *stuff/thing* ontology and MaxCon.

2.5.2: MaxCon and the Stuff/Thing Ontology

In addition to McDaniel's objection to MaxCon, one could also argue that it suffers from another serious problem: when two MaxCon simples come into contact, they are necessarily annihilated. For Markosian, contact is explained by the previously mentioned definition of maximal continuity. When there is no subregion between S_1 and S_2 that is not completely filled with matter, then S_1 and S_2 are in contact. Suppose that there are two maximally continuous regions of space R_1 and R_2 and that they each completely are filled with matter such that contain two MaxCon simples S_1 and S_2. If S_1 and S_2 move towards each other until they are in contact, then there will be a maximally continuous region of space R_3 that is the size of the fusion of R_1 and R_2. R_3 will be completely filled with matter due to the complete contact of S_1 and S_2. Since R_3 is completely filled with matter, there must be a simple S_3 located at R_3. Since simples have no parts, S_1 and S_2 must have been annihilated upon coming into contact. This example claims that nothing of S_1 and S_2 survives contact. This seems counter-intuitive since it allows for the *ex nihilio* creation and complete annihilation of objects. This is problematic for the same reasons discussed in section 2.2.1 above. Therefore, MaxCon should be rejected.

The *stuff/thing* ontology deals with this case by agreeing that the two objects S_1 and S_2 are annihilated. However, the matter that constitutes S_1 *and* S_2 is not annihilated; it comes to constitute the new object S_3. This conforms to two common intuitions about fusion. On the one hand, there is a sense in which fusion destroys the previous objects, and on the other hand there is a sense in which the *things* continue to exist; objects are destroyed upon fusion while matter is preserved. This ontological divide is at the heart of the disagreement between Markosian and McDaniel.

Instead of making this ontological distinction explicit, Markosian responds to McDaniel by claiming that he must reject SoC. I find this position somewhat mysterious given Markosian's *stuff/thing ontology*. SoC makes no reference to objects, so he does

not need to worry about a qualitative duplicate of a portion of a simple being a part (as in the Montana example above). Remember, the conclusion of the Montana example was that the arm of Montana must be a simple since the arm portion is a qualitative duplicate of the un-attached arm simple (where un-attachment is the absence of maximal continuity with any region outside of the one occupied by the arm) even though the arm is maximally continuous with the rest of the statue's matter. I think that this conclusion can easily be denied by rejecting the claim that the two simples in question are in the ontological category of *things*. One might claim this is *ad hoc*, but it seems warranted given that simples should not be expected to be exactly like objects, even if they superficially resemble them. If MaxCon simples are of the ontological type of *stuff* and not *things*, then SoC simply does not apply to them. Therefore, an advocate of MaxCon does not have to reject SoC and can instead maintain that SoC is true with respect to the ontological type *things*, but not to the ontological type *stuff*. One might worry that it is impossible for *stuff* to not constitute anything. However, allowing for un-constituted *stuff* fits nicely with Markosian's Brutal Composition view. For BC, some portions of matter are objects and that some portions are not. For example, water in a glass is not an object according to BC, even though a collection of water molecules is contained in the glass. Yet the water in the glass is still there. The *stuff/thing* ontology could explain this by claiming that there is water-*stuff* in the glass, but that the water-*stuff* does not constitute a *thing*.

Regardless, Markosian believes that he must reject SoC to save MaxCon. Mark Steen argues that this is not the case because McDaniel's argument is invalid. According to SoC, there is a qualitative duplicate of the matter that makes up Drum in Ball; call it Bottom (See *Figure 2.1*). However, the second clause of premise 1 claims that Bottom is not a qualitative duplicate of matter, but that Bottom is an *object*. Since SoC yields qualitative portions of matter, Bottom is not an object. This means that the move from

premise 1 to premise 2 is unjustified. We know that the matter that constitutes Bottom is a portion of the matter that constitutes the Ball. However, PPP cannot be applied here since it applies to objects, not portions of matter. All PPP says is that when you have an object with parts x and y then x and y must have a similar constitution relation. This is simply not the case in the example, since SoC does not guarantee that portions of matter are also objects. Steen argues that McDaniel is missing something like the following claim, which Steen calls Qualitative Duplicate:

QD: Any qualitative duplicate of an object is an object.[81]

If this were added to the argument, then the move in premise 1 would be justified. SoC would give Bottom as a qualitative duplicate of the matter that constitutes Drum. Since Bottom is the qualitative duplicate of the matter that constitutes Drum and that Drum is also an object, then QD entails that Bottom is an object as well. By PPP, Bottom is a proper part of Ball. Since Sphere is a maximally continuous region filled with matter, Ball is a MaxCon simple. However, Ball cannot be a simple and have parts. Therefore, MaxCon must be false.

This argument, as Steen points out, simply begs the question against MaxCon.[82] Assuming that Bottom is an object because of its qualitative identity to Drum is simply assuming that Mereological Structure and Extension cannot be separated; this is precisely what the MaxCon view denies. Therefore, the two views come to an impasse, unless there is new argument for the truth or falsity of the necessary connection between extension and mereological structure (McDaniel points to the familiar Humean Principle in support of extended simples; this will be discussed shortly.).

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[81] Steen 2011, 134.
[82] ibid. p. 141.

2.5.3: The Argument From Spatial Intrinsics

McDaniel presents another argument against MaxCon, the Argument from Spatial Intrinsics. This argument parallels the Argument from Temporary Intrinsics.[83] It will be helpful to have the Argument from Temporary Intrinsics in order to see the parallel structure of McDaniel's argument (Ch. 3., section 4 will discuss the former argument in depth).

> P1. Suppose Endurantism is true.
> P2. Suppose that Janice is sitting at t_1 and standing at t_2.
> P3. The property *is sitting* and *is standing* are intrinsic properties; they do not depend on anything besides Janice for instantiation.
> P4. Since the one and the same Janice is present at each moment that she exists, she eternally has the properties of sitting and standing.
> P5. However, since she has no temporal parts, these properties are inconsistent.
> C. Therefore Endurantism is false.

McDaniel's argument from Spatial Intrinsics is as follows:

> P1′. Suppose MaxCon is true.
> P2′. Suppose there are two simples S_1 and S_2 and that the former is gold while the latter is blue.
> P3′. If S_1 and S_2 are moved into contact, then they will be annihilated and a new simple, S_3 will come into being.
> P4′. Since the matter constituting the simples does not go out of existence, S_3 must be both blue and gold.
> P5′. However, a simple *thing* cannot be both blue and gold unless it has parts.
> C. Therefore, MaxCon is false.[84]

McDaniel's argument sparked a debate on what is now called the problem of qualitative heterogeneity; That is, is it possible for an extended simple to display qualitative variation with respect to some property (color, for example)?[85] Prima facie, this seems impossible for the reason cited in P5′ above. Intuitively, objects with qualitative variation need parts to instantiate properties that might otherwise be contradictory. If the two objects in the argument were composite, then the color variation in their fusion is

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[83] See Lewis 1986, pp. 202-205.
[84] McDaniel 2003, pp. 273-4.
[85] See McDaniel 2007a, 2007b, and 2009 and Parsons 2000.

explained by one part of the fusion being gold and the other part of the fusion being blue. Since this analysis cannot be applied to simple *things*, then another account must be given.

McDaniel argues that there are two ways that someone with a *stuff/thing* ontology could avoid the conclusion of the argument. The first is to accept DAUPO. With DAUPO, the MaxCon theorist can analyze the qualitative variation of the gold-blue by appealing to the portions of matter constituting the simple. The claim that S_3 is blue and gold would be analyzed as follows:

> There is a portion of matter (*stuff*) that constitutes S_3 at R_1 that is blue and a portion of matter (*stuff*) that constitutes S_3 at R_2 that is gold and the fusion of R_1 and R_2 is a maximally continuous region completely filled with matter.[86]

Since there is no mention of parts in this analysis, the analysis is not subject to the Argument from Spatial Intrinsics. Remember, McDaniel argued that the MaxCon theorist cannot accept DAUPO. However, I have discussed how accepting DAUPO is not, in fact, a problem for the MaxCon theorist. The claim that the MaxCon theorist cannot accept DAUPO suffers from the same misstep discussed earlier: DAUPO does not generate portions that are objects; it generates portions of matter. Therefore, it seems like MaxCon theorists can avoid the problem of spatial intrinsics by appealing to DAUPO.

However, there is a larger problem that has been lurking in the shadows of the *stuff/thing* ontology. So far, talk regarding 'portions' of *stuff* has been dangerously loose. I find it surprising that McDaniel even uses the term 'portions' in the first place since it gives the MaxCon theorist an easy escape from McDaniel's argument. Perhaps he is trying to give the MaxCon theorist the benefit of the doubt with concepts that are neutral on the issue of mereology. However, it is a legitimate worry that there is no difference between talk of portions and parts that is not *ad hoc*. Talk of portions is either

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[86] Paraphrase of McDaniel 2003, p. 274.

ontologically committing or it is not. If it is ontologically committing, then it is in the ontological category of *stuff* or it is not. If it is in the ontological category of *stuff*, then it is simply disguised talk of parts. A blue-gold MaxCon simple would contain two smaller portions of *stuff*; this is a many-one relation that cannot be anything except composition. If portions are not *stuff*, then MaxCon theorist must posit a third ontological category unique to portions in order to account for the blue and gold qualities. However, this is completely ad hoc; the category of portions only exists to solve the problem of the blue-gold simple. The MaxCon theorist must find some other way to talk about the blue-gold simple without invoking portions. For example, she could invoke Parsons's distributional properties, where the whole simple has a singular property with the specific blue-gold distribution.[87] Therefore, the MaxCon theorist should not use portion talk to discuss MaxCon simples with qualitative heterogeneity, nor should objectors like McDaniel grant MaxCon theorists such talk.

McDaniel has a final objection to the above analysis of qualitative heterogeneity; the analysis attributes intrinsic properties to *stuff* instead of *things*. He believes that this is problematic because "it seems that these properties are free-floating entities. They are neither had by the simple nor by parts of the simple; moreover, they are not parts of the simple. This is extremely odd."[88] In other words, The MaxCon theorist's analysis of S_3's qualitative variation holds that S_3 looks blue and gold even though it does not have the properties of blue and gold.

However, Markosian fully embraces the odd consequences of this analysis. He considers a situation where Romeo and Juliet are MaxCon simple people.[89] This means that when they embrace for the first time, the *thing* Romeo and the *thing* Juliet will be

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[87] See Parsons 2000. The distributional properties view will be discussed in further detail in section 2.7 of this chapter.
[88] ibid. 274.
[89] Of course, this analysis applies *mutatis mutandis* to other cases.

annihilated and a new simple, call it *RJ*, will come into being. This may seem disastrous, but Markosian claims that the *stuff* that constituted Juliet will continue to exist (as well as for Romeo), and that this *stuff* will have all the same properties as Juliet herself. He writes:

> My reply is that Juliet need not worry. For while it is true that the thing that is Juliet will go out of existence, it is also true that the stuff that is Juliet will continue to exist. Not only that, but that stuff will continue to support all of the properties—being alive, consciousness, being a person, loving Romeo—that she cares about having. And it is also true that she—Juliet!—will continue to exist, to be alive, to be conscious, to be a person, and to love her Romeo just as much as ever. Being a *thing* that goes out of existence is not, as it turns out, the worst thing that can happen to a person.[90]

This example partially addresses McDaniel's worry about free-floating properties; the properties are clearly tied to the *stuff* that constitutes Juliet (and Romeo). However, this example also further mystifies the relation between *stuff* and *things*. In fact, one might worry that it makes the ontological category of *things* wholly redundant. If everything that matters about Juliet is instantiated in the *stuff* that constitutes her, then what work does the constituted *thing* do at all?

At first, it seems that the *stuff/thing* ontology could be used to give an alternative, and perhaps better, analysis of seemingly coincident objects. The *stuff/thing* ontology can explain the puzzle of the statue and the clay's differing modal and historical properties by analyzing the statue as a *thing* and the clay as *stuff*. Given that they are ontologically distinct, they cannot have inconsistent properties since they are not in the same ontological category.[91] The potential ability to deal with puzzles of material constitution shows some purpose for the ontological category of objects. However, it does nothing to address the strange circumstances of Juliet, and this casts doubt on its value as a solution for coincident objects.

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[90] Markosian 2004b, pp. 424-5.
[91] See Markosian's 2015 "The Right Stuff" pp. 16-17.

Steen argues for the redundancy of the object category by appealing to the Too Many Thinkers argument put forth by Olsen.[92] Since the *stuff* that constitutes Juliet does not gain or lose intrinsic properties when it comes into contact with Romeo, the *stuff* must have had these properties all along. This means that the *stuff* that constitutes Juliet was thinking before it came into contact with Romeo and remains thinking after it came into contact with Romeo. Therefore, one of two outcomes must obtain: either (1) the region filled by Juliet and her *stuff* contains two thinkers (one of which perishes on contact) or (2) the *thing* Juliet does not think. The former outcome is somewhat absurd while the latter outcome is evidence for the redundancy of *things* as a robust ontological category. Markosian clearly does not think that the Juliet is killed, since he claims that Juliet will continue to exist in the passage quoted above.

At this point, one might think that the too many thinkers objection is misplaced. The reason that it seems like there are too many thinkers is because we have been interpreting the name 'Juliet' to refer to only the *thing* Juliet. However, Markosian claims that this is not the case: "When I utter the word 'I' on this account, my utterance picks out both a *thing* and a portion of *stuff*. Each referent has the property of being a person."[93]Markosian thinks that one can truly say that Juliet survives contact with Romeo since the name 'Juliet' refers to both the object-Juliet and the *stuff-Juliet*. However, as Steen argues, if each referent has the property of being a person, then there is a conscious, thinking Juliet *thing*. Since the *thing* Juliet is annihilated when it comes

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[92] Steen 146; Olson 1997 came up with this problem for opponents of animalism; he argued that accepting (a) below is by far the best solution. Here is a rough approximation of the argument: (1) Suppose you are sitting in a chair at region R_1, (2) then there is a thinking animal at R_1, (3) you are thinking in R_1, (4) Therefore, you must (a) be identical with that animal, (b) accept that animals don't think, or (c) accept that there is more than one thinker at R_1.
[93] Markosian 2004b, p. 423. This remark is about personal pronouns but applies to names in the same manner.

into contact with Romeo, the thinking *thing* ceases to be; it is dead. Therefore, appealing to reference does not solve the too many thinkers problem.[94]

Markosian would most likely bite this bullet. He could say that simple people, after all, are quite strange entities. Normal people are composite things constituted by *stuff*. Since a human being's *stuff* is constantly in flux, the human being can endure as a *thing*, but not as *stuff*; human *stuff* is not a human person. Simple people cannot endure in this way since they are destroyed upon contact with another MaxCon simple. This may seem counter-intuitive, but I think that Markosian does not have to bite this bullet. The problem with a simple person is that she constitutes an object; but why should we expect simples to behave exactly like composite objects? I see no reason why Markosian could not simply get rid of the claim that the Juliet *stuff* constitutes a Juliet *thing*. If simple Juliet is just *stuff*, then there is only one thinker: *stuff-Juliet*. The only reason one would have for believing that the *stuff* of Juliet constituting a thing is if one endorsed something like the following principle:

> **Necessity of *Stuff/Thing* Constitution:** If there is some *stuff*, then it necessarily constitutes a *thing*.

However, this principle might be too strong for the *stuff/thing* theorists; I cannot think of any non-question begging reason why they should accept it. One might argue that when people are in question, *stuff* necessarily constitutes a person. However, this begs the question against the *stuff/thing* theorists. Why do persons have to be *things*, especially when they are simple? Perhaps all of the puzzles of personal identity are results of failing to recognize a distinction between *stuff* and *things*. As long as there is something for each of the properties required for personhood to attach to, then there seems to be no good reason to think that it is problematic for the properties to be attached to *stuff*. After all, Descartes and many others held a similar dualistic ontology

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[94] Steen 2011, p. 147.

(although dualistic ontologies pose other problems). Therefore, as long as there is a satisfactory account of property attribution to *stuff*, then Steen's objection fails to gain traction against the *stuff/thing* ontology.

So far, the three-way debate between McDaniel, Markosian, and Steen has made certain assumptions about personhood: that it is an intrinsic property that can be attributed to material entities, whether they are *stuff* or *things*. However, there is an inherent danger in bringing people or thinkers into an already complicated argument about material objects. First, it complicates our set of intuitions about the various cases; the metaphysics of the inanimate are already complicated enough. Second, bringing people or thinkers into the debate requires importing views about the nature of personhood or thinking, and none of the philosophers in this debate are explicit about what views they hold. For instance, if one were a substance dualist, then any appeal to thinkers or persons as problems for simple objects makes no sense; the dualist would attribute this property to the mind, not the material body. One could also hold, like Van Inwagen, that personhood and thinking are material, but play by different rules than inanimate matter.[95] These are only two of the many options available to resist the claim that the properties of personhood or thinking thing attach to objects or *stuff*. While these sorts of questions will have to ultimately be accounted for, I believe that this is a backwards approach that only further muddies already muddy waters. Therefore, I think one can rightly regard all of the above arguments about simple thinkers with suspicion.

Markosian deals with several other objections in his "The Right Stuff."[96] I will not examine these objections further since they all seem to reduce to head-butting over whether *stuff* is possible. Markosian claims that *stuff* is possible and that it has many of the attributes that *things* have. However, *stuff* is not identical to *things*. His opponents

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[95] See Van Inwagen 1990.
[96] Markosian 2015.

argue that because *stuff* seems so similar to *things*, then there is no good reason for claiming that they are separate ontological categories. The fact that *stuff* and *things* are so similar, yet ontologically distinct, invites the question of why this is the case. It seems that the *stuff/thing* theory can only explain material constitution and simples at the expense of the unexplained similarity yet different nature of s*tuff* and *things*. Furthermore, an ontology with only *stuff* or *things* is more parsimoneous compared to the *stuff/thing* ontology. The *stuff/thing* ontology pays a heavy theoretical price.

What, then, is the final status of the MaxCon view? I believe that none of the arguments against the MaxCon view have shown it to be outright logically inconsistent. However, MaxCon does require the *stuff/thing* ontology to avoid the objections leveled against it, and this is not a cheap ontological commitment. Additionally, there are further reasons to be suspicious of the *stuff/thing* ontolog. By labeling his ontological categories as *stuff/thing* or matter/object dichotomies, Markosian invites confusion concerning *stuff* or matter. Part of the problem stems from the fact that in everyday language, the terms *'stuff'* and *'thing'* can be used interchangeably. Suppose that there is a pencil, a radio, and a watch battery on a table. One could utter, "there is some *stuff* on the table" or "there are some things on the table" to refer to the three objects on the table. Here are some other examples: (1) when entering an old attic "Wow! Look at all that stuff" compared to "Wow! Look at all these things!" or (2) "Did you hear the stuff he said to me?" vs. "Did you hear the things he said to me?" The only difference between these sentences is that *'stuff'* is a collective noun while '*thing'* is not.

However, this difference does nothing to elucidate the difference between Markosian's *stuff* and *thing*. Presumably, Markosian would agree with the statement that there are three *things* on the table. He could also agree with one interpretation of the statement about *stuff,* since *stuff* constitutes *things*. This interpretation of *stuff* does potentially have some everyday intuitional pull. For example, if one has a glass of water,

one might describe the glass as a *thing*, while describing the water as something other than *thing* (Markosian claims *stuff*). However, he cannot agree with the *stuff* statement about the pencil, radio, and watch battery when the statement references the pencil, radio, and watch battery explicitly: "There is some *stuff* on the table," "What kind of *stuff*?", "A pencil, a radio, and a watch battery." According to the *stuff/thing* ontology, the first speaker in this conversation is saying something false. Given that the *stuff/thing* ontology is supposed to help preserve commonsense statements about material objects (and *stuff*), it is a blow to the theory that one of its terms of art does not always produce true statements even when it is used correctly.

Obviously, Markosian is not tied to these everyday sorts of language use. He can simply choose a new term for the ontological type that he means, for example, *stuff**. However, I think this sort of move significantly weakens the plausibility of his ontology. Unlike the nihilist or universalist, Markosian does not give us necessary or sufficient conditions for *stuff*; he relies on an intuitive understanding of the concept, and this intuitive understanding is tied closely to our everyday language usage of *'stuff'*. Since *'stuff'* is ambiguous between *thing* and *non-thing* (I think it would be wrong to attribute an ontological usage of *stuff* to the ordinary speaker), one might begin to suspect that there is no difference between the categories of *stuff* and *thing* at all.

In conclusion, I think that if one has already accepted the *stuff/thing* ontology, then endorsing MaxCon is a natural extension of the view. On the other hand, I think that MaxCon is not enough of an independent motivation to take on that ontology. This is because a *stuff/thing* ontology is highly revisionary, while the proposed MaxCon analysis is much less so. It seems like a good philosophical principle that a non-revisionary view's plausibility should not depend on endorsing a revisionary view. Therefore, I would reject MaxCon as an answer to the Simple Question.

Now that I have concluded my analysis of various answers to the Simple Question, I will discuss another interesting problem concerning the nature of simples. This problem only applies to views that allow for the possibility of extended mereological simples. If one supposes that these kinds of simples are in fact possible, then interesting questions arise about what kinds of properties these simples can have.

2.6 The Natural Property View of Simplicity

Natural properties provide another approach for answering the Simple Question. Since natural properties are often included in one's ontology for other reasons (such as an account of qualities), natural properties are an elegant solution to the Simple Question. Simple objects are the objects that instantiate at least one perfectly natural property. McDaniel calls this answer the "Instance of a Fundamental Property" answer:

> **The Instance of a Fundamental Property View of Simples (Instance)**: *x* is a simple if and only if *x instantiates* some perfectly natural property *P*.[97]

The concept of perfectly natural properties is attributed to David Lewis. He claimed that naturalness comes in degrees, and that the perfectly natural properties carve nature at the joints; they are the fundamental properties of a world.[98] For example, the property 'being negatively charged' is perfectly natural. This property can be used to explain a whole host of causal relationships not only at the subatomic level, but at the macroscopic level as well. The property of 'being alive' is a natural property, but not a perfect one. This property is natural since it has a somewhat clear extension that is independent of human usage. However, 'being alive' is plausibly explainable by collections of other, more natural properties, such as molecular, atomic, or subatomic properties. Finally, the property of 'being a skyscraper' is even less

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[97] McDaniel 2009, p. 242

[98] See Lewis 1983. One could also think of perfectly natural properties as intrinsic properties. However, one might believe that terms "perfectly natural properties" and "intrinsic properties" have different semantics. But for my purposes here, nothing rides on this distinction. Also see Dorr & Hawthorne 2013 for a recent discussion of how to understand natural properties and the problems with these views.

natural. It does not seem to be important to the natural world in the way that 'having negative charge' or 'being alive' are. Typically, properties that are not perfectly natural will either supervene on perfectly natural properties or reduce to perfectly natural properties. So the property 'having negative charge' supports the less natural properties of 'being alive' and 'being a skyscraper.'

One might object that it is possible for composite objects to have perfectly natural properties. For instance, a chlorine ion seems to have the property of -1 charge, but a chlorine ion is also composite object; it is made up of protons, neutrons, and electrons (and protons and neutrons are made up of quarks, etc.). Therefore, given Instance, the chlorine ion is a simple, which is impossible since a chlorine ion is composite. Notice that this objection is not a problem for the nihilist, since the nihilist rejects the existence of composite objects; only simples can instantiate perfectly natural properties. However, defeating this objection may be worthwhile for those who do not accept nihilism, so I will provide a rebuttal. This objection is misguided since it takes the property of -1 charge to be identical to the property of having a *net* charge of -1. While the property 'having a net charge of -1' is a natural property, it is not a perfectly natural property since it is the sum of the perfectly natural properties instantiated by the protons and electrons of the atom. So while composite objects can have properties that are natural to a high degree, they cannot have perfectly natural properties.

This point can be generalized to any composite object that supposedly instantiates a perfectly natural property. Since the composite object has parts, then either (i) the composite object's smallest parts have perfectly natural properties, (ii) the composite object has the perfectly natural property, and that propertiy is partially instantiated by the object's parts, or (iii) the composite object has the perfectly natural property, but its parts have no other properties besides mereological and spatial properties. Option (ii) is absurd. How could a fundamental property such as -1 charge be

partially instantiated by an object's parts? Suppose that there is a composite object x that has -1 charge and also has two halves y and z. If (ii) is true, then y and z either instantiate the property of $-\frac{1}{2}$ charge, or they instantiate the property of -1 charge. If the former is the case, then -1 charge is not a perfectly natural property since it depends on the property of $-\frac{1}{2}$ charge. If the latter is true, then x has a charge of -2. As for option (iii), I will assume that it is false for now, since I will provide a thorough argument against it in Chapter 5. Since options (ii) and (iii) are false, it must be the case that composite objects never instantiate perfectly natural properties. Therefore, any object that instantiates a perfectly natural property is a simple.

However, one might deny Instance because one thinks that mental properties are perfectly natural properties and mental properties are instantiated by human beings.[99] McDaniel argues for this claim by appealing to the possibility of zombie worlds. A zombie world is a possible world where everyone in the actual world has a doppelganger that acts exactly as the people of the actual world do. However, the people of the zombie world have no mental properties; they are not conscious. If this is a real possibility, then it is possible for perfectly natural properties to be instantiated by composite objects. While this objection has some force, it also introduces the complicated debate over what mental properties are and how they are instantiated. Since there are many views on these issues that are compatible with Instance, this objection will only move those who already think that mental properties are instantiated by composite objects.

As previously stated, nihilists can easily accept Instance without additional metaphysical commitments, since Instance is a problem only for ontologies that contain composite objects. In fact, I believe that Instance and nihilism complement each other. Nihilism already entails that all perfectly natural properties are instantiated by simples, so Instance is certainly a sufficient condition for something being simple. All the nihilist

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[99] See McDaniel 2007a, p. 249

needs to show is that Instance is a necessary condition for an object being simple. If Instance were not necessary, then it would be possible for a simple to either have no properties at all, or to have an intrinsic non-natural or non-fundamental property.

I will discuss the second disjunct first. I have a hard time making sense of non-natural properties that are instantiated by simples. For example, if a simple has the property of 'net negative charge,' it either has the perfectly natural property of 'negative charge' or it has several perfectly natural properties that supervene on or ground the property of 'net negative charge'.[100] In the first case, it is true that an electron that has the property of '-1 charge' also has the property of 'net -1 charge'. However, the net property is redundant; it does no work. In the second case, the electron must bear multiple perfectly natural properties, such as three of the property '-1 charge' and two of the property '+1 charge' in order to have the property 'net -1 charge'.

This is a flagrant violation of Occam's razor. There is no reason to think that a simple with -1 charge instantiates multiple combinations of perfectly natural charge properties that add to a net of -1 charge. Therefore, claiming that a simple can have a property that is not perfectly natural entails that the property that is not perfectly natural will be superfluous, or that the simple must have a superfluous amount of perfectly natural properties. Furthermore, properties that are not perfectly natural are supposed to supervene on properties that are. If these non-natural properties are independent of the other intrinsic properties of a simple, then they are not grounded in the simple's perfectly natural properties and are therefore free-floating ontological garbage; Occam's razor demands their removal.

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[100] I suppose one could reject the superveneince/grounding claim. This has several disadvantages. First, since perfectly natural properties are discovered by science, rejecting the supreveneince/grounding of non-natural properties (net -1 charge) by natural properties (-1 charge) runs against the scientific account of such properties. Second, this results in an ontology that incurs the theoretical cost of these non-natural properties, as well as lack of an explanation for why these properties seem to be related to natural properties, even though they are distinct.

If the first disjunct is true, "thin particulars" must be possible.[101] Thin particulars are entities that have no properties but do have some sort of structure that is capable of instantiating properties. Thin particulars would not only have to be possible, but capable of existence without property instantiation. This is implausible for several reasons. First, a thin particular has no properties other than 'being a thin particular'. For instance, a table without its properties is a thin particular. But a table without properties seems to be no table at all (this objection is similar to Lewis's objection to endurantism; this will be discussed in Ch. 3). Second, since properties explain the qualities of the table such as its perceptual appearance, causal powers, and so on, there seems to be no purpose for these thin-particulars. They are ontologically superfluous, and Occam's razor dictates they should be cut out.

However, thin particulars might be suggested by the supersubstantivalist view.[102] If there are true empty regions of space (regions of space with no properties), then these regions are prime candidates for bare particulars.[103] If this is the case, then the objection that bare particulars have no purpose fails since there must be bare spacetime points to account for the extrinsic relations between properties that are pinned to a given point of spacetime. In other words, if we want to make sense of the claim that one electron is a certain distance from another, then there must be spacetime in between the two electrons to account for the distance.

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[101] See Armstrong 1989 pp. 60-61 for the term "thin particulars." He uses this term in his discussion of Locke's account of properties. For example, a table has the properties of harness, browness, and so on. But we do usually think of the table as a collection of these properties. On one interpretation of Locke's view (Armstrong argues that Locke may have postulated the thin particular as simply epistemologoical), the properties attach to the thin particular.

[102] Supersubstantivalists claim that spacetime is the only substance; objects are simply properties instantiated by regions of spacetime.

[103] It is my understanding that most physicists believe empty regions of space to be impossible. That is, any region of space has some energy fluctuation occurring within it even if that energy fluctuation averages to zero. See Greene 2003 p. 119-20 a minimum amount of energy, even if that energy is practically zero. However, there is no reason to think this is a necessary property of spacetime.

In response, one might argue that the property *being a point of spacetime* is a perfectly natural property. In fact, I believe this to be correct since spacetime points fit the previously discussed rough criteria for being a perfectly natural property: (i) they are fundamental in explanations of causal relations, (ii) they ground larger entities, such as spacetime regions, and (iii) there seem to be no further entities grounding spacetime points. Without any reason to treat the claim otherwise, I will proceed with the claim that *being a spacetime point* is a perfectly natural property. If my arguments above are correct, then it is necessary that all simples have at least one perfectly natural property: the property of belonging to an ontological category. Therefore, Instance provides both necessary and sufficient conditions for simplicity.

Instance has several advantages over other answers to the Simple Question. First, Instance is compatible with any worlds that contain point-sized simples, spatially extended simples, or both. Second, Instance is also compatible with the supersubstantivalist view that takes spacetime to be the only material substance. A simple in a supersubstantivalist world is either a spacetime point that instantiates a perfectly natural property or the smallest spatially extended simple region of spacetime that instantiates a perfectly natural property. Finally, Instance accommodates the model of explanation (discussed previously) that uses the smallest facts about a world to ground the other facts of that world.[104] In summary, Instance provides an elegant answer to the Simple Question and has the virtue of being compatible with many other metaphysical claims.

2.7: Qualitatively Heterogeneous Extended Simples

The problem of Qualitative Heterogeneity is roughly this: How can a spatially extended simple have qualitative variation with respect to its intrinsic properties? For instance,

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[104] Of course, philosophers who take a top-down approach to metaphysics would not hold this intuition.

how could a simple sphere have a bumpy "half" and a smooth "half," or a simple statue have a gold "body" and blue "eyes"?[105] This problem deserves attention for at least two reasons: (1) if extended simples are possible, then it seems to be conceivable that they can have qualitatively heterogeneous properties, and (2) if the world is one large extended simple, then it must be qualitatively heterogeneous and this is a metaphysical thesis worth exploring. Yet, as McDaniel's Argument from Spatial Intrinsics (previously discussed in 2.5) shows, there seems to be strong evidence for denying the possibility of heterogeneous extended simples. However, many philosophers have responded to the argument with analyses of qualitative heterogeneity that offer purported solutions to the problem. I have already discussed and rejected Markosian's stuff/thing ontological solution to the puzzle. In this section, I will discuss several other attempts to provide an analysis of a qualitatively heterogeneous simple, none of which I believe to be successful.

There are several solutions to this puzzle, but two of the most interesting are McDaniel's trope view and Parsons' distributional properties view.[106] It should be noted that both of these solutions require a set of metaphysical commitments that have wide ranging implications for other metaphysical issues. McDaniel's view relies on a background commitment to trope theory. Trope theory is typically used to solve the problem of seemingly universal properties: how can two or more distinct objects have identical properties? McDaniel uses tropes to account for the seeming identity of properties: "A trope is both a particular and a quality. On the trope-theoretic view, x and y are both F if and only if they each exemplify their own F-trope. Properties such as

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[105] The quotation marks indicate words that would be paraphrased away once an analysis of qualitative heterogeneity is worked out.

[106] See Spencer 2010, p. 168-9. One strategy involves indexing color properties to regions, for example a red block is a block that has the property of-being-red-at-R. The second and third strategies are endurantist strategies that analyze claims of redness as relations instead of properties (these will be discussed further in chapter 3). The second strategy is to analyze the red block as a block that bears the is-Red relation to a region. The third endurantist strategy is to analyze the red block as a block that bears the having-at-a-region relation to redness. Since I reject endurantism, I will not consider these views here.

being *F* are maximal classes or maximal mereological fusions of perfectly resembling tropes."[107] Using trope theory, the claim that "there is a green block" refers to a block that exemplifies a green-trope. The similarity between the green block and some other green thing, such as a green blade of grass, is grounded by each thing's membership in a maximal class of green-tropes or their being part of the fusion of the green-trope class.

Before I discuss how the trope view applies to an analysis of heterogeneous extended simples, I want to take stock of the various metaphysical commitments involved in this trope-theoretic analysis. Obviously, the view includes tropes in its ontology. The view also needs some sort of relation to connect these tropes to their objects. This relation could be some sort of instantiation relation, or simply identity. The trope-theoretic view also requires a primitive relation of maximal resemblance; in other words, there is no informative explanation of the shared characteristics of any two tropes other than they are in this resemblance relation. The trope-theoretic view also requires a view of composition that allows for fusions of tropes or an ontological commitment to natural classes. McDaniel endorses unrestricted mereological composition already, so he does not need to take on natural classes in order to motivate the trope theoretic view.

But how does this apply to extended heterogeneous simples? Consider a spatially extended simple that is square shaped; call it *S*. Suppose that *S* appears to have a green half and a purple half. Since *S* is simple, it does not have any halves. Since *S* has no halves, an analysis of *S* cannot use the standard strategy of attributing properties to parts. Instead, McDaniel says that tropes are instantiated by regions of space. Even though *S* is simple, *S* still occupies a region of space, *R*, and *R* includes two subregions, r_1 and r_2. One of these hemispherical subregions instantiates a green-trope, while the other subregion instantiates a purple-trope. Therefore, *S* seems to have a green half because it overlaps the green-trope at r_1. I find this analysis somewhat puzzling; it seems open to

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[107] McDaniel 2009, p. 327

the same objection to Markosian's analysis of the problem of qualitative heterogeneity: the tropes do not seem to be tied to the extended simple in any meaningful way. Instead, the tropes are instantiated by a subregion of the region occupied by *S*. This is the same account of property instantiation given by the supersubstantivalist. Retaining material objects that do not instantiate properties seems ontologicaly costly. One could hold onto these objects because of one's commitment to extended simples. However, I believe it is more reasonable to simply give up the possiblity of such simples in exchange for the parsimony of supersubstantivalism.

Alternatively, one could make the claim that the tropes stand in the constitution relation to the simple. However, there is no way to make sense of this claim without using mereology. If a simple is constituted by two tropes, then it is either identical to the tropes or the simple is a separate entity standing in a one-many relation to the tropes. The simple cannot be identical to the tropes since identity cannot hold between two different quantities. One could also claim that the constitution relation attaches tropes to extended simples in a way that preserves simplicity. However, this is an *ad hoc* strategy that introduces a mystery primitive relation that gives no further insight on the mechanics of qualitative heterogeneity.

Joshua Spencer argues against McDaniel's trope view by appealing to the possibility of extended regions of space that have no proper subregions.[108] Spencer argues that these regions of space are obviously incompatible with McDaniel's trope view. Suppose that the extended simple *S* occupies a simple region R_s instead of a composite region *R*. By supposition, *S* appears to have a green half and a purple half. However, since R_s does not contain any subregions, the green-trope and the purple-trope

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[108] Given that McDaniel is already committed to extended simples, the inclusion of extended regions of space in his ontology make for nice theoretical symmetry and consistency. An example of a simple region of space is the Planck length: ($1.616229(38) \times 10^{-35}$ meters). The Planck length is an extended region of space where the laws of classical physics and relativity do not hold.

can only be exemplified at R_s. This, of course, is contradictory; R_s cannot exemplify two color-tropes at the same time.[109] In order to evade this problem, McDaniel would have to either reject the possibility of extended simple regions of space and sacrifice theoretical consistency, or accept anti-Humean necessities that objects and properties can occupy spatial regions. One may be willing to pay that price, but his prior Humean commitments make this an unsavory instance of bullet biting.

Josh Parsons argues that a special kind of property, a distributional property, can allow for heterogeneous extended simples. In everyday conversation, we talk about distributions. We describe a chessboard as having a certain distribution of black and white squares. Typically, this is just shorthand for describing the variety of color properties and locations of those color properties instantiated by the board. However, Parsons claims that the chessboard only has one color property: the property of the board's particular distribution of white and black squares.[110] None of the board's parts have this distributional property; the distributional property is not composed of or constituted by the individual squares' color properties. Instead, the individual squares have their color properties because the board has a specific distributional property.

Spencer argues that using Parsons' account of distributional properties as an analysis of qualitatively heterogeneous simples entails unwelcome brute facts about the world. Spencer begins by considering several heterogeneous simple statues that have red stains at various locations: the left foot, the right foot, the forehead, and the nose. Suppose that there is a factory that produces these statues. Here is my interpretation of the argument:

> P1. Assume that there are wholly distinct distributional color properties for every way that a given statue can be stained.

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[109] I have modified Spencer's argument somewhat in order to continue to use the simples from McDaniel's example; Spencer's original argument involves statues instead of circles.
[110] See Parsons 2000, pp. 13-20.

P2. Suppose that the statues can be manufactured with any combination of stains on the right foot, the left foot, the forehead, and the nose.

P3. There are 16 combinations of red stained statues.

P4. Since distributional properties are wholly distinct, then it is necessary that a statue must have only one distributional property.

C. Therefore, there are exactly 16 necessary distributional properties.

According to Parsons, distributional properties are wholly distinct from one another; there is no overlap in the each of the 16 properties even though they all involve the quality 'red'. Spencer claims that if one accepts the distributional properties view, then one must take the fact that there are exactly 16 ways the statues could turn out as a brute necessity. It may not be immediately clear why this is a problem, so it will be helpful to briefly examine Spencer's argument in detail.

Spencer uses an argument from Ted Sider's "Against Monism" as inspiration. Sider argues against substance monism (such as that defended by Schaffer) by showing that the monist cannot explain certain facts about the size or the structure of a statespace.[111] Consider a possible world consisting of a screen with a 4x4 row of pixels. Each of these pixels can be turned on or off. Since there are sixteen pixels and each pixel has two states, then there are 2^{16} possible configurations of the statespace. Sider argues that anyone who rejects monism has an explanation of this numerical fact. Sider says the explanation consists of the following facts: "(i) there are 16 pixels, each of which has two available fundamental states; (ii) the fundamental states of the system include only the states of the individual pixels; and (iii) the possibilities for the entire system are generated combinatorially from the entities in the system and the fundamental states those entities can inhabit."[112] If monism is true, then the fact that there are 2^{16} possible

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[111] Sider is arguing against maximal monism, not priority monism. A statespace is the set of all the possible values that a system can have. For example, a statespace consisting of a binary gate (such as those used in computer processors) has 2 values: 0 or 1 (off or on).

[112] Sider 2007, 3. Note that this point generalizes to any number of binary entities within a statespace. For n objects with binary values, there will be 2^n possible configurations of the statespace.

configurations of the statespace is a fact about the entire world, since the world is the only object in the monist's ontology.

The success of this argument hinges on metaphysical explanation. Anyone who rejects maximal monism can appeal to the various pixels and their states to explain the fact that there are 2^{16} possible configurations, while the monist can only insist that the world has the primitive property of the statespace configuration. It is important to note that Sider's argument requires the assumption that the best account of metaphysical explanation begins with the fundamental facts and uses these fundamental facts to generate general facts. In the above example, facts about the pixels ground facts about the statespace. The virtue of this approach is that a small number of fundamental facts can ground or explain a large number of general facts; this approach keeps the set of brute facts as small as possible. In contrast, the maximal monist must hold that both the general facts about a statespace and the smaller facts about that statespace are just facts about the world; there is no explanatory connection between them. Of course, one could always take the priority monist route and claim that general facts of the world are fundamental and that these facts ground the smaller facts.[113] As a nihilist, I endorse Sider's bottom-up model of explanation, so I will assume the model's correctness.

In light of the above discussion, the similarities between Sider and Spencer's argument should be apparent. Spencer's factory can be described as the statespace of the system, and the four stains are the binary gates of the system. A system with four binary gates has 2^4 possible values, so the factory can produce 16 possible types of stained statues. A standard account of properties explains the 16 possible stained statues by grounding them in the four different locations where redness is instantiated. The advocate of distributional properties must claim that there are 16 distinct distributional properties and that there is no similarity between a statue with the distributional

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[113] See Schaffer 2010.

property of having two stained feet and a statue with the distributional property of having a stained left foot.

McDaniel argues that a distributional properties view must not only take the relation of resemblance as primitive, but also the additional relation of resemblance with respect to F.[114] While one may balk at a primitive relation of resemblance, many philosophers find it necessary. For example, trope theorists are already committed to primitive resemblance between tropes, and counterpart theorists are committed to resemblance between counterparts. However, the distributional properties theorists cannot explain certain resemblance with sentences of the form x resembles y. Suppose there is a square that is blue and a circle that is a slightly darker shade of blue; these objects resemble each other with respect to color, but not to shape. The trope theorist can account for the similarity between x and y by claiming that each object instantiates a blue trope, and these blue tropes resemble each other while they x and y also instantiate shape tropes that do not resemble one another.

However, the distributional properties theorist cannot say this since distributional properties are unique to the whole object; the square has the distributional property of being-square-shaped-and-having-blue-color-distribution. These distributional properties are not fine-grained enough to allow for similarity with respect to independent qualities. Therefore, distributional properties cannot account for the resemblance of two shapes with respect to colors. The only way that defenders of distributional properties could counter this objection is to advocate brutal similarity, and I have already argued against brutal-type views.

The defender of distributional properties is already in trouble. They also face a further problem: the fact that the four stain locations allows one to infer the 16 possible stain configurations. However, if the distributional properties view is true, then one's

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[114] See McDaniel 2003, p. 329

knowledge of the four distributional properties should make this inference impossible, since knowledge of these distinct distributional properties does not allow the inference of the other 12 possible distributional properties.

This can be made clear through a simple analogy. Suppose that the residents of some world w have only experienced two colors red and yellow until some time t. At t, a new color, orange, appears in w. Anyone who lived in w before t could not infer what orange would look like from their knowledge of the previous two colors even though orange is the combination of the two colors.[115] This inability to make the inference results from the qualitative experience of color properties being distinct from one another. Similarly, defenders of distributional properties are committed to distributional properties being distinct from one another. In other words, knowledge of one distributional property does not allow the inference to another seemingly similar distributional property. Therefore, distributional properties should be rejected since they require a brutal relation of similarity and cannot support our ability to make certain inferences.

Since the two most promising views for analyzing qualitative heterogeneity fail, the possibility of qualitatively heterogeneous simples is contingent on a forthcoming successful analysis. This makes for a strong case against heterogeneous extended simples. Spencer makes a final argument against that possibility of these simples:

P1. If it is possible that there is a heterogeneous simple that occupies an extended composite region of space, then it is possible that there is a heterogeneous simple that occupies an extended atomic region of space.
P2. It is not possible that there is a heterogeneous simple that occupies an extended atomic region of space.

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[115] Of course, they may infer that they could possible see other wavelengths of light with enhanced perceptual faculties. However, they still could not infer the qualitative nature of these wavelengths.

C. So, it is not possible that there is a heterogeneous simple that occupies an extended composite region of space.[116]

Any defender of qualitatively heterogeneous extended simples will hold that it is possible for there to be an extended simple cube that appears to be half blue and half green and that this cube occupies a composite region of space. Spencer defends P1 by appealing to the Humean idea of modal recombination. If atomic regions of space and composite regions of space are possible, then the properties of being composite or being atomic are intrinsic properties. Furthermore, given Humean recombination, it is possible that both types of regions co-exist at some world w.

Now suppose that in w there is a cube shaped atomic region of space that completely overlaps the blue-green simple cube. If P2 is true, then the cube cannot maintain its qualitative heterogeneity and occupy this region of space. Spencer and I have already made the case for P2; it could only be true if there are contrasting tropes that attach to an extended simple or if there are distributional properties instantiated by extended simples. Since neither of these options is possible, then there can be no heterogeneous simples that occupy atomic extended regions of space. Now, if one attempts to move the cube into the extended region of atomic space, then one of two things must occur: (1) the cube fails to enter the space, or (2) the cube's color becomes homogenous.

Each of these options is absurd; there is no barrier or force between the two regions of space that could prevent the entry of the cube. Any claim to the contrary makes a necessary connection between movement and color properties; either color properties necessarily prevent movement into a region or they necessarily change when moved into a region. This is a clear Humean violation and unacceptable. In summary,

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[116] See Spencer 2008, p. 179. This argument hinges on the possibility of extended atomic regions of space. If one finds these atomic regions unacceptable, the argument is not sound. However, the case against qualitatively heterogeneous extended simples is still quite strong.

the possibility of a qualitatively heterogeneous simple occupying a composite region of space entails the possibility of a world with extended atomic regions of space. In this world, there must be anti-Humean necessities about movement and qualitative properties. Therefore, qualitatively heterogeneous simples are impossible.

In this chapter, I have surveyed the various answers to the SCQ and argued that nihilism is the most promising answer to this question. I have also discussed the Simple Question and its proposed answers. I have shown that many answers to the Simple Question are problematic for philosophers who endorse composite objects, but that the nihilist view is compatible with all answers to the Simple Question. This gives nihilism a considerable advantage over universalism. Furthermore, not only is nihilism compatible with every answer to the Simple Question, but it also entails that Instance provides the necessary and sufficient conditions for simplicity. The nihilist can answer the Simple Question without invoking extra claims of necessity or additional ontological commitments. For the nihilist, this is an even greater victory over the universalist.

I have also argued that the most promising accounts of qualitatively heterogeneous extended simples are false. Furthermore, with the assumption of the possibility of extended atomic regions of space, Spencer's reductio succeeds. Therefore I feel confident in rejecting the possibility of qualitatively heterogeneous extended simples. In chapter 3, I will show that this outcome is poses a serious problem for endurantists.

Chapter 3: Time and Persistence

This chapter will focus on how objects persist through time. A discussion of persistence first requires a discussion of the existential status of the past, the present, and the future. I have used the Special Composition Question as a model for stating the two central questions that this chapter will aim to answer:

> **The Special Temporal Question (STQ):** Under what conditions, if any, do past, present, and future times exist?

> **The Special Persistence Question (SPQ):** Under what conditions, if any, do objects persist through time?

The STQ inquires about the metaphysical nature *of* time, while the SPQ inquires about how objects exist *in* time. Like the SCQ from Ch. 2, the STQ and the SPQ have three answers: "always", "sometimes", and "never". I will first discuss the STQ and it answers. Later in the chapter, I will discuss the SPQ and its answers.

Eternalism is the "always" answer to the STQ; it claims that all times equally exist. There are various sometimeser answers to the STQ: the moving spotlight view, the growing block view, and presentism to name a few. Presentism, the most popular alternative to eternalism, is the view that only the present instant of time exists. One could also be a temporal nihilist, a "never" answer to the STQ. The temporal nihilist would claim that no times exist whatsoever.[117] Differentiating theories of time can be somewhat confusing since theories of time are closely related to theories of tensed propositions. Throughout the rest of this section, I will take care to separate the two issues from one another. However, it will become apparent that some of the various theories of time and tensed propositions are compatible with another, and this

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[117] McTaggart 1908 argues that time is an illusion. His arguments are widely considered invalid, and few if any contemporary philosophers would endorse temporal nihilism. However, many eastern religious and spiritual traditions have argued that time is an illusion, so temporal nihilism's lack of current popularity does not justify an immediate rejection of the position. The issue bears further investigation, but I will not pursue it here.

compatibility makes it easy for one to lose track of whether the discussion is focused on answering the STQ or providing an analysis of tensed propositions.

3.1: A & B Theories of Time and Tensed Propositions

In his paper, "The Unreality of Time," McTaggart identifies what he calls the A-series and B-series of time.[118] The A-series is of a series of events that have temporal properties, which McTaggart calls A-properties, such as (where *x* and *y* are events): *x is past*, *x is present*, or *x is future*. Notice that the truth-value of an A-series proposition depends on the time that the proposition is evaluated at. For instance, if the proposition "the concert is past" is evaluated before the concert has happened, then it is false; if the proposition is evaluated after the concert, then it is true.

The B-series consists of a series of temporal relations, which McTaggart calls B-relations, between times. Some examples of B-relations include: *x is earlier than y*, *x is simultaneous with y*, or *x is later than y*. Unlike the propositions of the A-series, the truth-value of propositions analyzed with B-relations does not change with respect to different times of evaluation. This is because the relations of the B-series have the same truth-value at any given time. For example, consider the B-relation *Beethoven's life was before Stravinsky's life*; this proposition is true at any time. It was true in 400 B.C.E, it was true during the life of Beethoven, it is true now, and will continue to be true in the future.[119]

Before I further discuss the metaphysics of the A-theory and the B-theory, it will be helpful to understand how the A-theory and the B-theory analyze tensed propositions. The A-theory of time takes A-properties as primitive; the A-properties ground the B-relations. Conversely, the B-theory takes B-relations as fundamental; the B-relations

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[118] ibid.

[119] If one thinks that future events are indeterminate, then one might worry that the proposition in question is not true until both Beethoven and Stravinsky have existed. If this were the case, then only B-relations that involve determinately existing relata would be true at any time.

ground the A-properties. These A-properties and B-relations are supposed to ground the semantics of tensed propositions. The main difference between A and B-theories of tensed propositions is that, in the words of Zimmerman, A-theorists "take tense seriously," while B-theorists do not.[120] The can be illustrated with an example. Consider the following sentence:

(1) "Hungry Tyrannosaurs presently exist."

Is (1) true or false? This depends on how tense is incorporated into a proposition. The A-theorist understands (1) to really be the proposition:

(2) There *presently* exists an x such that x is a Tyrannosaurus and x is hungry.

From the vantage point of the present time, (2) is false since there are no Tyrannosaurs at this time, hungry or otherwise. However, if the time of evaluation was during the Cretaceous period, then (2) is true since there were Tyrannosaurs that were undoubtedly hungry during the Cretaceous. In contrast, a B-theorist analyzes (1) as the following proposition:

(3) At some time t, there exists an x such that x is a Tyrannosaurs and x is hungry.

If t is a time during the Cretaceous, then (3) is true, no matter when it is evaluated. Since speakers do not typically say things like (3) the reference to some time t must either be a hidden feature of the semantic content of (1), or it must be placed in the conversational context of (1). The B-theorist that embraces this analysis makes the claim that the propositions we express with our utterances are all tenseless; tense is simply an illusion of our language. This is why the *presently* from (1) disappears in (3).

In (3) the B-theorist uses a predicate like *is located at t* to account for the tense of (1) and reduce the tense of (1) to tenseless B-relations. However, since A-theorists take tense seriously, they must introduce a temporal operator to account for the "presently" of (2); this operator can be represented as **P$_r$**. With **P$_r$**, (2) can be analyzed as follows**:**

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[120] See Zimmerman 2005.

(4) $\mathbf{P_r}$ (there exists an x such that x is a Tyrannosaurus and x is hungry)

Not only will A-theorists have to make use of $\mathbf{P_r}$, but they will also have to use the operators $\mathbf{P_t}$ (past) and $\mathbf{F}$ (future) to account for past and future tensed statements. For example, the presentist analyzes the claim that "There was a hungry Tyrannosaurus" as follows:

(5) $\mathbf{P_t}$ (there exists an x such that x is a Tyrannosaurus and x is hungry)

Unlike (4), (5) is true even though both (4) and (5) the range over the same content. It is important to point out that (5) does not commit one to the existence of Tyrannosaurs; $\mathbf{P_t}$ restricts the existential claims inside the parentheses. With these temporal operators, tensed propositions do not have to reduce to propositions without tense.

3.1.1: The Privileged Present and Presentism

In order for tensed propositions to be evaluated, there must be some metaphysically privileged present moment. To see why this is the case, it will be helpful create an A-theory function that evaluates the truth of tensed sentences; call this function T_A. This function takes a proposition with a temporal operator as input and outputs a truth-value. The truth-value is determined by whether or not the tensed proposition refers to existing things or events. If T_A takes (2) as an input, then the output is that (2) is false because the proposition does not match the present moment's state of affairs. In order for T_A to output proper truth-values, there must be something special about the present time that allows T_A to pick it out from all the other times it could use as inputs. Therefore, A-theory requires the following claim:

Privileged Present (PP): the present time is somehow metaphysically privileged over past and future times.

There are two types of views that accept PP: presentism and hybrid theories. Each of these views falls under the "sometimeser" category of answers to the STQ. Presentism is

the view that only the present time exists, and it is by far the most widely defended.[121] For the presentist, the present moment is privileged because it is the *only* existing time; past and future times simply do not exist. In this way, presentism is analogous to *actualism*, the claim that only the actual world exists. Just like the presentist denies the existence of any times other than the present, the actualist denies the existence of any possible worlds other than the actual world we inhabit. Both of these views claim that the only things that exist are the ones that we are able to perceive.

There is a strong intuitive pull to the claim that we are justified in believing presentism or actualism because of our experience with the world. Presentism and actualism are both views about where and when things are located. More specifically, they claim that there is only one temporal or modal space; there is only one time and only one world. It is natural to extend this view to the other category of location: space. What would this sort of view be like? In order to refer to the present time, we use the indexicals "now" or "present" to pick out the time. The corresponding spatial indexical is "here," so I will call this view *hereism*. The hereist claims that there is only one space, the space picked out by "here." It follows that anything that is not "here" does not exist. Hereism runs into the immediate problem that very few people believe that spaces beyond the one they currently inhabit do not exist. In fact, this belief seems to be a form of solipsism, since existence depends on where one is located. Nothing outside of one's current space exists. Whether hereism is a genuinely fruitful theory is beyond the scope of this dissertation. However, it is worth noticing that while many people find themselves with presentist and actualist intuitions, they do not find themselves with hereism intuitions. For the sake of a unifying theory, perhaps the presentist ought to defend actualism and hereism. Given the problems with hereism, this would make presentism

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[121] For defenses of presentism see Prior 1967 and 1968, Bourne 2006, Hinchliff 199, Zimmerman 1996 and 1998, Markosian 2003, and Sullivan 2012.

much more unattractive. In fact, one might argue that since hereism is problematic and is also analogous to presentism, then presentism is just as problematic as hereism.

However, this argument cuts both ways. Eternalism (discussed below) is the claim that all times exists equally. Similarly, call the view that all spaces exist equally, *everywhereism*. Everywhereism is incredibly plausible. Therefore, whatever plausibility everywhereism has can transfer to eternalism. Eternalism itself is also a plausible view of time. However, the modal correspondent of everywhereism and eternalism is modal realism, the claim that all possible worlds exist equally. This claim is typically taken to be outrageous and absurd. So just as hereism cuts against the plausibility of actualism and presentism, modal realism may cut against the plausibility of everywhereism and eternalism. Therefore, without strong reasons to accept modal realism or hereism, both families of views have to deal with theoretical asymmetry.[122]

While hereism might be used to create problems for the presentist, presentism is by no means a fruitless theory. It has the advantage of both qualitative and quantitative parsimony. However, presentism must also account for the truth of propositions concerning the past or the future. *Prima facie*, this is a problem for presentism; how can a proposition concerning the past be true if there is no past at all? This is the Truthmaker argument against presentism. In short, it is as follows:

P1. Suppose presentism is true.
P2. The truth of a proposition is grounded in the concrete world.
P3. There are true propositions about the past.
P4. If presentism is true, then past times do not exist.
P5. If past times do not exist, then propositions about the past have no truth-value.
C. Therefore, presentism is false.

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[122] Although I do not have the space to devote to it here, one might argue that the reasons given in support of presentism translate to reasons to support hereism (or reasons for eternalism support modal realism). If hereism (or modal realism) is absurd and the reasoning for it is similar to the reasoning for presentism (or eternalism), then the case for presentism (or eternalism) is undermined.

The standard presentist response is to deny P2 and simply claim that the truth-value about past and future propositions is primitive. While this answer provides an answer to the initial objection, it also incurs a large theoretical cost for presentism. This cost makes presentism an unattractive answer to the STQ. This is only one of the reasons that I reject presentism. Of course, the truthmaker argument and the various responses to it are more much complicated than my brief presentation. However, it is outside the scope of this project to provide an in-depth analysis of the objection and presentism in general.[123] Therefore, I will simply assume that presentism is false for the remainder of this project.

3.1.1: Hybrid Theories of Time

The moving spotlight theory and the growing block theory are both hybrid theories of time. Hybrid theories of time accept PP, but deny presentism. In other words, they believe that the present is special, but that at least some other times exist beside the present time. I reject both of these views. In what follows, I will briefly discuss each of these views and provide some brief arguments against them.

The moving spotlight view claims that all things and times eternally exist, but that the present is still somehow privileged over the past and the future. C.D Broad explains this view by likening the present moment to a moving spotlight (hence the name).[124] Time is like dark yard that contains a spotlight. The spotlight momentarily illuminates certain regions of the yard in the same way that the present "illuminates" a region of the spacetime manifold. When the spotlight illuminates an object in the yard, a doghouse for instance, the doghouse is visible; with regards to visibility, the doghouse is privileged over the other things in the yard. Analogously, when a time is present, it becomes privileged over the other times of the manifold.

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[123] See Sider 2001, pp. 35-42 for an extensive overview of the Truthmaker arguments and responses to it.
[124] See Broad 1923, p. 59. Broad does not defend this view, but Smith 1993 does. Recently, Cameron 2015 has also defended this view.

Broad argues that while this explanation by analogy may seem successful, it in fact offers no explanation of how exactly the present moment is privileged over other times. While Broad discusses several objections, the main problem with the moving spotlight theory is that it can only offer an explanation of what makes the present privileged by offering the aforementioned analogy or by taking the spotlight as a primitive feature of the theory. Any theory that can only explain itself only through analogies is suspect. However, the moving spotlight analogy is not even a successful analogy. As Broad notes, the moving spotlight in the analogy is an event that unfolds over time. The claim that the present moment sweeps over the spatiotemporal manifold is also an event. Broad believes this to be a paradox because "to talk of events changing seems almost unintelligible."[125] The moving spotlight theorist has two options: (1) they could bite the bullet and take the privileged present moment as a primitive, or (2) they could posit some sort of hypertime, a time that contains another time. This hypertime is where the event that is responsible for the privileged present resides. However, this leads to a vicious regress. If the present time of our spatiotemporal manifold is explained by an event in hypertime, then there must be a present moment in hypertime that allows for events to occur in hypertime. This means that there must be some further time, hyper-hypertime that allows for the privileged present moment of hypertime, and so on. The moving spotlight theorists must pay a high ontological price for their choice of either a primitive privileged present or hypertime regression. Therefore, I reject the moving spotlight theory on the grounds that it is too costly.

The *growing block* view claims that the world is a constantly growing spatiotemporal hunk made up of all past times and the present time.[126] As each moment

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[125] ibid. p. 62

[126] This view is defended in Broad 1923, Ch.2, Tooley 1997, and Diekemper 2007. In Barnes and Cameron 2009, they defend a similar view, the "growing cloud of determinacy." Unlike growing block theory, Barnes and Cameron argue that all future times and objects exist, but that it is

passes, the hunk becomes larger, or grows, as the present time t comes into existence. For the growing block theorist, the present is metaphysically privileged because it is the edge of the growing block; it is the place where times come into existence. There are many objections to the growing block theory of time. Instead of providing a comprehensive overview, I will briefly discuss an objection put forward by Trenton Merricks in his "Goodbye Growing Block."[127] Suppose that the Emperor Nero believes "I am presently at the Coliseum," at some time t during his life. According to the growing block theorist, if t is the present moment, then Nero's belief is true. If t is in the past, then Nero's belief is false. However, Nero's phenomenological experience of believing "I am presently in the Coliseum" is the same whether t is in the present or the past. Nero's experience has nothing to do with whether his belief is true. This means any belief concerning the present moment has a high probability of being false.

The growing block theorist could reply that Nero's belief does not refer to the privileged present moment (the spotlight or growing block edge). Instead, his use of "presently" functions like and indexical. For example, the "here" of "I am here" is subjective and its reference is fixed by the context of its utterance, in this case, the time of utterance. Furthermore, it is a statement that can never be false. Nero's use of "presently" functions similarly to "here" and allows Nero's belief to be true even if he is no longer present.

However, Merricks argues that this response to his objection undermines the motivating factors for the growing block. The growing block theory is one that aims to capture our sense that the past is fixed while the future is open. For example, suppose that while Nero is at the Coliseum he comes believes that "It is presently indeterminate whether I will die tomorrow." If Nero believes this at the objective present moment, then

indeterminate which ones will exist when the present moment reaches them. In other words, the present moment narrows the pool of indeterminate objects to the determinate ones.
[127] Merricks 2006, pp. 2-7

his belief is true; his indexical use of the "presently" aligns with the edge of the growing block. However, once the objective present has moved past Nero, his belief is now false because the time "tomorrow" is no longer indeterminate. Just as before, Nero's experience of believing the future to be indeterminate does not change, even though the truth-value of his belief does. Therefore, our beliefs about the indeterminate future, the beliefs that motivated the growing block theory in the first place, are almost all false. Therefore, the growing block theory should be rejected.

3.1.2: The New B-Theory

B-theorists usually reject Privileged Present. Their rejection of PP is almost always taken to imply *eternalism*, the view that all objects and times exist in the same manner. Eternalism is the "always" answer to the STQ. Eternalists not only claim that all times can be quantified over with the existential quantifier, but that all objects can as well. Both statements like (1) and "Brian is listening to music" are propositions with unrestricted existential quantification. Since the B-theorist rejects the existence of a privileged present, they also typically analyze tensed propositions as tenseless propositions in disguise (recall the Nero example above). While both A-theory and B-theory naturally lend themselves to taking a stance on PP, this is not always the case. In what follows, I will show that the semantic claims of A-theory and B-theory do not entail taking a particular stance on PP.

I will begin by describing what Zimmerman calls the "new B-theory" of time.[128] Recall that I have emphasized distinguishing between A and B-theories of time and how a theory analyses tensed propositions. Zimmerman does not make such a distinction. His use of "B-theory" combines a theory of time with a theory of tensed proposition analysis. For Zimmerman, the old B-theory is the conjunction of eternalism and the view that propositions are tenseless. The new B-theory is the conjunction of eternalism with the

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[128] Zimmerman 2005

view that propositions about tense cannot be reduced to tenseless propositions. At first, this seems counterintuitive; one might even make the argument that the new B-theory is inconsistent. One might think that if a proposition is irreducibly tensed, then the tensed aspect of the proposition must involve the privileged present, otherwise it would not be irreducibly tensed. However, eternalism denies the existence of the privileged present, so the new B-theory is false.

The new B-theorist has two options to reconcile tensed propositions with eternalism. The first option is to analyze tensed propositions with a two-dimensional semantics theory. Like the old B-theorists, this involves taking the content of tensed propositions to be tenseless propositions. Unlike the old B-theorists, the new B-theorist does not take these tenseless propositions to be sufficient for capturing all of a tensed proposition's semantic features. Even though the content of a B-theory proposition can secure the truth-value of the proposition, new B-theorists believe that tenseless propositions do not capture all of the semantic content of tensed propositions. New B-theorists think that tense matters, but that is should be accounted for through an analysis of semantics. Zimmerman suggests several different two-dimensional semantic theories that capture the semantics of tense. Kaplan's characters (Kaplan 1989, Perry's belief-states (Perry 1979), and Stalnaker's diagonal propositions (Stalnaker 1981) are all possible ways one that could analyze tensed propositions.

It will be easiest to explain these ideas by showing how they each solve the problem of Perry's messy shopper.[129] Suppose I am at the store and I notice that someone has trailed sugar throughout the store. I think to myself, "Someone is the messy shopper." At some point, I look down and realize that my bag of sugar has a hole in it, and sugar had streamed out while I walked around the store. Now, I think, "I am the messy shopper." Both the thoughts "Someone is the messy shopper" and "I am the messy

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[129] See Perry 1979

shopper" are logically equivalent to 'Brian is the messy shopper' because they have the same extension. However, they cannot mean the same thing since I discover something new when I realize that I am the messy shopper.

For Kaplan, the meaning (what he calls character) of the indexical "I" is determined by the context of its occurrence. Once I look down at my cart, the new context changes the content of my thought, even though the thought still expresses the same proposition. On Perry's account, when I realize that I am the messy shopper, I enter into a different belief state. When I thought someone was the messy shopper, I believed the proposition 'Brian is the messy shopper', even though my belief-state did not self-attribute that proposition to me. Once I look at my cart, my belief-state changes and I can self-attribute the proposition which will cause me to act differently (I might fix the hole in the bag). I now believe both that 'Brian is the messy shopper' and that 'I am the messy shopper'. Finally, Stalnaker uses diagonal propositions to show the difference between the two thoughts. Stalnaker argues that when I think, "Someone is a messy shopper," my thought could refer to the messy shopper (Brian) in the actual world (since names rigidly refer) or refer to whoever plays the Brian role in a possible world. When I learn that I am the messy shopper, I eliminate all the possible worlds where someone besides me is the messy shopper.

While I don't have time to provide a full account of how each of these approaches can be used to capture meaningful tensed langauge, I will quickly sketch out each position. Suppose the tensed sentence "It is raining now" expresses the proposition 'It is raining on October 27, 1999'. Using Kaplan's character, the tensed features of the sentence are part of the character of the sentence, which is determined by the context of the utterance. Using Perry's belief-states, the tensed features of the sentence are explained by our belief-state toward the proposition; one is likely to get an umbrella or not go outdoors. And using Stalnaker's diagonal propositions, the tensed features of the

sentence are explained by the worlds where it is raining at whatever plays the "now" role. The soft tense approach, analyzes tensed sentences as having two semantic aspects: an eternal proposition and a mode of presentation. This mode of presentation captures the tensed aspect of an utterance.

However, one might worry that this two-dimensional approach does not yield irreducibly tensed propositions since the content of propositions is still an eternal proposition. The two-dimensional semantics makes tense out to be merely an extra feature of the proposition, like garnish on a dinner. In response to this, Lewis and Mellor propose that if one truly takes tense seriously, then the best way to capture tensed features of propositions is show that tense is an irreducibly perspectival feature of people's utterances.[130]

In "Attitudes De Dicto and De Se," Lewis argues that in addition to *de dicto* and *de re* types of propositional attitudes, there is a third type of propositional attitude: the *de se*. *De se* attitudes towards propositions are ones of self-attribution, and *de se* attitudes can be used to explain the irreducibility of tensed sentences to eternal propositions. What does it mean to self-attribute? Lewis gives the following example:

> Consider the case of the two gods. They inhabit a certain possible world, and they know exactly which world it is. Therefore they know every proposition that is true at their world... Still I can imagine them to suffer ignorance: neither one knows which of the two he is. They are not exactly alike. One lives on top of the tallest mountain and throws down manna; the other lives on top of the coldest mountain and throws down thunderbolts. Neither one knows whether he lives on the tallest mountain or on the coldest mountain; nor whether he throw manna or thunderbolts.[131]

Call the thunderbolt-throwing god Zeus and the manna-throwing god Thor. Zeus knows that Thor throws manna and that Zeus throws thunderbolts because Zeus knows all of the *de dicto* propositions that are true at his world. How, then, is it possible that Zeus

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[130] See Lewis 1979, 146−8 and Mellor 1998, 58−69.
[131] Lewis 1979, pp. 520-1

does not know whether he is Zeus or Thor? Suppose that Zeus and Thor both have the same perspective of their world, namely the perspective of perceiving all perspectives at once. If this is the case, then Zeus can perceive everything from his own perspective as well as everything from Thor's perspective. Since these perspectives are equal, Zeus has no way to distinguish which one is *his*. Zeus needs a way to self-attribute the property 'thunder-bolt thrower' to himself; Zeus needs to obtain the knowledge that *he* is the thunderbolt thrower. In other words, he needs to have a *de se* knowledge attitude towards the proposition 'Zeus is the thunderbolt thrower.'[132]

The new B-theorist can use the *de se* attitude to analyze perspective. Tense is a *de se* attitude towards an eternal proposition. For instance, if I believe that "I am alive now," then I have a *de se* attitude towards the tenseless proposition 'Brian is alive on August 3, 2016'. This eternal proposition allows for the following truth condition:

"I am alive now" is true iff 'Brian is alive on August 3, 2016' is true

Just as in the case of the Gods, knowing the proposition 'Brian is alive on August 3, 2016' does not ensure that I believe "I am alive now." Suppose that I have been given a drug that induces a very specific amnesia. While I remember that it is true that Brian is alive on August 3, 2016, I do not remember that I am Brian. It is still the case that my belief "I am alive now" is true because 'Brian is alive on August 3, 2016' is true. However, the drug prevents me from self-attributing the proposition 'Brian is alive on August 3, 2015'.

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[132] In Lewis 1978, pp. 514-16, he offers a more technical distinction between the *de dicto* and *de se* that involves how he understands propositions and properties. Lewis analyzes propositions and properties in terms of possible worlds. Propositions are sets of worlds, while properties are sets of individuals that have a property in a set of worlds. For example, "Water freezes at 32°F," expresses a proposition that is equivalent to the set of possible worlds where water freezes at 32°F. In contrast, "The ball is red" attributes to the ball membership in the set of all possible red things. Lewis is interested in how propositions and properties function as objects of intentional attitudes. Suppose that one believes the proposition 'Water freezes at 32°F'. Lewis analyzes this as self-ascribing the property of being located in a world that is a member of the set of worlds where water freezes at 32°F. Since this belief is a self-locating belief, then propositions reduce to properties; in Lewis's words "the *de se* subsumes the *de dicto*." (p. 521)

I have *de dicto* knowledge about my location in time, but not *de se* knowledge of my location. It is *de se* knowledge that gives me my temporal perspective on the world. Therefore, if new B-theorists do not wish to embrace tense as a semantic feature of language, then they can understand tense to be part of the larger phenomena of the *de se* attitude.

Before I conclude the section, there is one more potential combination of theories of tensed propositions and the metaphysics of time. Call this the new A-theory, a view that accepts Tenseless Propositions and PP. This view would accept some sort of metaphysically privileged present moment while maintaining that the fundamental semantic locutions are tenseless propositions. What would this view look like? Since our fundamental semantic locutions are tenseless, and this requires the existence of times, then the new A-theory requires a four-dimensional block universe. Like the standard B-theory, all tensed propositions are tenseless propositions in disguise and they have the form *x* is *F* at *t*. Unlike the standard B-theory, the new A-theory accepts PP, the claim that there is a metaphysically privileged present moment. However, this privileged present moment is incompatible with tenseless propositions since these tenseless truth conditions cannot capture a metaphysically privileged moment. If one treats the present as a property of times, then the tenseless propositions attributing the present property to times would be '*t* is *present*'. However, since all times either are present, have been present, or will be present, then every time would have the property 'is *present*. Therefore, there is no privileged present moment and the new-A theory is false.

In this section I have discussed several views that endorse PP: the moving spotlight, the growing block, and presentism. I have also discussed three plausible combinations of semantic theories: A-theory, standard B-theory, and new B-theory. Given my eternalist commitments, I reject any metaphysics of time that embraces PP, and because of this I must reject A-theory as well. For the purposes of my project,

nothing rides on whether one is a B-theorist or new B-theorist. In interest of time, I will put the issue aside for the remainder of the project.

3.2: Theories of Objects in Time

Typically, when one is discussing the relationship between material objects and time, "persistence" is the preferred term of art. For instance, Lewis says that "an object persists iff, somehow or other, it exists at various times."[133] I find this analysis a problematic characterization of persistence. First, it seems to rule out any presentist understanding of persistence.[134] Lewis claims that things persist only if they exist at various times. However, presentists explicitly deny this; for presentists, things only exist at one time: the present. If there is only one time, then it is impossible for things to exist at various times. Therefore, Lewis's analysis of persistence automatically disqualifies presentism from being a theory of objects in time, and this can be captured in the following argument:

> P1. Persistence occurs.
> P2. Objects persist by existing at multiple times.
> P3. Presentism is incompatible with persistence.
> C.   Therefore, presentism is false.

However, rather than taking the impossibility of presentist persistence as evidence against presentism, the presentist could reject P2 and be an error-theorist about persistence and simply insist that all talk of persistence is false. The presentist could also offer an alternative analysis of the semantics of persistence. For the presentist, the necessary and sufficient conditions for persistence do not have anything to do with existing past or future objects. Instead, the necessary and sufficient conditions are temporally restricted quantified statements. This analysis might look like the following, where P is the primitive predicate 'is present':

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[133] Lewis 1986, p.202
[134] It should be noted that presentism is a theory of time while a presentist theory of persistence is a theory of objects in time.

Presentist Persistence: An object x persists iff $\exists(x)\ P(x) \wedge (\mathbf{P_t}(\exists(x)\ P(x)) \vee \mathbf{F}(\exists(x)\ P(x)))$

This analysis seems to at least capture the spirit of Lewis's claim in that persistence is explained by existential quantification, even if the tense operators restrict existential quantification. If presentist persistence is an acceptable account of persistence, then P2 is false the above argument fails.

Second, even if it could be shown that presentist persistence is inadequate, the Lewis inspired P2 is still suspect because it characterizes persistence with temporal concepts. I have previously discussed the difference between the General Composition Question and the Special Composition Question. As I have previously argued, one can ask parallel questions about persistence: the General Persistence Question and the Special Persistence Question. Lewis's analysis of persistence seems to be aimed at answering the General Persistence Question. Recall that as far as composition is concerned, there are no non-trivial answers to the GCQ, since any answer will make use of mereological concepts. Similarly, if the general question about how objects exist in time is framed in terms of persistence, then Lewis's answer is a trivial one, since it makes use of temporal concepts.

Instead of using the GPQ as the jumping off point for investigating objects in time, one could take persistence as primitive and instead ask the Special Persistence Question (Under what conditions do objects persist, if any?). However, as I argued in Ch.1, persistence does not have to be taken as a primitive since it can be explained by mereology. The problem of persistence, then, can be framed as the Special Temporal Composition Question:

Special Temporal Composition Question: Under what conditions, if any, does diachronic composition occur?

Recall that the Special Composition Question has three general answers: always, sometimes, and never. Analogously, the Special Temporal Composition Question has the same three general answers and these answers are closely linked to the answers to the SCQ. Before I discuss these answers, it will be helpful to briefly discuss what it means for an object to be a temporal composite.

Sider presents a rigorous definition of temporal parts in his *Four Dimensionalism*.[135] Sider offers two definitions of temporal parts. The first definition is neutral between endurantism and perdurantism (more on this in a moment):

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

As a perdurantist, Sider prefers the following definition:

> **Temporal Part***: x is an *instantaneous temporal part of y* at instant t =$_{df}$ (1) x exists at, but only at, t, (2) x is a part of y; and (3) x overlaps every part of y that exists at t.[136]

The conditions of TP and TP* are quite similar with the exception of TP*'s condition (2). Sider prefers parthood to be atemporal. An endurantist might find TP* objectionable since it follows that x being a part of y is true at any time. The endurantist could argue that they do not understand what it means for something to be an atemporal part of another thing. However, the endurantist can grant that things have parts at a given time; for the endurantist, this is just a more complicated way to talk about spatial parts.

For the standard perdurantists, temporal parts and mereological sums answer any metaphysical questions about objects in time and persistence. However, there is a

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[135] Mark Heller also gives an good analysis of temporal parts, however I prefer Sider's. Heller's analysis is as follows: It is now easy to understand the notion of a temporal part. Any proper part of a four-dimensional object is smaller than the whole object along at least one dimension. A proper temporal part is smaller along just one dimension, the temporal dimension. A temporal part of *O* is a spatiotemporal part of *O* that is the same spatial size as *O* for as long as that part exists, though it may be a smaller temporal size." (1990, p. 11)
[136] ibid. 56

semantic question about the referents of our terms that involve objects in time. The first view is the worm theory. The worm theorist believes that our terms refer to an object's mereological sum; these mereological sums are sometimes called "spacetime worms" in that they stretch out over time just like earthworms stretch out over space (hence "worm theory"). For instance, if one says, "My guitar's strings need changing," the phrase "my guitar" refers to the mereological sum of my guitar's temporal parts, or the spacetime worm that is my guitar.

The second view is Sider's stage theory. Stage theory is the temporal analogue of Lewis's counterpart theory.[137] Counterpart theory analyzes modal claims with a primitive relation of similarity. It is true that I could have been President because there is a possible world where there exists someone who is President and is also sufficiently similar to me. Similarly, Sider claims that the proper referents of our everyday terms are not spacetime mereological sums, but the instantaneous stages that are parts of these sums (in other words, temporal parts). Stage theory claims that the referent of "my guitar" is the guitar-shaped object that exists at the instantaneous time of the utterance.

Both the worm theorist and the stage theorist have the same ontology. However, Sider adopts stage theory because he believes that stage theory provides a better solution to the paradoxes of coincidence than the worm theory. Paradoxes of coincidence are cases of problematic co-located objects. For example, consider the case of a woman who undergoes fission. Suppose that Susannah undergoes fission at some time t, and splits into two people, Susan and Sue. If it is assumed that psychological continuity is the criterion for personal identity, then it follows that Susan and Sue are identical:

P1. Susannah is identical to Sue.
P2. Susannah is identical to Susan.
C. By transitivity, Sue is identical to Susan.

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[137] See Lewis 1986

Denying P1 or P2 requires rejecting psychological continuity as the criterion for survival. Denying the conclusion entails that Susannah perishes during fission, or that Susannah is identical to only one of Susan or Sue (or that identity is not transitive). The psychological continuity view is incredibly plausible, and many philosophers do not wish to relinquish it. Both worm theory and stage theory provide a means of dissolving the paradox.

Since the worm theorist believes that our terms refer to mereological sums, 'Susannah' refers to the mereological fusion of Susannah's temporal parts. The worm theorist claims that Susan and Sue have existed all along as overlapping mereological sums. Beliefs that Susannah was a single individual before fission are simply mistaken. Worm theorists liken it to the case of overlapping roads. Suppose that Kim has never traveled out of her town and she believes that Main Street is one road. However, unbeknownst to her, "Main Street" is an overlapping segment of two roads that merge together as they enter the city limits and the roads diverge as they leave. Similarly, if one believes that Susannah is a single person, then one is making Kim's mistake. In both Kim and Susannah's cases, the referent of 'Kim' and 'Susannah', respectively, is either vague in that it does not specify which of the worms one is referring to, or the referent refers to the "supervaluation" of both of the worms.[138] For the worm theorist, then, both P1 and P2 are false and the paradox dissolves.

Sider argues that the worm theory goes against both the pre-philosophical intuition that Susannah is one person and the philosophical intuition that counting is done by identity.[139] Sider dissolves the Susannah paradox of coincidence by claiming anytime the term "Susannah" is used, it refers to the Susannah stage at the moment of

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[138] See Lewis 1993 for more on supervaluation.

[139] Briefly, Sider argues Kim counts only one road segment in above example. Since the road segment is identical to itself and counting is done by identity, Kim counts only one road segment. Therefore, she refers to the one road segment when she thinks "Main Street", not the two momentarily overlapping roads. Similarly, one refers to one Susannah stage since that stage is identical to itself.

use. This stage is not identical to any other stage except itself. Therefore, "Susannah" refers to only one thing at a given time, and the above intuitions are preserved. Since Susannah, Sue and Susan only refer to instantaneous stages, then the identity relation cannot hold between them. Instead, "Susannah will survive as Sue," is analyzed as the claim that Susannah holds a temporal counterpart relation (primitive similarity) to Sue without being identical to Sue. It also follows that Susannah holds a temporal counterpart relation to Susan without being identical to Susan.[140] Sider believes that since stage theory dissolves the paradox in a satisfactory manner and preserves important pre-philosophical and philosophical intuitions, stage theory is preferable to worm theory.

3.2.1: Perdurantism

With the explanation of temporal parts complete, I will return to discussing the answers to the STCQ. If temporal composition always occurs, then any mereological sum of temporal objects will count as further spatiotemporal object. Call this answer *strong perdurantism*:

> **Strong Perdurantism**: any conditions are necessary and sufficient for temporal composition to occur.

Strong perdurantists' ontologies accounts for all of the ordinary objects that we typically believe to persist: pianos, trees, dogs, and so on. It also contains many instantaneous temporal objects, such as *Brian-at-t_1*, where t_1 is a plane of the four dimensional manifold and *Brian* is a spatiotemporal object located at a subregion of t_1. Since any conditions are necessary and sufficient for temporal composition, a strong perdurantist ontology entails that any four-dimensional mereological sum is

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[140] Sider bases the idea of temporal counterparts off of Lewis's modal counterparts. The counterpart relation is a relation of similarity that underwrites our modal claim. For instance, it is true that I could have been a paleontologist because there exists a possible world where someone very similar to me is a paleontologist. On Sider's view, the counterpart relation is a relation of continuity, where continuity is analyzed in terms of physical or psychological causation. Therefore, it is true that I was a teenager because I have a temporal counterpart that is a teenager.

an object. These sums are similar to the universalist's bizarre objects (recall the *the-moon-plus-my-appendix* object). Some examples of bizarre temporal objects include the following: *the object that is the life of Julius-Caesar+the object that is the life of Brian-Carlson*, and *the fusion of all object in the Neolithic period+this morning's breakfast burrito during its 30 seconds in the microwave.*

Before moving on, it is worth exploring whether or not a presentist could accept Strong Perdurantism and therefore temporal parts. Each object in the presentist's ontology has no extension in the temporal dimension; they are temporally simple. Therefore, presentist objects are objects that have extended spatial parts, but only one, simple temporal part. While one can properly call this a temporal part, it does not do any theoretical work and hardly seems grounds for attributing perdurance to the presentist.

However, in Ch.3 of *Four Dimensionalism*, Sider argues that perdurantism is compatible not only with eternalism, but also with presentism.[141] This may seem counterintuitive since the presentist only accepts things that presently exist; this precludes the existence of past or future temporal parts. Sider argues that the presentist can use their tense operators to talk about temporal parts:

> x is an ***instantaneous temporal part*** of y =df (1) x is part of y; (2) x overlaps every part of y; (3) it is not the case that WILL (x exists); (4) it is not the case that WAS (x exists)[142]

The temporal operators used in the definition above ensure that talk of existing past or future temporal parts is not ontologically committing, since any such claims will be false. The presentist can still talk about these past or future parts in the same way that they talk about any past or future objects. Given the above definition of instantaneous temporal part, Sider formulates Presentist Perdurance as follows:

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[141] Sider 2001, pp. 71-3.
[142] Sider 2001, p. 71

Presentist Perdurance: Necessarily, ALWAYS(every object has a temporal part)[143]

Above, I said that calling presentism a perdurance theory because it entails presently existing temporal parts is a mistake since these temporal parts do no work. However, if a presentist adopted Presentist Perdurance, then the entailed presently existing temporal part, as well as the facts about past and future temporal parts, would do theoretical work. Perhaps this sort of view could use temporal parts in a theoretically robust manner.

However, I believe this is incorrect. First, presentist perdurance is overly complicated. Presentism can already solve many of the problems that eternalist perdurance can without temporal parts. The presentist need not say that a candle changes from lit to unlit because (1) there exists a temporal part that overlaps an unlit candle, and (2) WAS(there exists a temporal part that overlaps a lit candle). For the presentist, treating the problem of change with present and past candles is much simpler; talk of temporal parts is not required.

Second, it makes no sense to talk of temporal composition in a world that only has one instant of time. All composition in a presentist world can be explained by appealing to spatial composition. Since I analyze persistence through temporal composition and no temporal composition occurs, presentism has no use for temporal parts. Furthermore, in what follows, I will argue that the best analysis of endurantism uses the concept of temporal simplicity as the criterion for endurance. Recall the discussion of the various answers to the Simple Question in Ch.2. Given the framework I have provided, there is an analogue to the Simple Question, the Temporal Simple Question: under what conditions, if any, are objects temporally simple? That is, under what conditions do objects have no temporal parts? The pointy view claimed that an object is simple iff it is a point-sized object. Analogously, an object is temporally simple if

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[143] ibid.

it occupies a temporal point. Since the pointy view is at least sufficient for an object being simple, it follows that what Sider calls "instantaneous temporal parts" are in fact temporal simples. It follows that these instantaneous temporal parts are enduring entities since they are wholly present at each moment they exist. This is clearly incompatible with perdurantism. Therefore, because of its theory of time, presentists cannot be perdurantists.

Moving on, the next general type of answer to the STCQ is that of the sometimesers. Sometimesers find the bizarre persisting objects of the strong perdurantist unacceptable. I will label sometimeser answers to the STCQ as *weak perdurantist* answers since they still make use of temporal parts. Like sometimesers about composition, weak perdurantist answers can vary with respect to the conditions placed on temporal composition. For example, a weak perdurantist could claim that temporal composition is supported by causation:

> **Weak Causal Perdurantism**: diachronic composition occurs iff certain causal relations obtain between an object x at t_1 and an object y at t_2.

These causal conditions would (presumably) disqualify the bizarre persisting objects mentioned above, since there is no causal link of the right sort between the fusion of the objects of the Neolithic period and the breakfast burrito.[144] The weak perdurantist, then, accounts for persistence through spatiotemporal composition. For my purposes, strong and weak perdurantism are both plausible views. Nothing that I say in the rest of the dissertation will turn on accepting one or the other. For the remainder of this dissertation, then, I will refer to the combination of eternalism and perdurance as *standard perdurantism*.[145]

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[144] One could perhaps appeal to classes, sortals, or essences as well.

[145] This is in order to avoid confusion with the positive view that I will propose later.

3.2.2: Endurantism

The final "never" answer is known as endurantism. Before I discuss how the "never"

answer clearly explains endurance, I will discuss some attempts at defining endurance.

In the literature, many have struggled to provide a clear statement of endurantism. One

could attempt to define it as the conjunction of the theory of eternalism with the denial

of standard perdurantism. However, this definition provides no insight into the positive

claims that endurantism represents. Many philosophers simply appeal to an intuitive

definition:

> **Intuitive Endurantism** =$_{\text{def}}$ the view that an object persists by being wholly
> present at each moment that it exists.

Prima facie, this looks like an outright contradiction. This can be shown with the

following argument:

> P1. Suppose some object a is wholly present at t_1 and t_2.
> P2. If a is wholly present at t_1, then a is not wholly present at t_2.
> P3. Since a is wholly present at t_1, it follows that a is not wholly present at t_2
> C.   Therefore, a is not wholly present at t_1 and t_2.

This above argument is too quick, since it hinges on the truth of P2, and it seems that P2

begs the question against the endurantist. However, an analogous version of P2 can be

supported by appealing to a similar argument about object's location in spatial

dimensions. Someone who defended a spatial analogue of endurantism would claim that

objects are wholly located at each spatial region in which they exist. Consider some

object a' that fills two non-overlapping spatial regions r_1 and r_2.

> P1′. Suppose some object a' is wholly present at r_1 and r_2.
> P2′. If a' is wholly located at r_1, then a' is not wholly located at r_2.
> P3′. Since a' is wholly located at r_1, it follows that a' is not wholly located at r_2.
> C′.   Therefore, a' is not wholly located at r_1 and r_2.

P1′ supposes that spatially bi-located objects are possible. Furthermore, it supposes that

the *entirety* of the object is located in both regions, not just *parts* of the object. This

seems impossible. Our experience with material objects does not provide evidence for the objects supposed by P1′. Instead, our experience of the world supports P2′. Some may believe that there are bi-located objects (such as a disassembled computer), but nobody would claim that the computer is wholly present at each region of space occupied by one of its parts. Thus, if endurantists commit to P2′, then they must provide an account of their rejection of the analogous P2 that does not undermine their commitment to P2′. The problem is further exacerbated by the fact that eternalists typically use 'location' to refer not just to spatial location, but temporal location as well.

Endurantists might attempt to appeal to other uses of "wholly present" found in other areas of philosophy. For example, universals are supposed to be wholly present wherever they exist.[146] For example, a green ball and a blade of green grass that are the same both instantiate the same universal. The green universal is "wholly present" in both the ball and the blade of grass. Regardless of what one thinks about universals, this use of "wholly present" will not help the endurantist. Defenders of universals use "wholly present" to indicate that objects are all instantiating or participating in the same universal entity. Enduring objects are not universal entities; they are finite concrete objects with multitudes of differing qualities.

However, Hawthorne presents a bundle theory of universals that may provide endurantists with a solution.[147] One of the consequences of his theory is that it is compatible with the existence of spatially distinct objects that instantiate the same qualities.[148] If Hawthorne's arguments can be applied to time as well as space, then both P2 and P2′ can be resisted. Consider two distinct red balls that instantiate an identical shade of red. Hawthorne claims that the balls have identical shades because they both

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[146] I am discussing universals as defended by Armstrong (see Armstrong 1989), not the universals of Plato (although these may coincide depending on one's reading of Plato).
[147] See Hawthorne 1995
[148] Hawthorne uses this theory to respond to the problem of the indiscernible but distinct iron spheres discussed by Black in Black 1952

instantiate the same universal. In other words, the universal is wholly located in each ball at the same time. Therefore, the universal Redness is a counterexample to P2′.

Hawthorne further claims that objects are nothing more than bundles of universals (objects do not have "thin particulars" as discussed in 2.6). Since objects are just bundles of universals, it follows that objects can be wholly located in non-overlapping regions of space at the same time. To illustrate this, Hawthorne uses an example of two water droplets that instantiate the exact same universals.[149] In this case, while we normally count these as two objects, the bundle theory of universals tells us that they are, strictly speaking, one object that is wholly located at two non-overlapping spatial regions.

Endurantists could attempt to use Hawthorne's bundle theory of universals to explain how it is that objects can be wholly present at each time they exist. Suppose that a water droplet persists from t_1 to t_2. Given the endurantists' commitment to eternalism, the water droplet has a certain spacetime location at t_1 and a different spacetime location t_2. So, just as in Hawthorne's example, the only difference between the droplet at t_1 and the droplet at t_2 is their respective spatiotemporal location. Furthermore, since the droplets are bundles of universals, then they can be wholly present at both t_1 and t_2, even though t_1 and t_2 are non-overlapping times. The endurantists' problem seems to be solved.

However, the above account of enduring objects does not allow for the possibility of change. Suppose that the water droplet at t_1 is frozen at t_2. Endurantists claim that the droplet and the frozen droplet are the same droplet. But the droplet at t_1 and the frozen droplet at t_2 no longer share all their universals. The droplet at t_1 has the universal 'liquid' while the frozen droplet at t_2 does not. Conversely, the frozen droplet at t_2 has the universal 'solid' while the droplet at t_1 does not. Therefore, the droplet at t_1 is no longer

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[149] See Hawthorne 1995, pp. 194-196

wholly present at t_2, since not all of its universals are present at t_2. Only *parts* of the droplet are wholly present at t_2. Recall that intuitive endurantism claims that *all* of an object is wholly present at each moment it exists. Therefore, the bundle theory of universals does not offer an account of endurance that satisfies intuitive endurantism.

Alternatively, the endurantist could also attempt to appeal to the concept of omnipresence, typically attributed to monotheistic characterizations of God. Omnipresent beings are beings that are wholly present at every time and location. While I will not delve into the literature on omnipresence, I want to briefly comment on several things. First, it is unclear to me that omnipresence is synonymous with "wholly present." Omnipresence could be understood as the property of perceiving everything at once. If one insists that omnipresence must require the actual occupation of time and space, then omnipresence might be understood as a being that has a part at every time and location. Any sort of pantheistic deity would fulfill this sort of description. At any rate, the concept of 'omnipresence' is contentious. Appealing to a contentious concept to bolster endurantism's underspecified terminology only hurts its case. Any endurantist appeal to other uses of "wholly present" is unlikely to shed further light on the phrase. Therefore, intuitive endurantism will not do. In what follows, I will consider various attempts to define endurantism with more philosophical rigor.

Sider suggests that one might be able to define endurantism by claiming that an enduring objects is *strongly wholly present* throughout its lifetime:

x is **strongly wholly present** throughout interval t =df everything that is at *any* time in t in part of x exists and is part of x at *every* time in t.[150]

Endurantism could then be defined as follows:

Endurantism =df an object *persists* iff it is strongly wholly present throughout interval t

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[150] Sider Ch. 3 2001

However, (1) entails mereological essentialism, since x is composed of all the things present throughout T and nothing else.[151] If x gains or loses parts over that interval, then it is no longer strongly wholly present. This is equivalent to mereological essentialism. Since mereological essentialism is not a popular view, (1) should be rejected since it entails an unpalatable view of material objects.

Miller argues that endurance can be defined by modifying a popular endurantist account of property attribution (this will be discussed in more depth below) called *adverbialism*. Briefly, *adverbialism* is a view about how enduring objects instantiate properties. It was developed to counter the Argument from Temporary Intrinsics (more on this in 3.4), an argument that purportedly shows that endurantism requires objects to instantiate conflicting properties at the same time. For example, an enduring ball is wholly present at every time it exists, so a ball that was painted red and is now painted blue has both those properties at each moment that it exists. This is obviously contradictory. The adverbialist attempts to ameliorate this problem by claiming that it is not true that the ball is timelessly blue and red, but that the ball is both red-$t_1$ly and blue-$t_2$ly.[152] On this view, it turns out that seemingly intrinsic properties such as blue and red are not intrinsic. Instead, they are somehow bound up with the time in which they are instantiated (I will discuss this further when talking about the problem of temporary intrinsics below.)

Miller's strategy is to make an analogous move for parthood. Objects do not simply have parts; instead, they have parts that are bound up with the times in which those parts exist. Therefore proper part must be re-interpreted:

x is a **proper part** of y $=_{def}$ x is a proper part of y-$t$ly or x is $t$ly identical to y.

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[151] See Chisholm 1976.
[152] Defenders of which include Haslanger, S. (1989), Johnston, M. (1987), and Lowe, E.J. (1988)

For example, consider a persisting sphere S that is composed of an upper half A and a lower half B at t_1. Over some interval t, the sphere loses A and is thus composed only of B at t_2. The conventional problem is that if S's parts are wholly present at every moment S exists, then the transitivity of identity is violated.[153] The adverbialist mereology would claim that at t_1, both A and B are parts of S-$t_1$ly, while at t_2 only B is part of S-$t_2$ly. Miller's formal statement of endurantism is quite complex and I do not have the space to go into all the details.

However, I will briefly sketch out some objections. First, Miller's understanding of endurantism commits endurantism to adverbialism. While many endurantists are adverbialists, any endurantist that rejects adverbialism cannot use Miller's definition. Second, I reject the adverbialist strategy; I will argue against it in section 3.4. Finally, applying the adverbial analysis to parthood requires a complete revision of classical mereology. Classical mereology is a powerful theoretical framework that is quite complicated. In order to use his definition of endurantism, Miller would have to show that he could formulate an adverbial mereological theory that is equivalent to the strength and elegance of classical mereology. Even if he could do that, there is still the question of why one should give up classical mereology in favor of adverbial mereology. Classical mereology proceeds from extremely strong intuitions about parts and wholes, and these intuitions do not support adverbial mereology. It seems that the only reason Miller advocates adverbial mereology is to solve the problem of defining endurantism. He is simply pushing the bump under the rug to a new and more difficult location.

Furthermore, I find this approach conceptually murky. After all, there are abstract geometric objects that have parts. Since these objects are abstract, a

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[153]This is simplified presentation of the classical "Ship of Theseus" problem, where the planks of a warship are slowly replaced over time until none of the planks remain.

mereological analysis of these objects does not need to reference time.[154] If one were to continue to endorse adverbial mereology, then one would have to accept both adverbial and classical mereology in order to make sense of concrete parts and wholes as well as geometric objects. At the very least Miller's endurantism requires double the ideological machinery compared to any other view, and should therefore be rejected.

In "A Debate Reconsidered," Olfra Magidor explores a view she calls "liberal endurantism."[155] This form of endurantism is liberal because it is committed to the claim that for any fully occupied region of spacetime, there is an object that occupies all of the points of that region and no other points. Liberalism ensures that for any material object, each proper part of that object will fill a unique region of spacetime. For example, suppose there is a circle shaped region in the middle of my desk. If we suppose that my desk fully occupies the region at which it is located, then there must be a circle shaped object x that fully occupies the circular region in my desk. Similarly, all enduring objects will be co-located with temporal parts. Magidor defines liberal endurantism as follows:

> **Liberal Endurantism:** for any object x and any time t at which it exists, there is an object y that is co-located with x at t and exists only at t, but y is never a temporal part of x.[156]

Liberal endurantism preserves enduring objects while also allowing for instantaneous temporal objects. Magidor uses these instantaneous temporal objects to re-evaluate many of the popular arguments against endurantism. Recall Hawthorne's example that if one has cars in one's ontology, then one must also have incars (see Ch.2). The intuitive endurantist cannot explain this difference because when the car is pulling into the garage, there is no way of distinguishing whether the car might in fact be an incar. The standard perdurantist can allow for both cars and incars, since their view allows for a

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[154] If one does not like abstract objects, then geometric figures residing in a timeless world present the same challenge to adverbial mereology.
[155] Magidor, forthcoming
[156] ibid. p 5.

fusion of temporal parts that corresponds to the incar and a separate fusion of temporal parts that correspond to the car.

Magidor argues that the liberal endurantist can make use of the same solution. Since there are instantaneous temporal objects for all occupied regions of the cars, there is an instantaneous temporal object that overlaps the car and corresponds to the incar. However, given liberal endurantism, there is also an enduring object, a car, which does not share any parts with the incar. Therefore, the liberal endurantist can allow for incars without giving them theoretical importance.

While her arguments are quite interesting, I do not have the space for a full discussion here. However, I do have several broad criticisms of Magidor's project that do not rely on the specifics of her view. First, what reason is there to have an ontology of enduring objects and objects composed of temporal parts? This is an ontology that seems needlessly complex since it posits two different ontological categories of material objects in order to explain endurantist intuitions that objects are wholly present at any given time. Furthermore, liberal endurantism entails problematic co-located objects. Unlike the worm theorist's overlapping mereological sums, the liberal endurantist's overlapping objects cannot be explained by appealing to overlap since overlap entails that the overlapping objects share parts. The liberal endurantist's commitment to problematic co-location is another strike against the view. Therefore, I find co-location, and therefore Magidor's liberal endurantism unpalatable and will not consider it as a viable definition of endurantism.

I believe Giordani and Costa provide the most promising definitions of endurantism in their, "From Times to Worlds and Back Again: A Transcendentalist Theory of Persistence." They divide the endurantist view into two sub-views: Temporal Bare Uni-locationism and Temporal Multi-locationism. Bare location is defined as:

> **Bare location**: for any region *r* fully occupied by an object *x* at *t*, *x* does not have a proper part occupying *r* at *t*.[157]

An object is barely located if it is a mereological simple (recall the discussion of extended simples from Ch. 2). They then define Temporal Bare Uni-locationism as the following:

> **Temporal Bare Uni-locationism**: objects persist through time by being *barely located* at each instant of their persistence.[158]

In other words, a persisting object *x* is simple at each instance of its persistence. The above view is contrasted with Temporal Multi-locationsim:

> **Temporal Multi-locationism**: objects persist through time by being *exactly located* at each instant of their persistence.[159]

Giordani and Costa's Temporal Bare Uni-locationism is roughly equivalent to my definition of endurantism. However they present Temporal Multi-locationism as a live possibility; this is incorrect because Temporal Multi-locationism is just Intuitive Endurantism in disguise. Giordani and Costa use the phrase "exactly located" in place of "wholly present." Unpacking this term shows that Temporal Multi-locationism is identical to intuitive endurantism. Location is simply a two-place relation with an object and a region of spacetime as the relata. Giordani and Costa explain exact location as an object being "e*xactly* located at a region when this region is its 'shadow' in the dimension."[160] By 'shadow,' I take it that they mean something like full occupation; the object completely fills the region in which the object resides. Enduring objects, then, are objects that are stretched out through a time period *t* and exactly occupy each instant t_1 to t_n contained in *t*. In other words, an enduring object is one where the whole of it is present in the region it fills at a given time. Using 'exact location' in place of 'wholly present' does nothing to change the perplexity of such a view. One can ask the same

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[157] Giordini and Costa 2013, p. 212
[158] ibid. p. 213
[159] ibid. p. 213
[160] Giordani and Cost 2014 p. 211

question of the temporal multi locationist as of the intuitive endurantist: "How can an object be exactly located (wholly present) at each time it exists?"

Temporal Bare-Locationism is more promising. If a temporally extended object x occupies a four-dimensional region, and x has no proper parts, then x must be a four-dimensional simple with no spatial or temporal parts. Notice that this is equivalent to a nihilist-endurantist view. However, endurantists want more than this; they want objects to endure while retaining spatial parts. Therefore, the endurantist ought to embrace my distinction between temporal and spatial composition. With respect to temporal composition, endurantism parallels nihilism. The nihilist claims that all objects are spatially simple, while the endurantist claims that all objects are temporally simple. Therefore, endurantism is a "never" answer to the STCQ:

Endurantism: no conditions are necessary and sufficient for temporal composition to occur.

If it is true that objects persist and that temporal composition never occurs, then it follows that all objects are temporally extended simples. I believe that this is by far the clearest analysis of what it means for an object to endure. Extended simples can occupy a region without being wholly located at a given point of that region. In the same way, enduring objects are not wholly present at each moment; instead, they have no temporal part corresponding to each moment that they overlap.

In this section, I presented what I believe to be the proper formulation of temporal parts, perdurantism, and endurantism. Furthermore, I have discussed the problems with formulating endurantism. This reveals two things about endurantism: (1) there are many interesting analyses of endurantism, but they all ultimately fail in capture the view or they make unsavory ontological commitments, and (2) the only viable understanding of endurantism is to understand it as a "never" answer to the STCQ that requires an ontology of objects that are spatially complex but temporally simple. In the

next sections, I will discuss two strong arguments against endurantism: the Argument from Vagueness and the Argument from Temporary Intrinsics.

3.3: The Argument from Vagueness

According to classical logic, all proppositions are true or false. However, some propositions appear to be vague; they have no apparent truth-value. For instance, the proposition that one must have x number of hair's on one's face in order to have a mustache is vague. For the purposes of this project, I will assume that vagueness to be a feature of semantic decision.[161] For example, we as a community have not set any criterion for the amount of facial hair required for a mustache. In his *On the Plurality of Worlds*, Lewis argues for universalism by rejecting the possibility of vague composition. Sider uses the structure of Lewis's argument to present a powerful argument for perdurantism that has played a key role in defending perdurantism. Both arguments are centered on the central claims that (1) if composition occurs, then it cannot be vague and (2) that propositions concerning composition are always true or false. Sider's argument for perdurantism takes Lewis's argument as a premise. First, I will discuss Lewis's original argument as interpreted by Sider. Then, I will examine Sider's argument for temporal parts. Finally, I will discuss how the four-dimensional nihilist can make use of these arguments.

3.3.1: The Argument from Vagueness for Universalism

In his formulation of the Argument from Vagueness for universalism, Sider uses several technical terms. A *case* is a class of objects such that the class may or may not compose a further object. These cases are pre-theoretical and should not be controversial; for instance, the subatomic particles that seem to compose my body are a case, and those same subatomic particles scattered throughout the galaxy are also a case. A *continuous*

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[161] This view has its origins in Russell 1923. Evans 1978 argues against the possibility of vague objects. Fine 1975 and Lewis 192 and 1993 defend linguistic vagueness. Williamson 1994 argues for worldy vagueness as do Varnes and Williams 2011, Mericks 2001, Sorensen 2010 and Varzi 2001.

series of cases begins with a seeming case of composition and ends with a seeming case of non-composition. The continuous series also has a finite number of cases that connect the case of composition to the case of non-composition. Each case in the series is extremely similar to the case before it and the case after it (in whatever respects matter for composition, such as: spatial proximity, qualitative homogeneity, causal powers, and so on). Finally, there is a *sharp cut-off* between a pair of cases where composition occurs in the first case, but does not occur in the second case. Here is Sider's Argument from Vagueness:

P1. Assume for reduction that not every class of objects has a fusion.
P2. If not every class of objects has a fusion, then there must be a pair of cases connected by a continuous series such that in one, composition occurs, but in the other, composition does not occur.
P3. In no continuous series is there a sharp cut-off in whether composition occurs.
P4. In any case of composition, either composition definitely occurs, or composition definitely does not occur.
C. Therefore, every class of objects has a fusion.[162]

From P2, there is a pair of cases connected by a continuous series such that in one, composition occurs, but in the other, composition does not occur. It follows that at some point in the series, the cases cease to compose objects. Given P4, any case in this series definitely composes an object or definitely does not compose an object. It follows, then, that the transition from a case of composition to a case of non-composition must be a sharp cut-off. However, this contradicts P3, which says there are no sharp cut-offs in the series. Therefore, the initial assumption that not every class has a fusion is false; every class has a fusion and universalism is true.

An example will help make the argument clear. Consider the particles that seemed to compose my body and then were scattered across the universe. When these particles are in close proximity to one another they compose my body. When these

[162] Sider 2001, 123-125

particles are scattered, they do not compose anything. Using these two cases at beginning and end points, a series of cases can be constructed that links these two cases together. Suppose that each case results in the particles moving .00001 nanometers away from each other (if this is too large, then you can make the number as small as you like). Since there must be a sharp cut-off located somewhere in the series, it must be the case that x number of .00001 nanometer movements will destroy my body. However, this is impossible, since there are no sharp cut-offs in the series. Therefore, the particles always compose an object (although they do not always compose my body).

P2 is the least controversial, however one might object that not every pair of cases can be connected by a finite series of similar cases. For example, there is no series that connects a case of composition with finitely many objects in its class to a case of non-composition with infinitely many objects in its class. This is perfectly acceptable, says Sider, since nobody thinks that the difference maker between composition and non-composition is whether the class in question is finite or infinite. Even if this turns out to actually make a difference in some cases of composition, Sider only needs to have some pairs of cases where composition occurs and does not occur that are connected by a series in order for the argument to go through.

P3 is somewhat more difficult to defend. One might worry about the denial of a sharp cut-off between cases; perhaps the adjacent cases of the sharp cut-off are different enough that the transition from composition to non-composition is warranted and not arbitrary. However, if this is the case, then Sider thinks that the cases have not been made similar enough. Once the proper pair of cases is focused on, the absence of a sharp cut-off will be apparent. Therefore, positing a sharp cut-off remains problematic. In the example, the transition from composition to non-composition happens after x number of movements of the particles. If there was a sharp cut-off between my body's existence and destruction, then the cut-off would make the macrophysical "autonomous" from the

microphysical, since nothing much has changed as far as the particles are concerned, but a macroscopic object has been annihilated. He is careful to distinguish autonomy from supervenience; even if there was an arbitrary sharp cut-off after x number of movements of the particles, then whether my body exists would supervene on how many movements the particles have made. Instead, autonomy is a problem because it is metaphysically arbitrary. Sider does not refer to the sorites of decomposition here, but his reasoning is similar.[163] Given that we have already made many .00001 nanometer movements and the object has not had any change with respect to its being composite, why would one think that there would be any change at $x+1$ .00001 movements?

One could also object to P3 by arguing that a sharp cut-off would be not be arbitrary if composition could be somehow be understood as precise topological restrictions on regions of space that contain objects, such as spatial continuity. Sider rejects this for two reasons: 1) it rules out scattered objects like solar systems and galaxies, and 2) since under classical physics all objects are discontinuous, these sorts of topological restrictions would rule out any macrophysical objects in worlds that obeyed the laws of classical physics.

Sider's defense of P4 is by far the most controversial, and it is also quite complicated. The denial of P4 amounts to the claim that composition is sometimes vague. In order to follow the defense of P4, Sider first defines composite objects (Sider calls these fusions) as follows.

> **Fusion (F)** : There is some object, x, such that (1) every member of a class C is part of x, and (2) every part of x shares a part in common with some member of C.[164]

One might worry that the predicate 'is a part of' is vague. What would this vagueness amount to? Sider agrees with Lewis that all vagueness is semantic indecision, regardless

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[163] See Unger 1979
[164] ibid, 126.

of whether vagueness seems to be about language or seems to be about the world.[165] On this view, when a sentence has an indeterminate truth-value due to vagueness, the vagueness is the result of a predicate in the sentence having multiple precisifications (candidate meanings). None of these precisifications are inherently better than the others, and because of a lack of human interest, there are no linguistic conventions for deciding which of the candidate meanings is the standard meaning. The typical example of this kind of vagueness is a sentence like: "The man over there is bald." The predicate 'bald' has many precisifications of the form 'having no more than n hairs on one's head'. Since there are many acceptable values for n and the linguistic community has explicitly chosen none of these values, then the predicate 'is bald' is vague. Furthermore, this view holds that all vagueness is explained in this way and vagueness is never found in the world. Therefore, Sider simply dismisses the idea that composition is ontologically vague. However, on the assumption that vagueness is semantic indecision, one could argue that the predicate 'is a part of' is vague. Rather than providing an argument for the non-vagueness of mereological predicates, Sider opts for a different strategy to defend P4 from the charge of vagueness. In order to do this, Sider first establishes what it means for something to be *concrete*. Concrete objects are defined as the class of all objects that are not abstract, such as: sets and classes, numbers, properties and relations, universals and tropes, possible worlds, and so on (this list need not be exhaustive; any other abstract entities that one has in one's ontology can go on the list). Here is my interpretation of the argument against vague composition:

> P1. Suppose for reductio that it can be vague whether composition occurs.
> P2. Imagine a world w with a finite number of concrete objects.
> P3. Then there is a numerical sentence P that counts all of the objects in w using only first order logic and the 'concrete' predicate.[166]

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[165] Lewis 1986, 212-13

[166] For example: if there are two objects in the world, then ∃x ∃y[Cx ∧ Cy ∧ x ≠ y ∧ ∀z(Cz → (z = x ∨ z = y))].

P4. From P1, *P* is vague, since it is vague whether the objects in *w* compose a
    further object: the fusion of those objects.
P5. Since P is vague, either the predicate 'concrete', or the logical terms are vague.
P6. Neither the predicate 'concrete' nor the logical terms are vague.
P7. Therefore, *P* is not vague.
C. Reject P1; It is never vague whether composition occurs.[167]

P5 is supported by the assumption that vagueness is the result of semantic indecision. Since *w* has no vague objects, then it must be the case that the terms of the sentence have multiple precisifications. Most philosophers agree that the Boolean connectives do not have multiple precisifications. Furthermore, the predicate 'concrete' does not have multiple precisifications since it is stipulated to have no such things. Therefore, either the identity symbol or the quantifiers have multiple precisifications. There is good reason to think that identity does not have multiple precisifications.[168] Consider the universal quantifier; what would it mean for the universal quantifier to have multiple unrestricted precisifications? It would seem to mean that there is more than one "everything" for the quantifier to range over. Suppose we have two precisifications of the universal quantifier $\forall_1$ and $\forall_2$. In order for these to be genuine precisifications, there must be some *x* in $\forall_1$'s extension that is not in $\forall_2$'s extension. However, this means that $\forall_2$ is just a restricted quantifier, since there is something in the domain that it does not quantify over. Sider only argues that the universal quantifier does not have multiple precisifications, but what he says should apply to the existential quantifier as well since it can be defined by using the universal quantifier.[169] Since the quantifiers do not have multiple precisifications, then there can be no source of vagueness in *P*. This completes the reductio and secures P7.

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[167] Sider 2001: 126-130
[168] See Evans 1978 and Stalnaker 1988.
[169] $\sim\forall(x)\sim P(x) = \exists(x)$, in other words, it is false that everything is not-P entails that there is at least one *x* that is P.

At this point is should be noted that the Argument from Vagueness does not entail the truth of universalism. Rather, it entails that there is no true "sometimes" answer to the SCQ. The Argument from Vagueness for universalism can be easily modified to support the nihilist position as well:

P1′. Assume for reductio that not every class of objects has a fusion.
P2′. If it is false that no class of objects has a fusion (nihilism), then there must be a pair of cases connected by a continuous series such that in one, composition occurs, but in the other, composition does not occur.
P3′. In no continuous series is there a sharp cut-off in whether composition occurs.
P4′. In any case of composition, either composition definitely occurs, or composition definitely does not occur.
C′. Therefore, no class of objects has a fusion.

The arguments that Sider gives in support of P1-P4 can be used *mutatis mutandis* in support of P1′ to P4′. Therefore, if Sider's argument is sound, then the Argument from Vagueness for nihilism is sound as well. This means that the Argument from Vagueness does not only support universalism; the argument shows that any sometimeser answer to the SCQ is impossible. So in order for the Argument from Vagueness to succeed as an argument for universalism, it must be supplemented by additional arguments that nihilism is false.

3.4.2: The Argument from Vagueness for Temporal Parts

Sider's ultimate goal is to use the Argument from Vagueness against endurantism. He uses the argument to show that any concrete object must be composed of temporal parts. In order to do this, Sider introduces some technical terms:

f is an **assignment** iff *f* is a function that takes one or more times as arguments and assigns non-empty classes of objects that exist at those times as values.

x is a **diachronic fusion** (D-fusion) of *f* iff for every time *t* in *f*'s domain, *x* is a fusion-at-*t* of *f(t)*.

x is a **minimal D-fusion** of *f* iff *x* is a D-fusion of *f* that exists for only those times in *f*'s domain.[170]

The function *f* is supposed to be metaphysically neutral; assignments do not have to have any ontological weight. Under the assumption that I am an object, then there is some function f_1 that assigns me to various times in which I exist. For example, I have a diachronic fusion that spans the twenty-four hours of October 12, 2013. In this case, function f_1 takes every time of that day and assigns to that time the class of objects that compose me at that time. It should be noted that Sider is not claiming that these assignments are temporal parts. Rather, for every *t* in the domain of the assignment, there is a corresponding class of objects that compose me at that time. Whether these objects are temporal parts or not remains to be seen.

While it is true that all minimal-D fusions are D-fusions, the converse is not true. In the example, the D-fusion described by f_1 is not a minimal D-fusion, since I existed before and continue to exist after October 12. My minimal D-fusion would be the assignment *f* that takes all the times I exist as arguments and assigns all the objects that compose me at those times to those times. It should be noted that D-fusions and minimal D-fusions do not have to be continuous. There is the D-fusion of me at 12 p.m. on November 11, 2013 and Genghis Khan's nose at 9 p.m. on October 2, 1205. Whether this is a genuine entity remains to be decided, but it is a D-fusion nonetheless. The endurantist would accept that there are D-fusions of assignments with only one time (such as my body at t_1), but deny that an assignment that has multiple times is a D-fusion. For instance, if there is an object composed of Brian-at-t_1, Brian-at-t_2, Brian-at-t_3, and so on, then I would be composed of temporal parts; this is what the endurantist denies.

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[170] Sider 2001

In order to create the Argument from Vagueness for temporal parts, Sider simply replaces the term "class of objects" with "assignments" and "fusion" with "minimal D-fusion":

P1′. Assume for reductio that not every assignment has a minimal D-fusion.
P2′. If not every assignment has a minimal D-fusion, then there must be a pair of cases connected by a 'continuous series' such that in one, minimal D-fusion occurs, but in the other, minimal D fusion does not occur.
P3′. In no continuous series is there a sharp cut-off in whether minimal D-fusion occurs.
P4′. In any case of minimal D-fusion, either minimal D-fusion definitely occurs, or minimal D-fusion definitely does not occur.
C′.   Therefore, every assignment has a minimal D-fusion.

Remember, the endurantist must hold that not every assignment has a minimal-D fusion. For instance, consider an apple that comes into existence, exists for ten seconds, and then is annihilated. There are infinitely many assignments of times to the apple over the 10-second interval, since time is not metrical. However, the endurantist says that there is only one assignment that is a real object: the assignment of the lifespan of the apple to the apple. The Argument from Vagueness aims to show that each of the infinite assignments is an object in its own right, and that these objects can compose larger temporal objects.

Some of the previous terminology requires modification in order to account for the temporal elements in the new argument. The definitions of 'case' and 'continuous series' require some tweaking. Temporal cases differ from each other by whatever features one believes are relevant for differentiating minimal D-fusions: spatial relations, qualitative similarity, causal relations, and so on. The case at the beginning of the series and the case at the end of the series have the same assignment; that is, the same times are assigned the same classes of objects. As an example of an assignment f_2 where minimal D-fusion occurs, consider the time for which my body exists; f_2 pairs the times that I exist with the objects that compose me at each of those times. Now consider a

possible world where the particles that make up my body are scattered throughout the galaxy for the same interval of time. In this case, there seems to be no minimal D-fusion because the scattered particles do not compose anything. The intermediate cases consist of possible worlds focused on the same time interval. In each of these worlds, successive particles from my body are removed and scattered about the galaxy. At some world, one will no longer claim that my body continues to persist through time because I have been pulled apart enough to no longer be considered a minimal D-fusion.

The defense of the argument's premises requires little modification from the defense of the Argument from Vagueness for universalism. If one was satisfied with the defense of P2 and P3, then one should not take issue with P2′ and P3′. One could, however, resist P3′ by being a mereological essentialist. P4′ is supported by the same argument that defended P4, however, it is worth going through again. If one rejects P4′, then one thinks that it is vague whether an assignment has a minimal D-fusion. Sider gives four examples of vague minimal D-fusions, but one example will suffice. Suppose that whether minimal D-fusions occur can be vague. Now consider a statue made up of some particles at some world w_1, and suppose that it is vague (or indeterminate) as to when the statue comes into existence. If this is the case, then the statue determinately does not exist at some time t_1, but does determinately exist at some time t_2. However, during the interval between t_1 and t_2, it is indeterminate whether the statue exists.

Now consider another world w_2 that is much like w_1, except that w_2 contains a finite number of concrete objects. Also suppose that w_2 has some particles at t_1 and that these particles are duplicates of the particles in w_1. At t_1 the particles in both w_1 and w_2 do not compose anything, and it is indeterminate whether they compose anything until t_2. Suppose that the particles in w_2 are annihilated right before t_2. It then follows that whether or not the statue ever existed at w_2 is vague since there is no time where the

statue determinately exists.[171] Therefore, the number of concrete entities in w_2 is vague. However, since w_2 has a finite number of concrete objects, one could construct a numerical sentence (using only the 'concrete' predicate and first order logic) that would count the entities. Since numerical sentences cannot be vague, the assumption is false and whether minimal D-fusion occurs cannot be vague. Therefore, C' is true; every assignment has a minimal D-fusion. If every assignment has a minimal D-fusion, then all material objects are composed of temporal parts. Recall the example of the apple that comes into existence, persists for a ten second-interval t, and then ceases to exist. Since there is a real object that corresponds to every assignment possible during t, then endurantism is false, since the lifespan of an object is made up of infinitely many minimal D-fusions.

There are many ways one might attempt to resist the Argument from Vagueness.[172] For instance, one could argue that the vagueness is found in the world. If this is correct, then the source of vague composition will not be found in the numerical sentence *P*. Standard nihilism also allows for the rejection that everything is composed of temporal parts, since the standard nihilist believes that objects do not have spatial parts or temporal parts. The standard nihilist can simply modify the Argument from Vagueness for temporal parts to support nihilism about temporal parts. In conclusion, the Argument from Vagueness is a powerful argument against sometimesers views about composition or persistence. In the previous section, I argued that endurantism is a "never" answer to the STCQ. The Argument from Vagueness shows that the only tenable endurantist view is one that also endorses nihilism. The Argument from Vagueness

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[171] In w_1, whether the statue exists between t_1 and t_2 is vague, but the statue determinately exists at some time.

[172] For a comprehensive overview of resisting the Argument from Vagueness, see Varzi 2005 and Korman 2010. Varzi argues that each of the options that allow one to resist the Argument from Vagueness undermine the endurantist's claim that their view is the intuitive view of persistence, since they require embracing many counter-intuitive claims about material objects (p. 498). I am inclined to agree with Varzi on this point.

undermines any endurantist view that allows mereological sums located at a specific time, whether these sums are unrestricted or not. The first view advocates restrictions on persistence and composition, while the second two advocate restrictions on persistence and composition respectively. The Argument from Vagueness shows that these restrictions are impossible, and creates a significant problem for endurantists that are not nihilists. I believe that the Argument from Vagueness provides strong support for the rejection of endurantism. In the next section, I will discuss another famous argument against endurantism: the Argument from Temporary Intrinsics.

3.4: The Argument From Temporary Intrinsics

One of the most controversial arguments in the perdurantist/endurantist debate is Lewis's Argument from Temporary Intrinsics. Lewis begins with the claim that persisting objects have intrinsic properties, and that these properties change over time. He writes the following:

"Persisting things change their intrinsic properties. For instance shape: when I sit, I have a bent shape; when I stand I have a straightened shape. Both shapes are temporary intrinsic properties; I have them only some of the time. How is such change possible?"[173]

In this example, Lewis has both the properties of sitting and standing. Obviously, he cannot have these properties at the same time; this would be a straightforward violation of Leibniz's Law. Unless one gives up the claim that Lewis at t_1 and Lewis at t_2 are identical, then there must be some way to avoid violating Leibniz's Law. Lewis goes on to present three solutions to problem of temporary intrinsics. Each one of these solutions corresponds to presentism, endurantism, and perdurantism (I will not discuss Lewis's remarks about presentism, since I have already rejected presentism):

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[173] Lewis, 1986 pp. 203-4

First solution (endurantism): contrary to what we might think, shapes are not genuine intrinsic properties. They are disguised relations, which an enduring thing may bear to times. One and the same enduring thing may bear the bent-shape relation to some times, and the straight- shape relation to others...

Third solution (perdurantism): the different shapes, and the different temporary intrinsics generally, belong to different things. Endurance is to be rejected in favor of perdurance. We perdure; we are made up of temporal parts, and our temporary intrinsics are properties of these parts, wherein they differ one from another.[174]

I will call Lewis's endurantist solution *relational endurantism.* For the relational endurantist, a seemingly temporary intrinsic property, such as the property of being a square ($S(x)$), is in fact some sort of relation like $S(x, t)$. I think it is worth pointing out that one might worry that Lewis's choice of terms already undermines the relational endurantist's position. Lewis assumes that it is natural to think that the various intrinsic qualities of objects are properties represented by a single-place predicate. He believes that the relational endurantist's translation of property-talk to relation-talk is already a mark against relational endurantism.

His support of this claim seems to rely on an appeal to our pre-theoretical intuitions (or at least our pre-metaphysics of persistence intuitions) about whether a shape is a property or a relation. Lewis's statement above about relational endurantism, "contrary to what we might think," reveals that he clearly believes that our intuitions support the perdurantist view that shapes are properties. Not only does the perdurantist answer confirm this intuition, but it also presents an easy solution to the problem of temporary intrinsics. The sitting Lewis at t_1 is not identical to the standing Lewis at t_2; they are temporal parts of the four-dimensional object Lewis. Notice that this assumes worm theory; according to stage view, Lewis at t_1 and Lewis at t_2 are still parts of a four-dimensional mereological sum, but the sum is not Lewis. Since parts of objects can have conflicting properties, there is no problem of temporary intrinsics for the perdurantist.

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[174] ibid. 2004

Lewis's argument seems straightforward; however, one might worry the argument relies on the unclear concept of an intrinsic property. Lewis himself never provides a proper explanation of the difference between the two types of properties. In "Rearrangement of Particles: Reply to Lowe," Lewis briefly mentions that the relativizer will attempt to make a distinction between properties such as shape and properties such as unclehood. He then claims that the relativizer will ultimately treat both the properties in the same way: as relations.[175] It seems reasonable to interpret these claims as indicating that intrinsic properties are something that an object has in virtue of itself, and extrinsic properties are ones that require the existence of some other object in order for their instantiation to occur. It seems reasonable to suppose that an object could have the property of being a square even though it is in an otherwise empty world. In contrast, a person in an otherwise empty world could not have the property of being an uncle. This is a rough definition. Many philosophers offer their own interpretations of Lewis's intrinsic/extrinsic distinction. For instance Eddon defines an intrinsic property as the following:

> *a property is intrinsic* iff it never differs between duplicates. Two things are duplicates iff they share all their fundamental – or perfectly natural – properties, and their parts can be put into correspondence in such a way that corresponding parts have the same perfectly natural properties and stand in the same perfectly natural relations.[176]

Botterell gives the following definition:

> *a property P is an intrinsic property of an object x* if (i) whenever x has P, x's having P does not entail the existence of a wholly distinct object y, and (ii) y's existence is not contingent on the existence of x. 7 So, for example, the property of being red is plausibly intrinsic, since whether or not an object is red does not entail the existence of any other object. The property of being married, on the other hand, is plausibly not intrinsic, since whether a person N is married does entail the existence of an object distinct from N, namely N's spouse. If a property

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[175] Lewis 1999, p. 188.
[176] Eddon 2010, p. 607.

is non-intrinsic, I will also sometimes say that it is extrinsic, or relational, or derivative.[177]

Eddon's characterization of intrinsic properties relies on the existence of perfectly natural properties, while Botterell's characterization relies on the previously discussed Humean principle of modal recombination (see Ch.2). I believe that regardless of which analysis one chooses, the concept of intrinsic properties is at the very least intelligible. What Lewis needs to show is that intrinsic properties provide the best account of the various qualities that objects have. Simply assuming that intrinsic properties exist entails that relational endurantism is false. Therefore, the perdurantist needs to show exactly what is so objectionable about properties being relations in disguise.

There are several reasons one might object to properties as relations in disguise. First, it seems that properties are part of our best theory of the world given their widespread use throughout philosophy. Second, one might think that abstract entities, such as geometrical shapes, have shape properties independent of any times. Or perhaps one thinks that timeless worlds are possible; if endurantism is true, then these worlds would necessarily be empty or only contain bare particulars since there would be no times to serve as arguments for the endurantists's quality relations. One might also simply say that times do not seem to have to do anything with qualities like shape or color. Unlike events, shapes and colors require no passage of time for their existence. Of course, the endurantist could stand their ground and reject each of these points. However, this position will most likely be met with an incredulous stare.

In an attempt to avoid claiming that there are no properties at all, Sally Haslanger advocates what she calls the *adverbialist* solution to the problem of temporary intrinsics (I briefly discussed adverbialism on p. 26). Adverbialists attempt to use relations to disarm the problem of temporary intrinsics while still including

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[177] Botterell 2004, p. 6.

properties in their ontologies. There are two adverbial strategies: one that makes use of a three-place predicate, and one that uses a two-place predicate. The first sort of adverbialist accounts for temporary intrinsics with a three-place relation that takes objects, properties, and times as arguments. For example, the sentence "'the guitar is blue right now" is the proposition *g has at t the property blue,* or *H*(*g, t, B*). As Haslanger says, properties and objects "are treated...as individuals are to other individuals."[178] The *having* relation operates in the same way as other three place relations. In the proposition 'Jackie gives a bouquet to Beatrice', the three place relation *gives* takes three individuals as arguments: Jackie, a bouquet, and Beatrice. In the same way, there are three individuals involved in the temporary intrinsic described above: a guitar, a time, and the property *blue*.

Haslanger advocates the second adverbialist strategy of using a two-place *having* predicate. The difference between the three-place predicate and the two-place predicate is that two-place predicate takes property predicates and times as arguments instead of taking properties, times, and objects as arguments. For example, the aforementioned guitar being blue at *t* is no longer H(g, *B*, *t*), but *H(B(g), t)*. The guitar is blue, and the blue guitar is related to a time. This second type of adverbialism emphasizes the fact that the blueness and the guitar are tied more closely to each other than to the time they are at. Haslanger claims that this second type of adverbialism avoids the counter-intuitiveness of the first three-place relation by no longer treating properties and objects as individuals. Haslanger's main worry about the first type of adverbialism is that properties should not be treated as entities in their own right. However, it is worth pointing out that unless one is a nominalist about properties, then one will have tropes or universals in one's ontology, and these can be treated as individuals for the purposes of the *having* relation. In any case, I do not think there is much difference between these

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[178] Haslanger 1989a

two types of adverbialism. They both claim that temporary intrinsics are accounted for by a *having* relation that somehow involves times, properties, and objects. The adverbialist account's inclusion of properties may mitigate some of the worries mentioned above. Abstract objects or objects in timeless worlds can simply instantiate properties. The *having* relation is only used when properties must be instantiated by objects in time.

At this point, the lines between adverbialism and perdurantism may appear to be blurred. Both the adverbialist and perdurantist ontologies contain objects, properties, and times. There are two important differences: (1) the adverbialist has a primitive *having* relation, and (2) adverbialists do not have temporal parts in their ontology. Even though they may have an extra primitive relation, adverbialists think that it is a worthwhile tradeoff for rejecting temporal parts.

While adverbial and relational endurantism seem to be able to both solve the problem of temporary intrinsics, each of their relations is somewhat mysterious. Lewis discusses this perplexity by attempting to understand how an endurantist would "draw" a shape.[179] Lewis believes that the only way to make sense a relation like $H(g,t,B)$ is to represent the guitar as a "shapeless blob" that exists in the intersection of two circles (a Venn diagram), one of which has times in its domain and the other which has properties in its domain. It then appears that the guitar has no color at all, and the problem of temporary intrinsics resurfaces. The two-place adverbialist does not escape this problem either. Even by predicating the color blue to the guitar before putting it in the relation, it still follows that the guitar has no color independent of a time. Haslanger is not troubled by this consequence, since she believes that there is nothing wrong with the guitar lacking a color in the abstract.

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[179] See Lewis 1988 p. 67.

Instead of just admitting that it is hard (or maybe impossible) to conceive of the guitar separate from the times it is related to, what the endurantist should do is appeal to mereological analysis of the four dimensional manifold. I have already argued that endurantism is best understood as the claim that persisting objects are temporally extended and qualitatively heterogeneous simples. The guitar can change from blue to red since it is qualitatively heterogeneous along the temporal dimension even though it lacks blue or red temporal parts. I believe that this clears up Lewis's confusion about how to "draw" an enduring object with temporary intrinsics. Shortly, I will argue that taking enduring objects to be extended heterogeneous simples reveals a major problem for endurance theory. First, I will discuss some other endurantist arguments that attempt to undercut the problem of temporary intrinsics.

With worries about how to conceive of enduring objects set aside, adverbial endurantists and perdurantists seem to be at a standoff. For example, Wasserman says as much in his discussion of temporary intrinsics:

> And here we seem to have reached a genuine standoff. The endurantist takes *being bent at* as primitive and uses that notion to define *being bent*. The...perdurantist takes *being bent* as primitive and uses that notion to define *being bent at*. At this point it is unclear whether we have any substantial reason for favoring one account of persistence over the other.[180]

In order to gain any advantage over the endurantists, perdurantists must not simply appeal to intuitions that bolster their claim that temporary intrinsics are best accounted for by monadic properties. The perdurantist needs a counterexample to the endurantists's claim that quality instantiation must be a dyadic relation involving a time (or a three-placed relation involving a time). The most straightforward counterexample to this claim is asserting the possibility of a timeless world.[181] Sider argues that the endurantist cannot use their indexical or adverbial relations to explain qualities of

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[180] Wasserman 2004 p. 5; he describes what I am calling relational endurantism in this passage.
[181] See Sider 2001 pp. 99-101

objects in timeless worlds since there are no times to participate in these relations. Therefore, the endurantist must deny the possibility of timeless worlds. I, for one, find the possibility of timeless worlds plausible. On the eternalist model, these are simply worlds that lack a fourth dimension. All of the objects that exist in our world could also exist in a timeless world, but these objects simply would not persist in the timeless world. Therefore, the burden of proof is on the endurantist to show that timeless worlds are impossible.

However, I believe that this argument from timeless worlds can be taken a step further and actually provide support for the perdurantists claim that monadic properties account for the qualities of objects. The argument is as follows:

P1. Suppose timeless worlds are possible.
P2. At any timeless world w, intrinsic qualities of objects in w cannot be explained relationally.
P3. Therefore, objects in w have intrinsic qualities by instantiating properties represented by monadic predicates.
P4.　By Occam's razor, if property instantiation can account for the qualities of objects in timeless worlds and worlds with time, then the property account is better than alternative accounts.
C.　Therefore, the property account is better than alternative accounts.

If this is argument is correct, then the endurantist's relational approach cannot solve the problem of temporary intrinsics since the endurantist must still use timeless predictions to account for intrinsic qualities of objects in timeless worlds.

The only way the endurantist could attempt to resist this argument is by rejecting P1. In order to reject P1, the endurantist needs to show that it is necessary that all worlds have at least one moment of time. In order to account for a seemingly timeless world, the endurantist could claim that the appearance of timelessness in w results from the fact that w has only one instantaneous time and therefore no *passage* of time. If a world has only one instantaneous moment of time, then time cannot flow.

The perdurantist has several ways to counter this objection. The perdurantist could argue that positing worlds with only one instantaneous time is *ad hoc* since any instantaneous time would serve no metaphysical purpose in the world other than to support and endurantist account of intrinsic qualities. In other words, a timeless world and a world that has only one instantaneous moment of time can be described in exactly the same way since there is nothing at these worlds.

The perdurantist could also argue that worlds with only instantaneous time are flat-out impossible: either worlds are timeless, or worlds have an extended temporal dimension, even if it is quite small. Recall that for the eternalist, the world is a four-dimensional block with three spatial dimensions and one temporal dimension.

P1. Given eternalism, all times have the same metaphysical status
P2. Assume that there is some world w that has only one instantaneous time t_1.
P3. Suppose that another time t_2 is added to this world.
P4. Since time is not metrical, then for any two times t_1 and t_2, there are an infinite amount of times between t_1 and t_2.
P5. If follows that the w now has infinitely many times.
P6. Given P1, there is nothing special about t_2, but t_2 necessarily brings into existence infinite times.
C. This is absurd; worlds with only one instant of time are impossible.

This argument roughly follows the sorites paradox discussed in ch. 1 (p. 2). For any world with a temporal extension n, one could add more time to n and the world would increase its temporal extension by the exact amount added. But in the case of worlds with only one instantaneous time, the addition of another instantaneous time results in an explosion of times. If the endurantist maintains that worlds with one instant of time are possible, then not only must they accept that their relational account of intrinsic properties is *ad hoc* at these worlds, but they must also accept the paradoxical consequences of worlds with only one instant of time. The perdurantist who accepts

timeless worlds has neither of these problems.[182] Therefore, I think that while the Argument from Temporary Intrinsics does not so far show that endurantism is outright contradictory, the argument does show that the endurantist has to pay an excessively high price in order to defend against it.

I believe that the endurantist's position, relational or adverbial, becomes even less defensible when their view is understood as the claim that enduring objects are objects that are spatially complex but temporally simple. With this in mind, I will re-examine adverbialism. I will discuss Haslanger's adverbialism, but everything I will say targets three-placed adverbialists as well. Adverbialists are committed to a four-dimensional manifold of spacetime. They are also committed to matter that fills this manifold.[183] An object has spatial extension if and only if its matter occupies a region that extends in the spatial dimensions, and an object persists if and only if its matter occupies a region that extends in the temporal dimension. This simply follows from the endurantists's eternalist commitments.

Recall Haslanger's adverbialist analysis of a guitar that is temporarily blue: $H(B(g), t)$. This analysis is supposed to evade the problem of temporary intrinsics. However, given the spatiotemporal manifold previously described, this *having* relation is just the location or occupation relation in disguise. Given the eternalist framework, all temporal relations reduce to geometric relations between points in a manifold. It does not matter whether this relation is called the *having* relation or the *location* relation; the eternalist structure of spacetime does not allow for any other type of relation between matter and spacetime. When the adverbialist analysis of temporary intrinsics is understood as really being about location, then the adverbialist analysis falls apart. The

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[182] One might object that the perdurantist must claim that it is necessary for any world with at least one time, another time must exist at that world. I myself do not take this to be an objectionable necessity.
[183] Endurantists could not be supersubstantivalists since this would mean that all objects are made of spacetime, and the spacetime manifold has parts.

adverbialist analysis only tells us that the guitar is blue and located at one region while also not blue and located at another region. It should be obvious that this is not a solution to the problem of temporary intrinsics; it is just a description of the original problem!

Since the adverbialist rejects temporal parts, then it follows that the blue guitar must have no parts located in the temporal dimension; the guitar is simple with respect to the temporal dimension. Now, it can be seen that the problem of temporary intrinsics really has nothing to do with time at all. The problem of temporary intrinsics is just the problem of qualitative heterogeneity as discussed in 2.7: can extended simple objects have qualitative variation? Just like the defender of qualitatively heterogeneous spatially extended simples, the endurantist would have to apply a distributional properties analysis or a stuff/thing analysis to explain an enduring object's qualitative heterogeneity along its temporal dimension. I have already argued that these analyses fail, and since time is treated as just another geometric dimension, my previous arguments in 2.7 apply equally to any endurantist appeal to distributional properties or a stuff/thing ontology.

In conclusion, much of the debate around the problem of temporary intrinsics is due to a lack of clarity concerning the nature of enduring entities and the relations that account for their qualities. Once these things are brought into focus, I have shown that even if one grants the possibility of endurantism, it still pays a much higher metaphysical price than perdurantism. Furthermore, I have shown that endurantism is committed to objects that are both simple and qualitatively heterogeneous along their temporal dimension. Since qualitatively heterogeneous extended simples are impossible, endurantism is false.

In this chapter, I have summarized and discussed the main theories of time and objects in time. I have presented brief arguments against presentism, the moving spotlight theory, and the growing block theory. These arguments support the eternalist

feature of my 4D-nihilism. More importantly, I have argued that perdurantism's main rival, endurantism, is false. I have discussed the difficulties in defining endurantism and how these problems make the view suspect. I have shown that the only philosophically secure statement of endurantism is that it is the view that persisting objects are temporally simple but spatially complex. However, both the Argument from Vagueness and the problem of temporary intrinsics show that there can be no objects that are temporally simple and spatially complex. Since my 4D-nihilism is a perdurantist view, eliminating endurantism strengthens the case for 4D-nihilism. In the next chapter, I will formally present 4D-nihilism and discuss both the strengths of the view and problems that it can solve.

Chapter 4: Nihilist Perdurantism

This chapter will bring together the positive arguments from the previous two chapters and present my answer to the Total Mereological Composition Question: Nihilist Perdurantism. Roughly, this is the view that every material object is spatially simple but temporally composite. After formulating Nihilist Perdurantism, I will discuss its various applications and benefits to problems of composition and persistence.

4.1: What is Nihilist Perdurantism?

I call my view *Nihilist Perdurantism*:

> **NP** $=_{df}$ objects are extended through spacetime and are temporally composite, but spatially simple.

The view I am proposing is radical; I deny the intuitive features and maintain the unintuitive features of standard perdurantism. Like traditional compositional nihilism, NP entails that there are no leaves, guitars, or desks. Only objects without spatial parts, such as the fundamental entities described by physics, really exist. However, these objects are not one-dimensional because they have temporal parts that extend through the temporal dimension. This view might seem bizarre. Almost all philosophers as well as non-philosophers accept the existence of spatial parts, while only some philosophers accept the existence of temporal parts in addition to spatial parts. Bizarre or not, I will show that NP provides the superior solution to the puzzle of change.

I will argue that in addition to providing the best solution to the puzzle of change and the problem of the rotating disk (these solutions are discussed in the following sections), my view also makes another important contribution to the issues of time and persistence: it frames each of the solutions to the puzzle of change in terms of spatial and temporal parthood. Using this framework, it follows that there are four possible combinations of commitment to, or rejection, of both types of parts. Standard perdurantism commits to spatial and temporal parts. Standard endurantism commits to

spatial parts, but not temporal parts (this framework provides a clear definition of endurantism, a view that has faced definitional difficulties; I will discuss these difficulties later in the paper). A third view, nihilism (or eliminativism), rejects both spatial parts and temporal parts. Until now, NP, the fourth combination of parthood commitments has been ignored. This provides a framework for understanding the relationships between the various views of spatial and temporal parthood.

	Spatial Parts Exist	Spatial Parts do not Exist
Temporal Parts Exist	Perdurantism	NP
Temporal Parts do not Exist	Endurantism, Presentism	Nihilism[184]

Figure 2

With the exception of NP, each view in the above chart has received a thorough treatment in the literature.

NP takes inspiration from mereological nihilism (or eliminativism), a view championed at various times by Merricks 2001, Sider 2013, Unger 1979, and Van Inwagen 1990b. Mereological nihilists claim that all material objects are mereologically simple. Mereological Simples are defined as follows:

Mereological Simple: *x* is a mereological simple *iff* it is not the case that there exists any *y* such that *y* is a proper spatial or temporal part of *x*.

For the rest of the dissertation, I will assume that in addition to having no proper spatial

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[184] While any view about temporal parthood and spatial parthood can be classified in this chart, this chart uses the standard names for each view.

or temporal parts, simples are point-sized objects. [185] If all objects are mereological simples, then, strictly speaking, there are no maple leaves or guitars because their existence requires the existence of spatial parts.

For the nihilist, the sentence "The leaf is red" seems to be false since there are no leaves. Does this mean that the nihilist must attribute massive error to ordinary language speakers? It does not. Instead, the nihilist provides alternate truth conditions for sentences about objects (Van Inwagen calls this "paraphrase"; see his 1990b, Ch. 11). These truth conditions use *plural quantification*. The plural existential ($\exists xs$) and universal ($\forall xs$) quantifier both behave like the familiar singular existential and universal quantifier, except that they range over plural variables, the *xs*, instead of a singular variable, *x*. Plural quantification is used to translate what Van Inwagen calls "plural referring expressions."

Briefly setting aside the nihilist ontology, everyday expressions such as "the Carlsons", "the members of the department", and "the stegosaurus" are all plural referring expressions.[186] Plural quantification can be used to translate sentences such as "The stegosaurus are extinct" as follows: for some *xs* (for all *y*, *y* is one of the *xs* iff *y* is a stegosaurus) and the *xs* are extinct.[187] By combining plural quantification with predicates that take the form 'are arranged *x* wise', nihilists can provide truth conditions for sentences like "The leaf is red": for some *xs*, the *xs* are arranged leafwise and the *xs* are

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[185] One could claim that things like guitar-sized simples are possible. These simples would have no proper parts, but still have spatial extension. See Markosian 1998b for a discussion of possible extended simples and Williams 2006 for a discussion of actual extended simples. See McDaniel 2007 for an overview of other views on simplicity.

[186] Van Inwagen assumes a Fregean perspective and claims that these to be referring descriptions, not simply definite description (see Van Inwagen 1990b, p. 23). This is in contrast to the Russellian approach that eliminates reference from definite description. Whatever the correct analysis of these sentences is irrelevant to plural quantification. The plausibility of referring plural definite descriptions in English is evidence for the plausibility of plural quantification.

[187] Van Inwagen uses the phrase "is one of" as a primitive relation that functions like the '$\in$' of set theory see 1990b p. 26.

red.[188] Since NP rejects the existence of objects with spatial parts, it also uses plural quantification to analyze talk that seems ontologically committed to objects with parts.

The objects in the NP ontology are not mereological simples. They are objects that have temporal parts, but not spatial parts. These objects do, however, play a similar role as to that of the nihilist's mereological simples. To illustrate this, consider a cubic three-dimensional model that has two spatial dimensions and one temporal dimension. An instantaneous moment of the model populated with my objects has the same representation as an instantaneous moment of the model populated with mereological simples. In both models there are, strictly speaking, no objects such as composite objects such as trees or guitars.

However, when one views the whole of each model, then the differences are immediate: the nihilist model still has an array of points strewn about the cube, while the NP model has an array of lines running parallel to the temporal axis of the cube. In order to distinguish between these line and mereological simples, I will refer to the line objects as *four dimensional nihilist objects*, or NP objects, for the remainder of the dissertation. These NP objects provide the foundation for my solutions to the two puzzles presented in the following sections: (1) the puzzle of change, and (2) the puzzle of the rotating disk

4.2: The Puzzle of Change

This section will discuss Hinchliff's puzzle of change (briefly discussed in Ch.1) and the difference between the solutions presented by the standard perdurantist and the 4D-nihilist. I will argue that the 4-D nihilist has a better solution to the puzzle than the standard perdurantist. Mark Hinchliff believes that change is puzzling because our concept of change implies four conflicting intuitions. For some object x that changes: (1) One and the same object instantiates P at time t_1 and does not instantiate P at time t_2, (2) Change involves properties, not relations, (3) Change happens to the whole object, not a

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[188] It is important to note that *leafwise* contains not quantification. It merely describes a configuration of mereological simples.

temporal part of the object, (4) one and the same object persists through the change.[189] Standard Perdurantist reject (3) while endurantists reject (2). These types of change can be formulated as follows:

Perdurantist Change: for all objects x, x changes iff x has some temporal parts y and z such that y is P and z is not-P.

Endurantist Change: for all objects x, x changes iff x bears a certain relation to P at a time t_1 and does not bear a relation to P at t_2.

I have already identified endurantist change as the problem of temporary intrinsics and argued against it in section 3.4 and will not pursue the issue further here. As for perdurantist change, Hinchliff objects to this analysis because it violates the intuition that one and the same object persists through the change. For the perdurantist, a whole object does not have a temporary property P; it only has a temporal part that instantiates P. This account of change is said to be "static." Temporal parts either have properties or they do not; perdurantist change does not seem to capture the fluidity that we normally associate with changing things, such as the growing flame of a match being struck. The perdurantist analyzes our perceived fluidity of change as a consequence of our perceiving a rapid succession of temporal parts with varying properties.

Hinchliff objects to this static model of change. He argues that change is something that happens to the candle and that one can observe this change happening to the one-and-the-same candle. Supposedly, when one imagines a candle changing as it melts from the heat of its flame, one sees the change as happening to the original solid wax candle; the candle flows smoothly from solid to liquid. Hinchliff claims that our experience yields the intuition that the candle both has the property of being solid and the property of being liquid. The perdurantist cannot say that the candle is both solid

[189] Hinchliff 1996, p. 119

and liquid since only parts of the candle are solid or liquid; the spacetime worm that makes up the candle is neither solid nor liquid.[190]

I think that Hinchliff is mistaken to lean so heavily on intuition 3. There are everyday events that are counterexamples to (3). For instance, we are all familiar with how movie projectors work. A rapid succession of still images is shown on a screen, and this rapid succession gives the illusion of movement. This seems to be very much like the static model of change that the perdurantist proposes. Hinchliff's claim that intuition (3) is backed by our experience with change is somewhat undermined by our experience of static images producing the illusion of change. While the static account of change is still counter-intuitive, our experience of static change suggests that the static change view may not be as radical as it first seems.

I find the perdurantist explanation of the fluidity of change to be satisfying since it is able to do all the work that our typical talk of change does. However, this explanation of the phenomenology of change will not satisfy all. Since endurantism is false, I will argue that either perdurantism or NP must explain change, and that NP gives a better account of change than standard perdurantism.

Before I give an account of NP change, I want to discuss the objection that the puzzle of change is a non-issue for any sort of nihilist. This objection might go something like the following: "Nihilism automatically rules out the possibility of change, since it claims that the world is made up of unchanging simples. Since the NP ontology only has unchanging spatial simples, then there is no need for an account of change."

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[190] Sider's stage theory does not offer any solutions to the puzzle of change either. For the stage theorist, the candle is the instantaneous temporal part picked out by a specific time. So the melted candle is an instantaneous temporal part that has a solid candle as a temporal counterpart. If one agrees with Hinchliff, then stage theory is just as problematic than worm theory. The stage theorist's instantaneous temporal part that is picked out by "candle" only was solid in virtue of the fact that it is in a counterpart relation. For the stage theorist, then, change is governed by relations, not the properties that violate intuition (2).

Perhaps the elimination of change from one's theory is desirable. However, I claim that spatially simple objects can change, and that NP must account for this. What it is for a spatially simple object to change over time depends on which account of mereological simplicity that one defends, as there are many views on the nature of simples (See Ch. 2). However, most of these views are compatible with the possibility, if not the actuality, of changing simples. For example, it seems plausible that there is a possible world where some spatially simple particle, say an electron, could lose its property of -1 charge. The NP accounts for this by attributing the property of -1 charge to some of the electron's temporal parts and not to the others. As for an actual example of change in spatially simple objects, many physicists advocate a superstring theory where the tiniest objects are strings that vibrate in certain ways that correlate with fundamental properties. Supposing that these strings are spatially simple, it follows that they can change their properties simply by changing their vibrational pattern. Therefore, spatially simple objects that change properties are plausible and any ontology that contains these simples must provide an account of change.

Both the standard perdurantist and 4D-nihilist give the same account of a spatially simple object that changes: the object changes iff it has a temporal that is *P* at one time and a temporal part that is not *P* at another time. It might seem that 4D-nihilism fares no better than the standard perdurantism when it comes to Hinchliff's objection that change is static. However, I believe that the intuitive pull of the claim that change is fluid is only gripping when one considers macroscopic, composite objects. This can be illustrated by previous example of the melting candle. For the standard perdurantist, the candle is a composite objects that has both spatial and temporal parts. The change from the candle being solid to being liquid is analyzed as our successive viewing of the candle's temporal parts that are solid, the candle's temporal parts that increasingly soften, and the candle's temporal parts that are completely liquid. The

temporal parts of the candle compose the whole of the candle, yet the candle itself does not wholly instantiate solidity or liquidity. This description of change is incompatible with (3), since the candle does not change; the candle is a succession of temporal parts with varying properties.

However, the NP analysis of the appearance of a changing guitar is quite different. Given NP, "candle" refers to the spacetime worm simples-arranged-guitar-wise. Therefore, there can be no intuition that one and the same object changes, since there is no single object that occupies the candle shaped region. The change of the candle's states is due the different positions of the NP objects across spacetime that results in different relations between the temporal parts of the NP objects. The 4D-nihilist claims that our perception of the changing things is just the re-arrangement of NP simples. All change is explained by either the addition of NP simples to regions occupied by *simples-arranged-x-wise*, the removal of NP objects from *simples-arranged-x-wise*, or the re-structuring of *simples-arranged-x-wise*. As these simples occupy new locations, any properties instantiated by the simples come into different relations with the other properties instantiated by the simples. These relations are responsible for what we perceive as macroscopic change.

One might be tempted to claim that this arrangement is what changes, and therefore, the NP is no better off than the perdurantist. However, remember that the NP does not quantify over arrangements; talk of "an arrangement" is of the form *simples-arranged-x-wise* and is expressed with plural quantification instead. Therefore, talk of an arrangement of simples does not refer to any existing thing. Just as we are mistaken in our claims that there are composite objects, we are mistaken in our claims that there are quantifiable entities that correspond to arrangements.

Macroscopic change, then, is just NP objects coming into new relations with each other. Now, Hinchliff might object that this violates intuition (2), that change involves

properties and not relations. However, the relations he has in mind are not the relations of nihilism, but the endurantists's relations between objects, properties, and times. NP change does not use these types of relations; instead, it uses the properties of the NP objects to support seemingly higher-order properties either through supervenience or reduction. Therefore, when it comes to macroscopic change, none of Hinchliff's intuitions are violated.

However, change at the level of the NP simples themselves does not evade intuition (3), since this type of change is analyzed as the simple themselves having various temporal parts that instantiate different properties. Therefore, according to Hinchliff, the 4D-nihilist has not successfully defused the problem of change. In response, I suggest that our intuitions about changing objects that have no proper spatial parts are muddled at best and non-existent at worst. In general, I hold that our intuitions about material objects are not *a priori*, and that intuitions about change are definitely *a posteriori*. This means that our intuitions about change are dependent on our perceptions of seemingly existing macroscopic, changing objects. If this is correct, then the objector must claim that since we have no intuitions about changing NP objects due to our lack of perceptual experience with them, then our intuitions about changing NP objects are *a priori*.

I strongly doubt that we have any *a priori* intuitions about changing objects. Most of our experience with changing things is perceptual in nature; certainly our experiences with change used to motivate the puzzle of change our perceptual. Perhaps there is a sense of change in other *a priori* matters that could be a possible source for intuitions of change. One could say that when we first imagine a square, and then imagine a line dividing the square from corner to corner, our imagined square has changed into two triangles. However, this is not a real case of change. The square does not change into two triangles; we are simply noticing that there are at least two triangles

that overlap the square. Any change of this sort is just loose talk for moving our attention from one property of the geometric figure to another. Therefore, unless there are counterexamples forthcoming, I will cautiously reject the possibility of any sort of *a priori* intuitions concerning change. The objection that one can apply Hinchliff's intuitions to NP objects fails; our intuitions about change are unreliable and cannot be applied to changing simples.

In conclusion, there is no way that standard perdurantism can avoid denying intuition (3) of the puzzle of change. However, NP avoids disarms the puzzle of change by showing that macroscopic change is the product of rearrangement. Furthermore, I have argued that while changing NP objects do change as a result of their temporal parts, Hinchliff's intuitions do not gain any traction on them. Therefore, in comparison with standard perdurantism, the NP presents a superior response to the puzzle of change. Furthermore, since endurantism and presentism are false, then NP presents the best response to the puzzle of change.

4.3 Genidentity and The Puzzle of the Rotating Disk

If universalism is true, then any mereological sum is a four-dimensional object that stretches out over time and space. Intuitively, there is a difference between persisting objects, such as a tree, and objects such as the fusion of Aristotle's beard with Donald Trump's toupee. The temporal parts of the first sort of object bear a special relation to each other; they are connected to each other in the way that the temporal parts of the beard-toupee are not. First, both the tree and the beard-toupee are spacetime worms, yet the tree worm is completely continuous while the beard-toupee worm is discontinuous. Second, it seems that the tree's earlier temporal parts are responsible for the existence of the tree's later temporal parts. In contrast, the temporal parts of Aristotle's beard do not seem to be responsible for the existence of Trump's toupee. This suggests that the tree's temporal parts bear a special relation to each other, unlike the temporal parts of the

beard-toupee. Sider dubs the relation that holds between the temporal parts of the stone the "genidentity" relation.[191]

> **Genidentity:** Some x and y stand in the genidentity relation iff they are parts of some continuing portion of matter.[192]

But what makes a portion of matter continuous with another portion of matter? Typically, causal relations or the laws of nature are employed to analyze continuity between portions of matter.[193] However, this analysis of continuity is open to a powerful counterexample: the homogeneous rotating disk. This counterexample, first attributed to lectures given by Kripke (but discussed by many others), concerns the possibility of disks made up of a homogenous matter.[194] One disk, call it S, is stationary, while the other disk, call it R, is rotating. The argument from the rotating disks claims that standard perdurantism must use genidentity to analyze the difference between the two disks and also that genidentity cannot analyze the difference in motion; therefore, perdurantism is false. Before I discuss the argument in detail, it will be helpful to first explain how the genidentity relation is used to analyze the motion of a heterogeneous rotating disk.

Suppose that there is a Ferris wheel with an orange seat at the top of the Ferris wheel. As the Ferris wheel rotates 180 degrees, the orange seat travels along the circumference of the wheel until it reaches the bottom of the wheel. Viewed atemporally, there is some instantaneous temporal part x of the orange seat at each point along the circumference of the wheel during the temporal interval of rotation, and these parts are paired with a unique time t. The genidentity relation will hold between any combinations

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[191] Sider 2001, p. 225.
[192] ibid.
[193] For example, Russell 1914 and Armstrong 1980
[194] See The arguments of Kripke and Armstrong are discussed in Lewis (1999 , 1986b , p. xiii n. 5); Noonan (1988); Robinson (1989); Shoemaker (1979); and Zimmerman (1998a , 1999).

of these temporal parts. If x is the temporal part of the seat located at the top point of the wheel at time t_1 and y is the temporal part of the seat located at the bottom point of the wheel at time t_2, then x is genidentical to y. This is because the matter that makes up the orange seat travels from the top of the wheel to the bottom of the wheel. If the third spatial dimension is eliminated for simplicity, then the path of the seat through the two spatial dimensions and the one temporal dimension will be helical; as the seat travels downward along the circumference of the circle, it also moves forward in the temporal dimension. Now suppose that there is a blue seat on the Ferris wheel that is located opposite of the orange seat. The matter that composes the blue seat can never be genidentical to the matter that composes the orange seat since these seats will never share any temporal parts. In other words, the helixes of the blue and orange seat will twine around each other without ever overlapping.

Unlike a heterogeneous disk such as the Ferris wheel, a rotating homogeneous disk composed of temporal parts has genidentical temporal parts that do overlap. To understand why this is a problem for the perdurantist, let us return to the homogeneous disks R *(Fig. 3 and Fig.5)* and S *(Fig. 4 and Fig. 6)*. Suppose that R has temporal part x at t_1, and that x is located in the upper hemisphere of R. R also has a temporal part y at t_2, and y overlaps the bottom hemisphere of R.
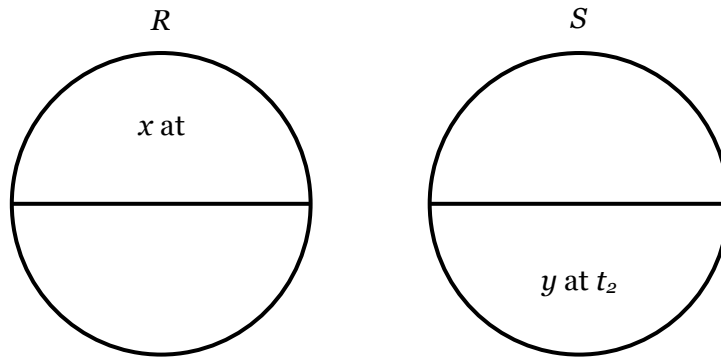
Figure 3

After R has rotated 180 degrees over the interval t_1 to t_2, the genidentity relation should hold between x and y for the same reasons that the genidentity relation holds between the temporal part of the orange seat x and the temporal part of the orange seat y. Since the disk is in motion, the matter of R's temporal part x is responsible for R's temporal part y. In other words, there is a helical path from x to y. Therefore, it seems that the genidentity relation that holds between x and y can account for the rotation of R. However, the temporal parts of the disk do not stand in a unique genidentity relation. R also has a temporal part w at t_1 that is located at the bottom hemisphere of R:
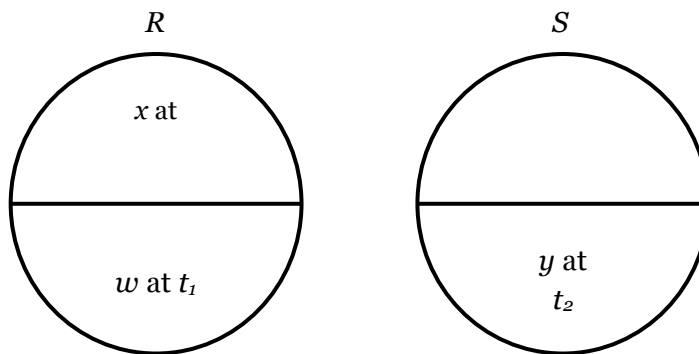

Figure 4

The genidentity relation *also* holds between w and y since there is a continuous portion of matter between w and y over the interval t_1 to t_2. However, given the rotation of the disk, the genidentity relation should only hold between x and y; because of the disk's rotation, the matter of w should be on the top hemisphere of R by t_2. Intuitively, since the disk is rotating x is responsible for y and w is not responsible for y. The presence of two genidentity relations when there should only be one is not just a problem caused by conflicting intuitions. First, there are not just two candidate genidentity relations, but also an infinite number of candidate genidentity relations that could be responsible for y. This is because any hemispherical shaped part of R has a continuous spacetime path to y. Therefore, standard perdurantism requires that every hemispherical region of R is somehow responsible for y's existence. This is clearly absurd. If R was just a rotating hemisphere, then x would be the only candidate for genidentity with y. Since genidentity is an intrinsic relation, it should depend on nothing but the existence of the hemisphere to obtain. However, when another hemisphere is added and R becomes a sphere, this unique genidentity relation disappears and is replaced by an infinite number of genidentity relations.

The same problem occurs for the stationary disk S; there are both helical and straight fusions of temporal parts (along with the infinite other spacetime paths) that are continuous with the bottom hemisphere of S. Both R and S have an identical set of genidentity relations, therefore genidentity cannot account for the difference in motion between R and S. The standard perdurantist must attempt to find some way to privilege one of the many genidentity relations over the other.

One might try to address the problem of the disks by appealing to an analysis of causation. As previously stated, both Russell and Armstrong think that genidentity is simply a nomic causal relation. The genidentity relation obtains when one stage of an object nomically causes another stage. However, as Zimmerman points out, a nomic

analysis of the rotating disks fails when the disks are located in the same possible world.[195] Since the disks are made of the same homogenous matter, the same laws govern the discs. However, these laws cannot differentiate between the helical spacetime worms and straight spacetime worms located in each disk since natural laws do not take into account all of the mereological objects in a standard perdurantist's ontology. Therefore, the perdurantist cannot appeal to nomic causation to solve the problem of the rotating disks.

Alternatively, the perdurantist could appeal to a singularist or immanent view of causation.[196] An immanent causation relation is not like the scientific causation relations between events or things. Roughly, some object or event *x* immanently causes *y* when the causation relation in question obtains independently from any laws of nature. For instance, many religions believe that a godhead caused the creation the universe *ex nihilo*. This means that the godhead causes the laws of nature themselves to come into existence. Therefore, the godhead must have immanently caused the creation of the universe. If this type of causation is included in the perdurantists metaphysics, then the problem of the rotating disk can be solved. Despite our intuitions that the rotating and stationary disks are subject to the same nomic causal relation that explains genidentity, two different immanent causal relations in fact govern the disks. These different causal relations allow for the assertion that there is only one unique genidentity relation for each disk.

There are several problems with this solution. First, unless one has other reasons to accept the existence of immanent causation, then appealing to immanent causation to solve the problem of the disks is *ad hoc*. As the above example shows, immanent causation is typically used to explain the interaction between the divine and the natural

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[195] Zimmerman 1998a
[196] Zimmerman 1997 and Anscombe 1971

world. While this may appeal to some perdurantists, most would most likely wish to either remain neutral on or deny the possibility of a godhead.

Second, even if one accepts immanent causation, it is not without cost; it requires the rejection of Humean Supervenience. Humean Supervenience is the claim that all there is to a world (possible or actual) are the local qualities that are instantiated in a possible world. For example, both things like an electron located at point p in world w or a red ball in region r of w are local qualities of w. As for laws of nature, a Humean Supervenience analysis of natural laws claims that laws just supervene on the local qualities of a world.[197] Lewis claims that the laws of nature are really just a system of propositions that best describe and predict the local qualities of a world; these laws are not exhaustive or infallible.[198] Returning to the problem at hand, recall that since the disks have identical local qualities with respect to their matter, Humean Supervenience requires that they are governed by the same best system of laws. Since the best system of laws will use the same predictions for things with identical qualities, then the disks will be analyzed with the same laws. While these laws can tell us about how it came to be that R is rotating, they still cannot distinguish between the many candidates for the genidentity relation needed to distinguish the disks. Therefore, Humean supervenience cannot solve the problem of the rotating disk. If one is not willing to accept immanent causation, then appeals to laws of nature fail.

Many philosophers, such as Sider (and myself), are strongly committed to Humean Supervenience and would only relinquish it under enormous philosophical pressure. Furthermore, Sider believes that "non-Humean accounts of lawhood and

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[197] See Lewis 1986 Philosophical Papers introduction ix-xii

[198] It is important to note that Lewis does not make the claim that Humean Supervenience is true of all possible worlds. Instead, he argues that it obtains in the "inner sphere" of possible worlds that contain only the same type of local qualities contained in our world. Worlds in the "outer sphere" might have non-Humean characteristics with "alien properties"; immanent causation is one such example of an alien property.

causation are shrouded in mystery and obscurity."[199] Because of this, Sider attempts to find a solution that preserves Humean Supervenience while also solving the problem of the rotating disks. It seems that the only way to do this is to claim that the rotating disks are possible, but that they are constrained to the outer sphere of possible worlds where Humean Supervenience is not present. This means that while the rotating disks are not possible in our world, they are possible in outer sphere worlds that have things like immanent causation. However, this conflicts with the intuition that these rotating disks are possible in inner sphere worlds like ours. In response to this, one could claim that there is no way to distinguish between inner and outer sphere worlds. If this is the case, then Sider could simply hold that the disks are in fact constrained to outer sphere worlds. However, this solution cuts both ways, as one could simply claim that the disks are just as likely to be in the inner sphere of worlds. Furthermore, there is nothing alien about such disks. While large homogenous entities might not exist in the actual world, there is little reason to think that they could not exist in a world that has laws of nature that are similar, but not identical, to the actual world.

Sider attempts to secure the possibility of actual rotating and stationary homogeneous disks by arguing that the best analysis of the genidentity relation is one that involves the best possible laws of dynamics and motion.[200] This means that an analysis of genidentity is not contained to just the facts about the stages of an object, but to all the other local qualities of a world. Using this account of genidentity, Sider can say that R's temporal part x stands into the genidentity relation to the temporal part y if x is continuous with y and the best laws of dynamics require that the spacetime worm x and y are part of has a helical shape.

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[199] See Sider 2001, p.234. Teller 2002 argues that these non-Humean relations are not strange since we already are committed to some non-Humean relations such as spatiotemporal relations.
[200] See Sider 2001, p.231 for a formal presentation of this account.

However, this analysis of genidentity runs into two problems: (1) a world that contains only *S* and *R* does not have enough local qualities to construct the best laws of dynamics, and (2) persistence is an external relation since it depends on qualities that are extrinsic to the persisting object. Sider admits that there is nothing to done about (1) or (2) except to bite the bullet. Furthermore, if one is already committed to the best system theory of laws, then one is used to ruling out intuitively possible worlds (such as empty worlds that have no local qualities) and analyzing seemingly intrinsic relations as extrinsic relations instead. Regardless, having to bite this bullet is a blow to the perdurantist view. Furthermore, it is even a larger blow to Sider, since some of his arguments for standard perdurantism are arguments that force presentists or endurantists to deny the possibility of certain possible worlds.

In summary, the possibility of a stationary homogeneous disk and a rotating homogeneous disk leaves the perdurantist with a dilemma: accept some sort non-Humean account of immanent causation, or bite the bullet and claim that the disks cannot be located in any Humean world like ours.[201] However, I will argue that the 4D-nihilist does not face this dilemma, which provides reason to favor it over the standard perdurantist view.

The rotating disks are supposed to be an objection to perdurantism full stop. However, this objection does not target perdurantism per say; instead, it only targets perdurantist views that also are committed to universalism about composition. Since the disks are mereological sums of their various instantaneous stages, then for any interval *t*, there will be an infinite number of paths that the disk's spacetime parts could take. However, the NP's ontology only contains objects that are spatially simple. Since these simples do not have any proper spatial parts, a NP spacetime worm will only have one

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[201] One might have other reasons for denying immanent causation besides the Humean reasons discussed by Sider. However, the literature on causation is vast, and I will not pursue the topic further here.

path through spacetime. For the NP theorist, both the rotating disk and the stationary disks must be either *disks-arranged-simplewise* or four-dimensional objects that are spatially extended while having no proper spatial parts.

If the disks are *just simples arranged disk-wise*, then the problem is immediately resolved. To keep things simple, assume that the objects of the *simples-arranged-diskwise* are point-sized with respect to their spatial dimensions. These spacetime worms are lines that run through space. Any point along the same line is genidentical to any other point on that line. As the *simples-arranged-diskwise rotates*, these lines will form a helical pattern. However, since the temporal parts of one NP worm never fuse with the temporal parts of another NP worm, then there are no straight-line-shaped objects within the *simples-arranged-diskwise*. Similarly, there will be no helical objects in the stationary *simples-arranged-diskwise* since none of the worms are in motion. Therefore, NP preserves a robust genidentity relation differentiates between the two *simples-arranged-diskwise* [202]

However, under the assumption that extended simples are possible, then one could object that NP can provide no analysis of the difference between an spatially extended and spatially simple NP object. It should be noted that this problem is not the same as the problem of genidentity, although it is similar. Since extended simples have no parts, there cannot be multiple candidates for the genidentity relation between temporal parts. However, an advocate of extended simples must still explain the difference between a rotating and stationary simple. The NP might attempt to use a Sider-style extrinsic theory of motion that relies on the best system of laws along with all of the local qualities of a world. However, this would leave the NP no better off than Sider; worlds where only the rotating and stationary simple exists are not rich enough to create the best system of laws.

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[202] In the case that simples are not made of matter at all, then the genidentity never obtains.

The best NP solution to this problem is far less complicated than Sider's solution. The difference between a rotating extended simple and a stationary extended simple is due to a difference in their natural properties. The rotating extended simple has the property of possessing a certain amount of kinetic energy, while being located at the same spatial region over its period or rotation. Conversely, the stationary simple lacks any property of kinetic energy, while remaining located in the same spatial region.[203] One might object that this analysis fails to capture to explain motion in a world with only two rotating extended simples. For instance, one simple could be rotating in one direction and have a certain amount of kinetic energy while the other simple could be rotating in the opposite direction and have the same amount of kinetic energy. This simply requires making the difference in properties a difference in velocity rather than just energy. While velocity is most likely not a fundamental property in our world, it seems plausible that velocity is a fundamental property at a world with extended simples.

In conclusion, the NP has an elegant solution to the problem of the rotating disk. If the rotating disks are in fact *simples-arranged-disk-wise*, then the helical paths of the temporal parts of the arranged simples explain their rotation. If the rotating disks are in fact spatially extended and spatially simple NP objects, then the NP simply needs to appeal to whatever property is responsible for motion of any kind in a given world. Unlike the standard perdurantist, the 4D-nihilist can remain committed to Humean Supervenience while also not ruling out the existence of plausible possible worlds, such as a world where only the two disks exist. Furthermore, rotational motion in extended simples can be accounted for with the same fundamental property strategy. Therefore, NP can solve a problem that standard perdurantism has no easy answer to.

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[203] Some might object that having an amount of kinetic energy is not a natural property, but a property that supervenes on quantum properties. While this is the case in our world, world with extended simples cannot be subject to quantum properties.

In this chapter, I have proposed NP, a new ontology of material objects that provides answers to both the Special Composition Question and The Special Temporal Composition Question. I have argued that NP is superior to its rival, standard perdurantism, in that it provides superior solutions to the puzzle of change and the puzzle of the rotating disk. In the final chapter, I will examine some objections to NP and my response to these objections.

Chapter 5: Objections to Nihilist Perdurantism

In the final chapter, I will address two objections to NP. The first objection threatens NP specifically by focusing on NP's prima facie inconsistency with regards to temporal and spatial parts. The second objection targets mereological nihilism in general by claiming that atomless gunk (objects whose proper parts necessarily have proper parts) is possible and that this possibility undermines the case for nihilism. However, I will argue that the evidence for the possibility of gunk is not convincing, and that NP remains a plausible ontology of material objects.

5.1: Objections Specific to Nihilist Perdurantism

I have argued that when it comes to the puzzle of change, NP is superior to perdurantism, endurantism, and presentism. However, there remains a serious objection to NP that focuses on NP's seemingly incongruent claim that temporal parts can exist without spatial parts. One might object that NP has a needlessly complex ontology. For example, consider ball that has a red hemisphere and a blue hemisphere. While one might timelessly talk about the blue hemisphere of the ball, perdurantists claim that this kind of talk has a tacit reference to the present time of the utterance. Since the blue-hemisphere-part of the ball is temporally indexed, then it is a temporal part. Unlike perdurantism, it seems that NP requires the existence of ontologically distinct spatial parts and temporal parts. If this were true, then the NP theorist would have to endorse two ontologically primitive types of parts compared to the perdurantist's one type of part. Therefore, it seems that considerations of theoretical parsimony favor perdurantism.

However, NP does not require distinct spatial and temporal parts. I will illustrate this with a geometric analogy. Consider a cube c and square plane p that is part of the cube. The plane has parts along its x and y axis, yet it has no parts along its z-axis since it has not extension along this axis. Therefore, with respect to the z-

axis, the plane is simple.[204] In the same way, a NP object has no extension in any of the three spatial dimensions and is therefore simple with respect to these dimensions. However, it does extend in the temporal dimension and is therefore composite with respect to that dimension.[205] Therefore, NP does not require two distinct ontological categories of temporal part and spatial part.

However, there is another related objection that poses a larger problem for NP. NP allows for composition to occur along the temporal dimension, but not along the spatial dimensions. One might argue that this is at best an ontologically costly distinction, since it lacks the parsimony of a view that allows for composition to occur across all dimensions.[206] Furthermore, one could also push harder and claim that the NP's asymmetry with respect to composition is *ad hoc*; there is no reason for positing restricted composition other than to postulate a new view. However, NP is not *ad hoc* because the relationship between temporal parts is not the same as the relationship between spatial parts.[207] Therefore, in order for NP to be viable, I need to show that there is a real difference between a NP object's relation to its temporal parts and a NP object's relation to other NP objects.

There is such a difference, and it has to do with how the parts of NP objects are in contact with one another. Our everyday concept of contact applies to what we believe to be composite objects. For example, it seems that the chair is in contact with the floor or the water is in contact with the glass. Call this *spatial contact*:

Spatial Contact $=_{def}$ x and y stand in the contact relation iff (1) there is no empty region R between x and y and (2) there is no interceding object z

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[204] Technically the plane has an *improper part* along the z-axis, since x is an improper part of y iff x is a proper part of y or $x = y$.

[205] If it turns out that extended simples are possible, then a NP object might extend into the three spatial dimensions. However, it would still have no parts with respect to these dimensions.

[206] Perhaps NP's compositional asymmetry is a pricey ontological cost, but an investigation of this point requires an all-encompassing examination of NP costs and benefits and thus goes beyond the scope of this paper.

[207] This objection could be leveled against the endurantist as well, since the endurantist maintains that objects are spatially composite but temporally simple.

between x and y.

The second conjunct of the right hand side of the biconditional denies the transitivity of contact. For instance, if x is in contact with z and z is in contact with y, then it does not follow that x and y are in contact.

However, our best physical theories offer models of material objects that conflict with the common sense idea of contact. Science tells us that when the world is viewed microscopically, we find that there are no material objects in true contact. Electrons form the boundaries of every atom. The outermost electrons of one atom repel all of the outermost electrons of other atoms. If contact requires that there be no space between two objects, then these electrons can never come into contact, since their electrical fields will determine the boundaries between atoms while also maintaining space between those boundaries. Therefore, it seems reasonable to conclude that material objects never come into contact with one another; they are simply aggregates of subatomic particles. If this is correct, then the intuition that contact is possible is in trouble.

In response, one could argue that the truth conditions for objects being in contact with another should be revised. Instead of objects being in contact with one another when there is no space between the objects in questions, objects are now in contact with one another when they are as close as they can be to each other given the laws of physics. On this definition of contact, two atoms that are pushed together will cease to move once their respective electrical fields meet.

> **Scientific Contact** $=_{\text{def}}$ x and y stand in the contact relation iff x and y are as close together as they can be given the physical laws of the world where x and y reside.

Scientific Contact has some appeal, but it is also problematic; I will discuss the problems with it momentarily.

So far, I have only discussed contact with respect to the spatial dimensions. However, under the supposition of eternalism and perdurantism, there is also another

kind of contact: temporal contact. After all, it seems that the temporal parts of an object are as close together as they can possible be. Call this kind of contact *spacetime contact*:

> **Spacetime Contact** $=_{def}$ x and y stand in the contact relation iff there is no empty spacetime between x and y and there is no interceding object z between x and y.

If spacetime contact is true, then only temporal parts of mereological simples can be in contact. For the sake of argument, I will suppose that subatomic particles, such as electrons, are mereologically simple. Assuming that nihilism is false, a maple leaf is made up of subatomic particles. Given our laws of physics, these particles are all surrounded by empty regions of spacetime.[208] Therefore, if the maple leave is considered from the three spatial dimensions, then its parts are not in contact. However, the subatomic particles of the leaf are in contact with their respective temporal parts. For any of the leaf's electrons, a temporal part of electron e_1 at time t_1 will be in contact with the immediately successive temporal part e_2 at time t_2. There is no empty region of spacetime between e_1 and e_2. Even though spacetime contact makes almost all utterances about contact false, it is derived from the same intuitions as the original contact. It simply expands contact to include the temporal dimension as well.

At this point, one might object that spacetime contact is inferior to *scientific contact*. After all, *scientific contact* seems to preserve our intuitions about contact. Certainly, it seems to make our talk about contact true. For instance, if *scientific contact* is true, then one can still truly say that the handle of a coffee mug is in contact with the cylinder of the mug. This may be an advantage for *scientific contact*, since one might believe that a theory that preserves the truth of our talk is preferable to one that does not (see Ch. 1, pp. 13-14). Since I am not as invested in preserving the truth of ordinary talk, I

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[208] This might not be quite true. Electrons and protons certainly never come into contact. However, it may be that the protons and neutrons (or other particles) that form the nucleus of an atom are in contact. Therefore, if composition depends on contact, then the NP theorist would have to admit that some objects have spatial parts, namely the nuclei of atoms. This is a somewhat strange consequence of adopting the definition, but I am willing to accept it.

will put this consideration aside.

Furthermore, scientific contact remains *revisionary*; I doubt that most of us have the electromagnetic forces that repulse atoms from each other in mind when we describe something with the contact relation. If true, then *Scientific Contact* requires our concept of 'contact', as well as other related relations, to change. Perhaps this is unproblematic since science regularly revises our concepts. However, *scientific contact* is not an empirical hypothesis, but philosophical analysis that conflicts with common sense. Therefore, *scientific contact*, does not have the theoretical advantage of preserving our intuitions about contact.

There is another problem with scientific contact; it allows for cases where objects are closer together than they should be. Suppose that there are two electron stages e_1 and e_2 that exist at the same time t. If these stages are in contact at t, then there will still be some distance between them due to physical law that negative charges repel. Now suppose that there are two electron stages e_3 and e_4 that are successive temporal parts of a single electron. It seems that e_3 and e_4 are in contact as well; they are as close together as they can be. But if scientific contact is true, then e_1 and e_2 are as close as possible given the restrictions of the physical laws. However, since e_3 and e_4 are closer than e_1 and e_2, then e_3 and e_4 are *closer* than is possible given the physical laws. Since the physical laws specify contact, and the physical laws require that some distance be maintained between two electrons stages, then it follows that e_3 and e_4 cannot be in contact. However, if the concept of contact is supposed to capture two objects being as close together as they can, then e_3 and e_4 are a paradigmatic case of contact since there is nothing between them. Therefore, since scientific contact cannot capture a plausible case of contact, then it should be rejected in favor of spacetime contact.

With the adoption of spacetime contact, I can answer the above objection to NP. NP's compositional asymmetry is not objectionably arbitrary since there is a strict division

between cases of composition and cases of non-composition: whether or not temporal contact occurs. Now NP can be redefined in terms of spacetime contact:

NP* =$_{\text{def}}$ x and y compose z iff x and y are in spacetime contact with one another.

This new formulation of NP guarantees that all composite entities will have no three dimensional proper parts. Throughout the rest of the paper, all mentions of NP will refer to **NP***. As mentioned before, this is a technically a restricted composition view. However, it does not suffer from the myriad difficulties associated with those other views, such as problems of vagueness and decomposition.

NP does not suffer from the problem of decomposition because the removal of a temporal part from a NP object either definitely destroys it or does not definitely destroy it. Suppose there is some NP object x that persists over interval t_1 to t_2 and some temporal party y that is located between t_1 and t_2. If y is removed, then x will cease to be a single line through spacetime; it will become two lines through spacetime. But if y is located at exactly at t_1 or t_2 (i.e. the endpoints of x's line), then the removal of y does not destroy x; x's duration merely decreases. As for vagueness, since spacetime contact definitely occurs or definitely does not occur, NP does not allow for vague composition and is therefore immune to the argument from vagueness (see Sider 2001 Ch. 4, section 9 for more on the argument from vagueness).

5.2: Gunk and Nihilism

A material object is gunky if and only if every proper part of the object has proper parts as well. In other words, gunky substances never decompose into a finite amount of proper parts. The possibility of gunky objects is typically used as a counterexample to nihilism. The argument is quite straightforward:

P1. Nihilism is true iff nihilism is necessary.
P2. If Gunk is possible, then nihilism is not necessary.
P3. Gunk is possible.
C. Therefore, nihilism is false.

This argument hinges on whether gunk is possible. If it is possible, then it not only threatens standard nihilism, but NP as well. Before I discuss the argument for P3, I will briefly comment on P1. The truth of P1 rests on the claim that any metaphysical claim must be a necessary claim. If metaphysical claims are not necessary, then many of the *a priori* arguments used in support of these claims are no longer valid. For example, if nihilism is not necessary, then arguments such as the argument from vagueness or the sorites paradox provide no evidence for this contingent nihilism. Even so, one might try to argue that there are good reasons for accepting minimal nihilism in the actual world for various reasons. Perhaps minimal nihilism gives the best account of our scientific theories. However, I think that sacrificing the *a priori* arguments for nihilism greatly undermines the plausibility of the view. Therefore, I will not consider contingent nihilism as a live option.

Since contingent nihilism is no longer an option, it seems that the nihilist must deny the possibility of gunk altogether. This may seem like a difficult path to take. However, the above argument is not as strong as it appears. The nihilist can use a possibility argument to conclude that nihilism is in fact necessary:

P1′. Nihilism is true iff nihilism is necessary.
P2′. If nihilism is possible, then nihilism is necessary
P3′. Nihilism is possible.
C′. Therefore, nihilism is true.[209]

Obviously, the proponents of the possibility of gunk will deny P2′. However, just as the nihilist must argue for the impossibility of gunk, the gunk theorist must argue for the impossibility of nihilism. Therefore, the possibility argument for gunk does not gain traction; it reduces the debate to simply butting heads about the possibility of a nihilist world or a gunky world. In order to avoid this outcome, Sider pursues an alternative strategy that relies on a reductionist theory of necessary claims. Roughly, Sider describes

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[209] See Sider 2013 p. 35 and Effingham 2010

this view as the view that to "be a necessary proposition is to be a proposition that is i) true, and ii) of an appropriate type, where the appropriate types are given by a list…"[210] The list of necessary propositions contains statements that fall into the categories of analytic propositions, mathematical propositions, metaphysical propositions, and so on.

Sider thinks that this reduction of necessity is the best alternative to modal realism. Whether or not this is the correct view of necessity, it does have the interesting consequence that the possibility of gunk or nihilism is irrelevant. Since gunk theory and nihilism are both propositions of metaphysics, then what is relevant is whether or not the actual world is nihilistic or gunky. Given the preponderance of arguments for nihilism, Sider concludes that nihilism must be necessary. However, since I wish to remain neutral on the issue of the proper analysis of necessity, I will not embrace Sider's defense of the impossibility of gunk.

Putting Sider's above strategy aside, I will have to show that contrary to what many think, gunk is in fact impossible. What, then, is the evidence for the possibility of gunk? For starters, many philosophers think that gunk is conceivable. For example, in Sider 1993, he makes the following in response to Van Inwagen's arguments for nihilism: "I find the *possibility* of gunk so compelling that I am willing to reject any theory that rules it out."[211] Kris McDaniel further elaborates on this point:

> I don't know how to prove the possibility of the existence of gunk save by pointing out that gunk seems to be robustly conceivable: we have mathematical models that we can interpret as representing the parthood structure and shape of gunky objects, namely the regular open sets that represent certain regions of Euclidean space: the shapes of these regions are represented by the distance relations defined on the members of these open sets, and the parthood relations are represented by the subset relation. Conceivability provides evidence for possibility.[212]

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[210] Sider 2013 p. 37
[211] Sider 1993, p. 288; he is responding to Van Inwagen 1990. Note that Sider does not hold this view anymore.
[212] McDaniel, 2006

Dean Zimmerman argues that the only way that material objects can come into real contact is if they are made up of gunky matter. Since Zimmerman believes that it is possible for material objects to be in true contact, he concludes that gunk must be possible as well.[213] Schaffer provides additional reasons for the conceivability of gunk:

> For instance, it is conceivable that everything is both extended and divisible. This generates a Zeno sequence of divisions without limit. Likewise Pascal's hypothesis is conceivable, on which there is an endless nested sequence of microcosms, in which every physical "simple" of the universe houses a miniature replica universe, every "simple" of this mini-universe houses its own mini-universe, and so on without limit...Further, there are gunky models of classical mereology (see Simons 1987, 41). So to the extent that the models of classical mereology represent metaphysical possibilities, it follows that gunk is metaphysically possible...Finally—and perhaps most tellingly—gunk is scientifically serious.[214]

The support for the conceivability of gunk can be classified into four categories: (1) prima facie conceivability, (2) thought experiments such as the nested universe hypothesis, (3) formal considerations such as the fact that gunk can be modeled with mereology, and (4) empirical considerations.

I will deal with (3) first. It is a mistake to think that a formal model is evidence for metaphysical possibility. For instance, classical mereology entails universalism, but few find this compelling enough to reject nihilism. Furthermore, one can develop whatever formal system one likes without thinking of metaphysical commitments. For instance, some logics allow for one and the same thing to be both *P* and not-*P*, or for the possibility of vague truth-values. However, I do not find this compelling evidence to no longer believe in contradictions or accept that truth is vague. The mere creation of a formal system that entails certain metaphysical claims is not good evidence for the claims' truth. Therefore, consideration (3) offers little support, if any, to the gunk

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[213] See Zimmerman 1996. Zimmerman's argument is interesting, but it requires the existence of composite objects in order to work. He argues that any non-gunky account of topology cannot capture the possibility of extended material substances coming into contact. Since I reject composite objects, I will not discuss the argument any further here.

[214] Schaffer 2010, p. 61

theorist's case.

As seen in the passages above, consideration (1) is the most commonly cited evidence for the possibility of gunk. However, the claim that gunk is conceivable and therefore possible is somewhat of an odd defense of gunk, even disregarding the fact that the nihilist can claim equal evidence from conceivability. This is because the above claims fail to make a distinction between metaphysical possibility and epistemic possibility. Suppose that I believe that a winged horse, Pegasus, could fly in the actual world (perhaps a mad scientist breeds a winged horse). It seems possible to me until I learn about the physics of flight and the biology of flying creatures. In order to fly, Pegasus would need enormous wings. However, these wings would not be strong enough for flight given the limited muscular attachment points on Pegasus's body (among other factors). Given the natural laws of our world, it is nomically impossible for Pegasus to fly. I can *prima facie* conceive of Pegasus, but once I find out the facts, I can no longer do so.

This point generalizes to many types of metaphysical claims. For instance, it seems to me that the nihilist should grant that universalism is *prima facie* conceivable while maintaining that universalism is false. The nihilist just holds that universalism is epistemically possible, not metaphysically possible. If this is the case, then the nihilist can simply claim that one can *prima facie* conceive of gunk because it is epistemically possible as long as one hasn't examined the arguments, but that gunk is in fact impossible once on has done so. Obviously, the nihilist will have to provide arguments for the impossibility of gunk, but the mere conceivability of gunk does not provide much support for taking its metaphysical possibility seriously.

5.2.1: Emergence Nihilism

I believe, however, that I can do better and show that gunk is not actually conceivable. To do so, I will examine several thought experiments that seem to support the possibility of gunk. The first thought experiment is that of the world of infinite descent. First, I will

borrow a helpful concept described in Williams 2006:

Illusions: If scenario w is conceivable, then either it is possible, or there is some genuinely possible world w' that is generating the illusion that w is possible.[215]

Williams argues that if one is presented with some conceivable phenomenon that seems to entail a genuine possibility, and one does not think that the possibility is genuine, then there must be an alternative possible world that does not entail the possibility in question while also fully accounting for what one has conceived. In general, when one takes oneself to be conceiving a genuine possibility, one is vastly under-specifying the features of the world where that possibility occurs. In fact, one is only focused on an incredibly tiny number of features of that world, leaving the rest of the world's features ambiguous. Therefore, it seems likely that when one attempts to conceive of gunk, one is the victim of an illusion. If this is the case, then there must be some w causing the illusion.

Williams suggests that the world in question is a world where nihilism is true. However, Williams advocates what he calls *emergence nihilism*. Like standard nihilists, emergence nihilists are committed to a world that contains only mereological simples. Emergence nihilists differ from standard nihilists in that they allow for the co-location of mereological simples.[216] This allows for possible worlds where there are not only very small, but also simples that are macroscopic. For instance, standard nihilism claims that what appears to be a coffee mug is merely a collection of mereological simples arranged coffee-mug-wise. Emergent nihilism accepts these simples, but also claims that there are simples that correspond with the appearance everyday objects, like coffee mugs.

These extended simples co-locate with a plethora of other simples. For example, an extended mug simple is co-located with each extended simple that appears to be one of the mugs parts. For instance, there is a handle-shaped simple and a cylinder-shaped

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[215] Williams 2006, p. 503
[216] Ibid, p. 504

simple that co-locate with the mug shaped simple, and the handle shaped simple is co-located with an upper-handle-shaped simple and a lower-handle-shaped simple and so on. Therefore, when one conceives of a seemingly gunky world, one is actually conceiving of a world that contains co-located simples of various sizes. In this world, for any mereological simple x, there will be at least two simples y and z that are co-located with x. Therefore, when one conceives of a world of infinite descent, one is really thinking of a world that is co-located mereological simples all the way down. Like a seemingly gunky world, this world will contain an infinite amount of material layers. However, instead of each of these layers standing in various composition relations to one another (as in a gunky world), a given layer L of mereological simples is co-located with the layers above and below L. This is a world where there is no bottom layer and nothing is a proper part of anything.

While emergence nihilism does provide an illusory world that explains the seeming conceivability of gunk, the view is not without problems. Tallant points out that nihilism is a view that locates the fundamental objects in a world at the bottommost layer. However, emergence nihilism has not bottommost layer; it is co-located simples all the way down. Therefore, attaching any fundamental properties to these simples is objectionably arbitrary.[217] Not only does emergence nihilism face this objection, but it is also committed to several controversial claims: (1) the possibility of qualitatively heterogeneous simples and (2) the possibility of co-locating material objects. I have already argued against the possibility of qualitatively heterogeneous simples in Ch. 2 and I have no desire to endorse the possibility of co-locating material objects. Co-location is not only mysterious, but also an *ad hoc* solution employed to solve puzzles of coincidence. One of the main strengths of nihilism is that it deflates puzzles of

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[217] Tallant 2013. Interestingly enough, Tallant thinks that gunk is possible, despite the fact that this argument applies to any gunky world as well. This argument against gunky worlds will be further discussed towards the end of this section.

coincidence. Invoking co-location to address gunk is just as *ad hoc* as invoking co-location to address puzzles of coincidence. Furthermore, while emergence nihilism is technically a form of nihilism, it is not nihilist in spirit since it fills the world with unnecessary metaphysical clutter. Therefore, given the serious difficulties facing emergence nihilism, the view should be rejected. However, this does not mean that William's general approach is unfruitful; I simply need to find a world that accounts for the illusion of gunk and does not require the acceptance of controversial metaphysical claims.

5.3: Though Experiment Arguments for Gunk

In order to show that gunky worlds are illusory, I will unpack the idea of a world of infinite descent. By doing so, I will show that worlds of infinite descent do not offer any evidence for the possibility of gunk. When asked to conceive of a world of infinite descent, one will most likely imagine a situation where one divides a hunk of matter, zooms in on one of the divided pieces, and divides this piece again, and so on.

For example, consider a world w that seems to be gunky. In this world, a wizard gives Maria a knife that can divide anything in half; the knife also shrinks itself as well as Maria whenever she cuts something in order to allow her to cut smaller hunks of matter. The wizard then sets Maria to the task of cutting a piece of wood in half, and then cutting the resulting halves in half until she reaches the bottom. Maria is quite discouraged by the task since she believes herself to be in a gunky world and that she will never reach the bottom. Now suppose that she is incorrect; she is not in a gunky world, but instead in a world made up of mereological simples. When Maria cuts the piece of wood in front of her, the simples arranged wood-wise are separated into smaller groups of simples arranged wood-wise. Since this world is not gunky, Maria should eventually reach a point where she can no longer cut anything (perhaps the simples are point sized, or perhaps the simples are indivisible; see Ch. 2).

Now suppose that the wizard lied to Maria. At first, Maria cuts the wood until she can no longer cut it. Then, she shrinks down to the microphysical level and proceeds to cut until she can no longer do so. However, instead of shrinking Maria again to allow her to continue cutting, the wizard adds more simples to the pieces of wood that Maria just cut; he gives Maria the illusion that she is shrinking. As long as the wizard continues, Maria can cut the wood forever and never reach the final layer. From this scenario, it is obvious that Maria' experience is phenomenologically identical to the experience she would have if she were in a gunky world and cutting gunky matter. Maria has no way to know whether she is in a world with gunk or not; she finds herself in a skeptical scenario. Therefore, since the possibility (and therefore necessity) of nihilism is supported by a large number of arguments and the possibility of gunk is not, then given the nihilists explanation for the illusion of gunk, it is more plausible that worlds of seemingly infinite descent do not support the possibility of gunk. In order to resist this claim, gunk theorists need to find some way to overcome the skeptical argument above. I have already argued that they cannot do this through any sort of thought experiment that appeals to the experience of a gunky world. Therefore, gunk theorists need to find non-experiential evidence to support the intuition that gunk is in fact conceivable. However, I cannot think of what this evidence would like. A more promising strategy is to find evidence for the possibility of gunk that does not rely on conceivability.

Zimmerman's argues that gunk is possible because gunky matter is the only type of matter than can come into true contact.[218] His argument is long, so I will just give a short description of it here. In brief, Zimmerman believes that material objects can come into contact with each other. In order to come into contact, material objects must be impenetrable. In order to be impenetrable, objects must have either completely open or completely closed surfaces. Finally, in order to have completely closed or open surfaces,

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[218] See Zimmerman 1996.

objects must be gunky. However, nihilism easily sidesteps this argument, since Zimmerman uses the mereological concept of 'part' to define open and closed objects. Therefore, the nihilist can easily ignore the argument.

Schaffer argues for the possibility of gunk by appealing to the possibility of nested worlds.[219] The argument from nested worlds is similar to the argument from worlds of infinite descent. However, it does not rely on phenomenological experience. So what is a nested world? A nested world is some world w that appears to have mereological simples. However, these simples are in fact small worlds contained by the simples. Each of these small worlds appear to have mereological simples that are in fact smaller worlds, and so on. This series of nested world continues infinitely downward.

Before continuing with the argument, some terminology is needed. It will be helpful to describe nested worlds as having *world layers*. For any nested world w, the upper limit of w is the first world layer. If one zooms in on what appear to be the fundamental objects of the first world layer, one will find a nested replica of the first layer residing each seemingly fundamental objects; this is *w's* second layer. For any world layer in w, there will be another world layer below it. The seemingly simple objects with replica universes also need to be defined. In addition to containing replicas of the first world layer, these objects instantiate the fundamental properties of the world layer they reside in. These objects functions as simples by instantiating the fundamental properties of a world layer but are not true simples. I will refer them as *faux-simples*:

> **Faux-simple:** *x* is a faux-simple iff *x* instantiates a fundamental property in the world layer where it resides and *x* also contains a replica of the world layer *x* resides in within itself.

With these definitions in hand, Schaffer's argument from nested worlds is easily explained: nested worlds made up of infinitely descending world layers that each contain

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[219] Schaffer attributes the nested world hypothesis to Pascal.

faux-simples are possible, therefore they are gunky.[220] Of course, if gunk is possible, then nihilism is false.

Since Schaffer's argument rests on the possibility of nested worlds, I must show that these nested worlds are in fact impossible. In order to do so, I need to further investigate the metaphysics of nested worlds. Suppose that there is some world w that is much like our world, except that it is a nested world. To keep thing simple, also assume particles such as electrons are faux-simples in this world; the electrons appear to be the smallest bits of reality, but they actually contain a whole other universe inside themselves. Also assume that the universes contained in the electrons are very similar to the top layer of w; they contain, trees, people, airplanes and so on. They also have electrons that are faux-simples. There are several questions that need to be answered about w: (1) how is it that objects like the trees, people, and airplanes contained in some faux-simple f do not ever fall out from f into the top layer of w? And (2) how is it that a faux-simple electron can have a fundamental property like -1 charge if it has infinitely many layered universes as parts?

There are several possible answers to (1). It is not enough to say that the faux simple f is a fusion of its parts, since fusions can gain or lose parts. One might attempt to answer (1) by claiming that it is a brute fact that objects in f do not ever fall out into the top layer. This is the same as denying that the axioms of composition apply to all concrete objects equally. This alone is troubling, since it seems there is no reason for denying the universality of mereology. Furthermore, this solution is *ad hoc*; the axioms of mereology are violated for no other reason than to provide an explanation for a questionable possibility. On top of this, these brute facts increase the price of a theory. Therefore, this brute fact approach is not a promising solution.

Instead, one could include some sort of entity in their ontology that protects the

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[220] See Schaffer 2010, p. 61.

objects inside *f* from falling outside of *f*; call this entity a *world-barrier* (I will discuss world-barriers more fully in 5.3). World barriers are not unique to nested worlds. For instance, if one is a modal realist and denies trans-world composition, then world-barriers are required for the separation of concrete possible worlds. These world-barriers prevent the things in one possible world from slipping into another possible world. It might seem that the fact that nested worlds require world-barriers is no real difficulty. However, the world-barriers required by modal realism cannot get the job done since separate world from other worlds; they are *interworld-barriers*.

Therefore, if modal realists wish to countenance the possibility of nested worlds, then they must not only accept interworld-barriers, but *intraworld-barriers* as well. These intraworld-barriers separate the things contained in the *f* from the things not in *f*. However, the intraworld-barrier solution is no better off than the brute fact solution above; ideological primitives have simply been swapped for ontological primitives. Each of the answers just discussed can only answer (1) in an unsatisfying and theoretically costly manner. Therefore, any advocate of modal realism should deny the possibility of nested worlds. Furthermore, intraworld-barriers are even less plausible for actualists who deny modal realism. Unlike modal realists, actualists have no need for interworld-barriers, which makes the plausibility of intraworld-barriers even more suspicious. If my arguments are correct, then nested worlds are impossible. The argument is simple:

P1. Composition occurs at nested worlds.
P2. Given the axioms of mereology, there are fusions of objects within a faux-simple *f* and objects outside of *f*.
P3. Therefore, there are fusions of objects within and without *f*.
P4. But there are no such fusions.
C. Contradiction; nested worlds are impossible.

I have already argued for the truth of P2-P4. P1 simply falls out of the fact that nested worlds are gunky; any gunky object is a mereological fusion. Therefore, the problem posed by (1) above is enough to demonstrate the impossibility of nested worlds.

Question (2) above is motivated by the principle that the properties of a composite object are grounded in that object's parts. For example, an atom of Hydrogen has a net charge of zero in virtue of it being composed of a proton with +1 charge and an electron with -1 charge (and these particles have their charge in virtue of the quantum particles, and so on.) However, in a nested world, a faux-simple electron does not have its charge in virtue of its parts, since it contains a plenitude of universes within it. This means that certain objects in a nested world, such as electrons and protons, have no ground for their properties. Now, any world where the macrophysical is grounded in the microphysical will have objects with ungrounded properties at the bottom layer of the world. For instance, why do the molecules in a nested world have a net charge in virtue of its parts while the electrons do not? The defender of nested worlds might respond by denying that objects have their properties in virtue of their parts. However, this move will only avoid being an *ad hoc* solution to (2) if it is applied to all composite objects. If all composite objects do not have their properties in virtue of their parts, then it is puzzling as to why the parts have properties at all. For instance, if a molecule has its net charge of 0 independently of its parts, then it is always a coincidence that the molecule has parts with charges that cancel each other out. While one could simply bite the bullet here, I think this bizarre consequence is a strong reason to reject the claim that properties of composite objects do not have their properties in virtue of their parts.[221] Advocates of nested worlds must pay yet another theoretical price for the possibility of nested worlds.

If my arguments are correct, then the last hope for the possibility of gunk rests on empirical arguments. Schaffer believes that empirical considerations provide strong

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[221] Of course, one could object that consciousness is an example of a property instantiated by a composite objects that does rely on the object's parts. However, the metaphysics of consciousness are tangled enough as is, and invoking consciousness here muddles the issue beyond all hope for clarity.

evidence that supports the possibility of gunk. In Schaffer 2003, he writes:

> We now have no evidence that there will be a final theory, no evidence that such a theory will postulate anything that could serve as a mereological simple, and no evidence that such a theoretical postulate will correspond to an ontological simple as opposed to a boringly decomposable composite. Evidence for fundamentality is lacking thrice over.[222]

Schaffer's argument seems to be that since there is no good reason to think there will be a final theory of physics, then there is no evidence for mereological simples. However, his argument misses the mark. If physics is silent on the issue of mereological simples, then it remains a philosophical issue to decide whether such simples provide a plausible theory of our world. In fact, Schaffer should respond to the lack of empirical evidence by claiming that his view is compatible with either gunky matter or mereological simples and therefore cannot violate any future scientific theories. However, it seems to me that the micro-fundamentalist can simply respond by claiming that perhaps our best physical theories will include the claim that the world cannot be fundamental, in which case priority monism is false. At this point, I imagine Schaffer will simply insist that this is highly unlikely. But this is no different than the nihilist insisting that our physical theories requiring gunk is unlikely. This argument, like each of the previously discussed arguments, comes down to simply insisting that gunk is possible and fails to provide any real objection to the nihilist.

Schaffer makes a stronger argument by claiming that not only may physics require gunk in the future, but also that physics might require gunk *now*:

> Thus Dehmelt (1989) posits an infinite regression of sub-electron structure, Georgi (1989, 456) suggests that effective quantum field theories might form an infinite tower that "goes down to arbitrary short distances in a kind of infinite regression . . . just a series of layers without end," and Greene (1999, 141–42), noting that "history surely has taught us that every time our understanding of the

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[222] Schaffer 2003, p. 205. In Sider 2013 p.31-5, he argues that the claim that there will be no final theory is a dubious induction at best, since we cannot estimate how much further down our physical theories will delve. Physical theories have only made three or four major revisions: atoms, subatomic particles, quarks, and perhaps superstrings. Sider argues that this is no grounds for a successful induction.

universe deepens, we find yet smaller microconstituents constituting a new level of matter," allows that even strings might be just "one more layer in the cosmic onion."[223]

Schaffer's quote of Greene above is misleading. Greene does not claim that the strings of string theory must have further structure; he simply notes that it is an open possibility as to whether string theory is the final theory or not.[224] Neither of these possibilities are incompatible with mereological simples. As for the other quotes, Schaffer could argue that if the theories proposed by Georgi or Dehmelt become the accepted physical theories, then the good Quinean must accept gunky objects. However, as Schaffer himself has pointed out, the scientific community has constantly evolved its understanding of the basic bits of reality. Therefore, it seems reasonable that when there is strong disagreement within the scientific community, the metaphysician should remain agnostic. If this is correct, then Schaffer's argument about actual physical theories requiring gunky objects has no more force than the previously discussed claim that future theories might posit gunky objects.

In closing, I will turn from rebutting arguments against the possibility of gunk and discuss one of Sider's arguments against gunk.[225] This argument is somewhat similar to previously discussed problem of property instantiation at nested worlds. Sider argues that if a world is gunky, then there are no non-arbitrary candidates for the things that instantiate fundamental properties. Here is my interpretation of the argument:

P1. Suppose Gunk is possible.
P2. At the gunky world, fundamental properties must be instantiated by only one object.
P3. For a given gunky object, no matter how small, there are infinite candidates that can instantiate fundamental properties.
P4. Picking any one of these candidates over the other is objectionably arbitrary.
P5. Therefore, fundamental properties cannot attach to gunky objects.

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[223] Schaffer 2010 60-1
[224] See Effinhgham 2010, p. 246. Interestingly, Effingham interprets Greene to be in support of nihilism here.
[225] I discussed debunking argument with respect to Korman's ordinary object ontology in Ch. 2, p 17.

C. This contradicts P2; gunk is not possible.[226]

Defenders of the claim that gunk is possible have several options that would allow them to resist the above argument, but none of these options are very appealing. The first option would be to reject P4 and claim that there are simply brute facts about what gunky objects are the bearers of fundamental properties. I have already argued that the strategy of appealing to brute facts is *ad hoc*, so I reject this response. The second option for the gunk theorist would be to reject P2 and claim that fundamental properties are, in some sense, gunky as well. I find the idea of a gunky property unintelligible and therefore will assume that P2 is true.

The gunk theorist's best option for resisting the argument is to reject P3 and claim that there is only one candidate for instantiating a world's fundamental properties: the world itself. If this is true, then it follows that something like Schaffer's priority monism is true. As a NP theorist, I reject priority monism although I do not have the time to articulate these arguments here. Therefore, putting priority monism aside, the above argument is sound. So even if my arguments against the possibility of gunk are rejected, the gunk theorist has the difficult choice of being forced to accept priority monism, or come up with an account of how gunky objects with fundamental properties are not arbitrary.

In this chapter, I have defended NP from both specific and general objections. I have shown that while NP is a restricted view of composition, its restriction is not *arbitrary*. I have also made several arguments against the possibility of gunk: that the evidence for the conceivability of gunk is lacking because any gunky world can be explained away as an illusion. Furthermore, I have argued that gunky nested worlds are impossible. I have also shown that empirical evidence does not support the possibility of

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[226] See Sider 201, p. 32-35. Sider presents this as an argument against actual gunk. However, if views on fundamentality are necessary, then there is no reason not to apply this argument to possible gunk as well and cover all the bases.

gunk as this time. Furthermore it seems that objects in gunky worlds cannot instantiate fundamental properties. In conclusion, NP can resist each of these serious objections. While there are undoubtedly more objections to NP, this project has provided a solid foundation for further exploration and development of the view.

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