PERDURANTISM, STAGE THEORY AND AMBIGUITY

by

JAMES A. SIMMONS

(Under the Direction of Yuri Balashov)

ABSTRACT

In this thesis I defend a semantic claim about the persistence of material objects through time commonly termed *perdurantism*. I first motivate the shared metaphysical background, in particular the theses of eternalism and four-dimensionalism, shared by perdurantism and its competitors. I then argue that problems with counting and the predication of historical properties tell against *stage theory*, while unacceptable metaphysical commitments are fatal to the *ambiguity theory*. Perdurantism, on the other hand, can, by an appeal to counterpart theory of modality *de re*, answer the problem of permanently co-located entities.

INDEX WORDS: Persistence, time, four-dimensionalism, stage theory, counterpart theory, coincidence, co-location.

PERDURANTISM, STAGE THEORY AND AMBIGUITY

by

JAMES A. SIMMONS

B.A. (Hons) University of Warwick, UK, 2002

M.Sc. University of London (Econ), UK, 2003

A Thesis Submitted to the Graduate Faculty of the University of Georgia in Partial Fulfilment of the Requirements for the Degree

MASTER OF ARTS

ATHENS, GEORGIA

2005

PERDURANTISM, STAGE THEORY AND AMBIGUITY

by

JAMES A. SIMMONS

Major Professor:	Yuri Balashov
Committee:	Randolph Clarke Charles Cross

Electronic Version Approved:
Maureen Grasso
Dean of the Graduate School
The University of Georgia
August 2005

TABLE OF CONTENTS

Perdurantism, Stage Theory and Ambiguity

1 Introduction

I will define *perdurantism*[1] as the following semantic thesis:

> **PSC**: the semantic values of continuant terms[2] are temporally extended space-time worms.

I will defend perdurantism[3] against two alternative semantic theses: stage theory[4] and the ambiguity theory[5], two alternative theories of persistence which share much metaphysical common ground with perdurantism, but differ on the semantics of continuant terms. The stage theorist accepts this alternative semantic claim:

> **SSC**: the semantic values of continuant terms are instantaneous stages of temporally extended space-time worms.

[1] The term appears in Lewis [1986, p. 202], where it is attributed it to Mark Johnston.
[2] Those are, terms which name objects falling under sortal predicates, like 'person', 'car', 'planet' and 'egg'.
[3] Defenders include Balashov [1999, 2000], Lewis [1986], Quine [1976], Russell [1914] and Sider [1997]. A fuller list is given by Sider [2001*a*, p. 3].
[4] Defenders include Sider [1996, 2001*a*], Hawley [2001].
[5] Not, to my knowledge defended by anyone, although mentioned by Sider [2001*a*, p. 197, n. 38]. I had previously thought that the problem of co-location mentioned below was serious enough, and the adoption of counterpart theory repugnant enough, to push the four-dimensionalist towards the ambiguity theory. I now think that becoming a counterpart theorist about *de re* modality is the preferable option for the four-dimensionalist.

The ambiguity theory, on the other hand, claims that:

> **ASC**: the semantic values of continuant terms are both temporally extended space-time worms, *and* their instantaneous temporal parts.

Typically, perdurantists and stage theorists will share a bundle of metaphysical theses about time and persistence. Most importantly, they will both accept:

> **Eternalism**: all times are equally real.
>
> **Reducibility of tense**: tensed statements can be given tenseless truth-conditions.[6]
>
> **Four-Dimensionalism**: some objects have proper temporal parts.

Call the conjunction of these theses (MB). The debate between the various (MB) theories requires a certain amount of stage setting. It is not evident, for a start, why we should be interested in semantic theories for a metaphysic as counterintuitive as (MB). So I will begin by discussing and defending two of these shared metaphysical commitments; eternalism and the existence of temporal parts. I will spend rather more time on the arguments for the latter. Having secured the common metaphysical terrain, the remainder of the paper will be devoted to defending perdurantism both negatively and positively. The negative part of the defence will take the form of an attack on stage theory, against which I will offer two arguments, and an attack on the ambiguity theory. The positive part will be constituted by a defence of perdurantism against a problem with the argument

[6] I will not defend the thesis of the reducibility of tense, although I think it is correct.

from coincidence. The solution to this problem forces the perdurantist, I shall argue, to become a counterpart theorist about modality *de re*.

2 Eternalism and Presentism

The eternalist claims that past and future times are just as real as the present, and that things located at those times but not in the present really exist. They do not, of course, exist *now*, but they exist all the same. The presentist, on the other hand, denies this. The only time that exists is the present time, and the only things that exist are those that are located at the present time. Dinosaurs do not exist. They have *existed*, but they do not *exist*.[7] We must be careful here not to render presentism a trivial truth, for it is certainly not presented by its defenders as such. It might seem trivial if we were to suppose that something which *existed,* or *will exist,* does not *exist.* To do that would be to suppose that 'exists' really just means 'exists presently'. For sure, the presentist thinks that everything which exists, exists presently. But she does not, or should not if she supposes her theory to be substantive, claim that 'exists' just *means* exists now. The presentist, rather, claims that everything which exists *simpliciter* is present, and the eternalist claims that everything which exists, has existed or will exist, exists *simpliciter.*

The presentist must give some account of truths about past times, and things located at them. The problem is that the truth of a sentence like

Socrates was the teacher of Plato

[7] Some deny that there is a substantive metaphysical issue behind the eternalist-presentist debate. I do not propose to enter this meta-ontological debate here. Hilary Putnam is perhaps the best known defender of this 'no-conflict' theory, particularly in his [1987].

seems to entail the existence of both Socrates and Plato, something which the presentist denies. The eternalist, of course, is able to accept the sentence as a truth without concern for the ontological commitments it forces: she accepts that Socrates and Plato exist. But the presentist denies the existence of all ancient Greek philosophers, for none of them belong to the present. Does the presentist then simply deny that the sentence is true? In order to avoid this unattractive consequence, primitive tense operators, 'WAS' and 'WILL'[8], are introduced, and are supposed to allow acceptance of the problematic sentences without requiring the existence of the non-present objects. The presentist is thus able to accept as true 'WAS (Socrates is the teacher of Plato)', without becoming ontologically committed to the existence of Socrates, because the 'WAS' operator introduces an opaque context. I will discuss two arguments against presentism; the truthmaker argument, which questions the legitimacy of taking the tense operators as primitive, and the argument from special relativity.

2.1 The Truth-Maker Argument

The truth-maker argument probes the acceptability of the presentist's move to introduce a set of primitive tense operators in order to save talk of non-present things and facts. An attractive constraint on one's philosophical theories is that truths should be grounded in reality. This *truthmaker principle* can be found in Armstrong [1997], and states in essence that there must be some entity, some truthmaker[9], which grounds every truth[10].

[8] To deal with less simple claims about the past and the future, the presentist will be able to introduce metrical tense operators, e.g. 'WAS *n* years ago…'.
[9] Although exactly what entities are truthmakers is controversial. For Armstrong, they are *states of affairs*.

With this idea in mind, we can see (as is noted by Lewis [1992, p. 219] and Sider [2001*a*, 35-42] a tension with presentism. The presentist introduces the primitive tense operators in order to save temporal talk without commitment to non-present entities. 'WAS (Socrates is the teacher of Plato)' is apparently true even though Socrates does not exist. But what is the truthmaker of this sentence? What feature of the present, of reality, grounds the truth of this sentence? Presumably, it is not simply the evidence that presently exists for the truth of this sentence. After all, most presentists will want to accept that there are truths about the past for which we have no evidence. It is not at all clear that the ontology of the presentist is robust enough to ground the truth of our talk of past and future entities and facts. What facts about the present could possibly ground the truth of this sentence, or of any of the other sentences which the presentist helps himself to with the aid of the tense operators?[11] One possibility is that facts about the past and the future are grounded in facts about presently existing objects, and the laws of nature.[12] The major obstacle to accepting this account, to my mind, is that it would require us to accept determinism; to accept that facts about the past and the future can be deduced from facts

[10] There is a slight difficulty with the idea expressed in this way. Consider the true sentence, 'there exist no unicorns'. What entity grounds the truth of this sentence? The problem of true negative existentials led David Lewis [1992] to modify the truthmaker principle, and demand that rather than there be some truth-making entity for every truth, each truth should supervene on being. The idea is that if 'there exist no unicorns' is true in the actual world, then it is also true in every world which contains exactly the same objects, and which instantiates exactly the same properties as the actual world. The idea is that truths supervene on the entire nature of reality.

[11] Some deny that the trouble of finding truthmakers is a particular problem for the presentist. Trenton Merricks (conversation), for example, emphasises parallel difficulties in finding truthmakers for modal claims. I am inclined to dispute the parallel with modal truths, and there appear to be two ways of forcing the disanalogy: (1) be an eliminativist about modal truths, but not truths about the non-present, or (2) insist, as seems to be the preference of Sider [2001*a*, p.41-42] that there is hope of grounding modal truths in notions of logical consistency, and so on.

[12] The idea is considered briefly by Sider [2001*a*, p. 37]. Sider's main concern with the proposal is that it would rule out a regularity theory of laws.

about the present. Whether or not determinism is true, and there are well-known reasons to doubt that it is, the presentist should not be committed to it by her metaphysics of time.

A more radical solution for the presentist will be to claim that the truth of our temporal talk really is just grounded in brute facts about the present. *Prima facie*, this seems like gratuitous ontological postulation in order to salvage one's theory.[13] However, this is the route taken by John Bigelow [1996], who claims that the world, that is, the sum total of present existents, instantiates properties like *Socrates previously having been the teacher of Plato*. The central problem with the postulation of properties like *Socrates previously having been the teacher of Plato*, is that they seem to make no difference to the things, in this case the world, which instantiate them. There seems to be no independent reason to postulate the existence of these properties beyond saving the presentist's common talk. The postulation of such hypothetical properties is an unacceptably ad hoc move on the part of the presentist.

It seems, then, that the presentist's ontology cannot, without the addition of dubious properties of which we should be suspicious, or the commitment to determinism, support the truth of statements about the past or the future. This would be enough to cast suspicion upon the doctrine, but there are more arguments which threaten presentism.

2.2 The Argument from Special Relativity

The claim that the theory of special relativity contradicts presentism is widely known, and I aim only to rehearse the argument here, and note a possible, failed, response to it. My brief rendition of the argument will follow that given by Simon Saunders [2002]. The

[13] Far better, it seems to me, to pursue Merricks' line if one is committed to presentism [n.11 above].

presentist claim is that all that exists belongs to the present. So everything which exists is simultaneous with everything else which exists. If I click my fingers, then there is a fact of the matter about which events are simultaneous with my clicking: they are all and only the events which exist at the time of the clicking. But absolute simultaneity is not well-defined in the theory of special relativity. So while the presentist seems committed to the claim that there is a fact of the matter about which other events are simultaneous with the clicking of my fingers, special relativity denies that there is such a fact. This is not to say that there is no partitioning of spacetime into spaces the contents of which we might call 'simultaneous', but any such partitioning will have no fundamental status. Since the presentist wants to say that one of the partitioned spaces constitutes the entirety of what is physically real, surely the partitioning will have to be non-trivial.

I will consider the most plausible suggestion for such a partitioning which is made by Sider [2001*a*, 45-52][14]. The idea is that, in a departure from the basic presentist doctrine that reality is three-dimensional, the presentist admits the reality of a four-dimensional region of spacetime and calls this region 'the present'. The idea is to pick some point *p*, and retain as part of 'the present', every other point which is spacelike separated from *p*. This 'present' is definable in Minkowski spacetime, unlike the presentist's preferred notion of absolute simultaneity.

One might think that the new position is presentist in name only. For one, the new position admits the existence of a four-dimensional region, although a much smaller one

[14] Two options he suggests, 'here-now-ism' and the retention of an arbitrary hyperplane, are *really* non-starters, and so I shall not discuss them. Two others, similar to the one discussed below in retaining a four-dimensional region of spacetime are unacceptable because they simply do not constitute presentist positions. These options, (1) of retaining a past light cone of a point *p*, and (2) retaining a future light cone of a point *p*, do not even approach the presentist's intuition that only the present exists, and do not allow the distinctive presentist solution to the problem of temporary intrinsics. For that solution, see Merricks [1994].

than is admitted by the eternalist. Further, the presentist must now accept that some things are located at multiple *existent* points. Because reality now contains every point spacelike separated from p, it will contain, for some things, multiple points on those things' worldlines. But then the presentist loses her power to present an attractive solution to the problem of temporary intrinsics. (That problem is discussed below. The presentist's solution is given by Merricks [1994].)

The eternalist might also charge that the choice of point p is arbitrary. The presentist would presumably reply that the criticism begs the question against presentism itself, not this relativistic reformulation of it. After all, the presentist project always consisted in claiming that some three-dimensional space constituted the whole of reality. And the eternalist always claimed that the choice of this region was arbitrary. But, the eternalist would go on, contra this response to the charge of arbitrariness, the eternalist is free to emphasise this difference between traditional presentism and its Minkowskian variation: that the new version privileges a *single point* of reality, and uses this point in the definition of reality itself. In traditional presentism, there was no single point which had this honour. While the presentist has *some* answer to the charge of arbitrariness in the traditional case (the three-dimensional region whose existence the presentist admits is simultaneous with the admission), she has no parallel answer to the new charge. p is not distinguished from the other existent points by being present. In the presentist's new gerrymandered sense, all the points are present. In the absence of a more adequate partitioning of spacetime into a region of points which we might call the present, special relativity seems to tell very strongly against presentism.

This is all that I shall say against presentism. Of necessity, my discussion is brief but my aim in the first part of this paper is to render plausible the metaphysical commitments of the perdurantist and the stage theorist. It seems to me that more work must be done on this front to render four-dimensionalism viable, than eternalism.

3 Three-Dimensionalism and Four-Dimensionalism

The three-dimensionalist claims that every thing is wholly present at every moment at which it exists, i.e. that there is nothing which has a temporal part[15,16]. The four-dimensionalist, on the other hand, says that there are some things (whether or not they are the things in which we are usually interested, like people and cars) which are temporally extended by virtue of having parts at different times. In short, the four-dimensionalist thinks that some things, which aren't events or processes, have proper temporal parts. I will present three arguments for four-dimensionalism. None is unassailable, and I shall mention problems with each. Nonetheless, I think that, if the collective weight of the arguments does not incline one towards four-dimensionalism, at very least it renders four-dimensionalism a live hypothesis.

3.1 The Problem of Temporary Intrinsics

[15] Three-dimensionalists, or endurantists, include Mellor [1998], Merricks [1999, 2001] and Zimmerman [1996, 1998].
[16] No thing has a temporal part, only in some limited sense of 'thing'. Obviously, the three-dimensionalist will draw a distinction between things and events or processes, and will typically accept that these latter have temporal parts.

It has been claimed that the so-called 'problem of temporary intrinsics' is fatal to the three-dimensionalist's account of persistence[17]. I certainly do not think that this is true and will describe a possible three-dimensionalist solution below. The debate will be reduced to a choice between basic assumptions about the nature of change.

The problem of temporary intrinsics is due to David Lewis [1986, p. 202-204]:

> The principal and decisive objection against endurance, as an account of the persistence of ordinary things such as people or puddles, is the problem of temporary intrinsics. 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? I know of only three solutions.

The three solutions are these:

(1) Seemingly intrinsic properties are actually disguised relations, and an enduring thing may bear the bent shape relation to some times but not to others. The solution is rejected because it 'is simply incredible' [ibid. p. 204] to suppose that shape is a relation, and not a property.

(2) The only intrinsic properties a thing has are those it has at the present moment.

(3) The different shapes belong to different things, in particular, to the thing's different temporal parts.

Solution (2) is the presentist's solution, and is offered by Merricks [1994]. Since I have already rejected presentism above, I will not consider (2). (3) is Lewis's preferred

[17] This much is suggested by Lewis [1986, p. 202]

solution. Lewis's rejection of (1) may seem a little quick, especially considering the ranks of those who actually accept it as the correct solution to the problem of change. For example, it is defended by Johnston [1987], van Inwagen [1990], and Mellor [1998]. I will concentrate here on the defence of Mellor.

The metaphysical presupposition which forces Mellor to accept that apparently intrinsic properties are really relations to times is this: that *things* differ from *events* in virtue of the fact that the former, unlike the latter, do not have temporal parts. Mellor's reasons for supposing that events but not things have temporal parts relies in part on the common sense intuition that supports endurantism:

> "not all particulars extended in time have temporal parts. Events do: each course of a meal is a temporal part of it. But things do not: atoms, people and planets have only spatial parts. This means that things, unlike events, *are* wholly present at every moment within their *B*-times. Some *B*-theorists admittedly deny this […] but no one else does. No one else would say that only parts of Sir Edmund Hilary and Tenzing Norgay climbed only a part of Everest in 1953. The rest of us think those two whole men climbed that one whole mountain, and that all three parties were wholly present throughout every temporal part of that historic event." [p. 86]

So things, like people and planets, are wholly present at every moment at which they exist. The assumption is also supported by considerations about change. Change in a thing *X*, for Mellor, consists in *X*'s having incompatible real properties[18] at different

[18] "Real changeable properties are those whose changes have their first effects on or near the things we ascribe to them. The idea is that if, for example, changes in my fame are not changes in me, then my being famous is not a property of mine. Yet as it is ascribed to me, it is not a property of anyone or anything else either; so it is not a property at all." [Mellor, p.88]

times. Mellor rejects the temporal parts account of change, according to which things change by virtue of having temporal parts with incompatible properties, because he thinks that change requires identity as well as difference. If the world really consists of momentary particulars, and persisting things are just mereological sums of these momentary particulars, then there is no change in a B-world after all[19]. If *X*'s change from being bent to being straight is really just a matter of *X*'s having temporal parts x_1 and x_2 which are respectively bent and straight, then nothing has changed after all. There is nothing which *was* bent yet is *now* straight, and such a thing is precisely what is required for change: it 'needs a single particular for the difference to be a change *in*; and here there is no such particular' [ibid. p. 89].

Mellor accepts that things change, and that a thing's changing consists in that thing's having incompatible real properties at different times. Given his endurantism, and his acceptance of the B-theory of time, the problem of temporary intrinsics threatens to strike his theory strongly. Consider this change, where *F* and *F'* are incompatible properties:

(A) *X* is *F* at *t*, and

(A') *X* is *F*' at *t*'.

The temporal parts theorist will say that this change consists the differing properties of *X*'s temporal parts, where x_1 is *X*'s temporal part at *t*, and x_2 is *X*'s temporal part at *t*':

(TP) x_1 is *F*, and

(TP') x_2 is *F*'.

[19] The objection that only the A-theory, and not the B-theory, can account for change is one pushed by McTaggart [1908].

But in denying that things have temporal parts, this account is not available to Mellor, and it would not satisfy his robust conception of change anyway. Since persisting things, like people and planets, are supposed to be wholly present at every moment at which they exist, Mellor must say instead that what lies behind the change from (A) to (A') is *X*'s being related in different ways to different times: *X* cannot both be and not be *F* simpliciter. So Mellor must offer instead:

(R) $F(X,t)$, and

(R') $F'(X,t')$

The advantage of (R) and (R') is that Mellor's identity condition on change is met: it is *X*, rather than distinct temporal parts of *X*, which figures in our analysis of (A) and (A'). It is *X* which was *F* but later has the incompatible property *F*'. On the other hand, Mellor must say what Lewis finds 'incredible' [1986, p. 204]; that apparently intrinsic properties are really relations to times. The question, for Mellor, is whether to accept that things have temporal parts, and therefore fail to discriminate between things, and events or processes, or to give up the intuition that the changeable properties of things are not relations. He argues that the latter is the less expensive option.

The intuition that the properties involved in change are non-relational can be explained by reference to the fact that almost always, when we say that *X* is *F*, we really mean that *X* is *F now*. This is not to say that, at *t*, we mean that *X* is *F* at *t*, for we may not even realise that it is *t* now, but just that we *mean* that *X* is *F* now. This is not to say that that sentence is made true by some tensed fact. So, syntactically, '…is *F*' is still a one-place predicate; but it is elliptical for '…is *F* now'. But this, Mellor argues, is no evidence that the property which grounds the truth of the relation is not a relation. We

should be wary, he implies, of drawing substantive metaphysical conclusions from considerations like these about language. For sure, such considerations can explain our intuitions, but they will not necessarily say much about extra-mental reality.

Once we understand the grounds of our intuition in this case, and realise that they are not metaphysically significant, we can consider detachedly the consequences of relationalism about the pertinent properties. Mellor thinks that the relational nature of these properties would entail only three (perfectly acceptable) things. First, if we say that *X* has a real property *F*, we must say (or it must be implicit) *when X* has that property. This is no problem. Second, if two entities are linked by some relation, then they are so linked no matter how we refer to them. So (A) and (A') must remain true for reference-preserving substitutions of *X*, *t* and *t*'. This is to say that both contexts in '… is *F* at …' must be transparent. This is no problem either. Finally, no relation can relate something non-existent to anything else. So (A) and (A') entail the existence of *X*, *t* and *t*'. Again, this is no problem. So is Lewis right to find Mellor's position incredible?

I think that there is *some* advantage to a theory on which *apparently* intrinsic properties are *really* intrinsic properties, such as Lewis's. However, it is not clear to me that the package of views that Lewis supports as a whole is, in itself, more acceptable than that offered by Mellor. While Lewis is able to accept that properties like shape are intrinsic, he must also say what is nearly as counterintuitive: that persisting things are fusions of parts existing at different times. Further, he must stipulate that change consists in some thing's having temporal parts with incompatible properties[20], and deny that any *particular* ever really changes its properties. If there were no further arguments in favour

[20] A claim, as Yuri Balashov reminds me, with an impressive ancestry. In particular, see Russell [1903, section 442]

of four-dimensionalism, I should find it difficult to choose between perdurantism, which must make do with change by proxy of one's temporal parts yet can insist that shape is an intrinsic property, and endurantism, which supplies thorough-going change and relational properties.

3.2 The Problem of Coincidence

A popular reason to prefer four-dimensionalism over endurantism is the easy solution it offers to problems of coincidence. Suppose that two objects are coincident at a time t iff (1) they have a shared spatial location at t, and (2) they share all the same parts at t. There is a strong intuition that distinct material things can never coincide in this way, but a number of puzzle cases threaten this intuition. I will consider two.

Suppose that at t a lump of clay is moulded into a statue. Presumably, the lump of clay survives this change of shape, but it also seems true to say that a statue comes into existence. Since the lump existed prior to t, and the statue didn't, they are distinct entities. But at t, they are coincident according to our definition.[21] Similarly, consider a cat Tibbles, and Tib, the undetached part of Tibbles that is the cat minus her tail, at t_1. Suppose that some accident befalls Tibbles and she loses her tail. Then at t_2, Tib still exists (nothing has happened to it, after all) and, so long as cats can survive the loss of their tails, which presumably they can, Tibbles still exists. Yet they are at t_2 completely coincident. We still want to say, however, that they are distinct things, since (like the lump and the statue) they have different historical properties. The perdurantist has a good answer to these problems which avoids admitting the coincidence of distinct material

[21] Sider [2001*a*, p. 142] describes this puzzle.

things.[22] The lump and the statue are not coincident, for they are not wholly present at *t*. Rather, they simply have a shared temporal part at *t*: they just *overlap* then. Coincidence is thus rendered as acceptable as the partial overlap of distinct roads. Similarly, Tibbles and Tib are extended space-time worms which overlap for some of their careers, namely the portions of their careers temporally located after the accident. The endurantist, on the other hand, has no easy solution to the puzzle, and must take one of a number of strategies. For example, she might (1) admit that the coincidence of material things is ubiquitous, or (2) deny by placing appropriate restrictions on compositions that some or all of the concerned entities exist. The endurantist may take one of two strategies here. She may accept that some classes of objects have fusions, but resist coincidence by limiting the ranks of composite objects (Peter van Inwagen [1990] takes this route). Or she may deny that any class of objects has a fusion. That is, she might commit herself to mereological nihilism. But both of these solutions are, to say the least, rather expensive. Although I shall consider a problem with the argument from coincidence below, I think what has been said is strong support for four-dimensionalism.

3.3 The Argument from Vagueness

I want now to consider an argument for four-dimensionalism that is widely considered to be among the most important. The argument is to be found in Sider [2001*a*, p. 120-139],

[22] Some, for instance Sider [2001*a*] and Hawley [2001], think that stage theory offers a better solution to these problems. Since the stage theorist admits the existence of temporal parts, I need not consider the relative merits of perdurantism and stage theory at this point. If perdurantism provides a superior solution to the puzzle than endurantism, then (regardless of the merits of stage theory in dealing with coincidence) this is one strike in favour of the existence of temporal parts of material things, the metaphysical thesis that I am pushing at the moment.

and is inspired by a sketch of an argument for unrestricted composition to be found in Lewis [1986, p. 212-213]. The argument assumes that there is *some* condition under which a class of objects will compose another. The argument does not need to be liberal in its claims about this condition. We might accept, as van Inwagen [1990] does, that some objects compose another only when they constitute a life, or with Merricks [2001], that they do when they constitute a person. So long as *some* class of objects have a fusion, the argument can get started. Now, given some arrangement in which composition *does* occur, it seems plausible that given some very small adjustment to that arrangement, composition will still occur. But then it seems that, given a class of objects which does not have a fusion, we will be able to construct a series of cases, each member of which is extremely similar to the adjacent cases, which links that case to a case where composition does occur. Given the implausibility of the notion that adjacent cases in such a series might differ with respect to whether composition occurs, we will reject the idea that there is a class of objects which does not have a fusion, and conclude that every class has a fusion. And from here, we can demonstrate the existence of temporal parts.

This is a little quick, though. My fuller rendition of this argument closely follows Balashov [2005]. It is due to Sider [2001*a*], and is inspired by a related argument from Lewis [1986]. Having stated the argument, I will consider a criticism of it due to Ned Markosian [2004]. First some definitions. A *case of composition* is a 'possible situation involving a class of objects having certain properties and standing in certain relations' [Sider, 2001*a*, p. 122]. About each such case, we can ask whether the class of objects in question has a fusion. A *continuous series of cases* is a series of cases of composition in

which each case is extremely similar in the relevant respects[23] to the adjacent cases. A *sharp cut-off* in a continuous series is a pair of adjacent cases, in one of which composition definitely occurs and the other of which composition definitely does not occur. There are three steps to the argument:

Step 1: Establish the thesis of *synchronic universalism*, i.e.

(SU) Any class of objects existing at t has a fusion at t.

Step 2: Establish *diachronic universalism*, i.e.

(DU) If for all t in T there is an object $x(t)$ existing at t, then there is an object y existing at all t in T, but at no t not in T, such that, at t, $y = x(t)$.

Step 3: Using (DU), show that temporal parts exist.

Sider's premises for step 1 are as follows:

P1: If not every class 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.

P2: In no continuous series is there a sharp cutoff in whether composition occurs.

P3: In any case of composition, either composition definitely occurs, or composition definitely does not occur.

The argument works like this. Suppose we accept that there is some case in which composition does not occur, i.e. that composition is restricted. Then (so long as we accept that there is also some case in which composition *does* occur, and that assumption is extremely plausible) by P1 there is a continuous series of cases which connects the case

[23] Those relevant respects being any factors which might be pertinent to composition. For example, qualitative homogeneity, spatial proximity, unity of action and comprehensiveness of causal relations. [The list is due to Sider, p. 123.]

in which composition does not occur to one in which it does. P3 states that composition can never be vague, i.e. that there are no borderline cases of composition. So in our continuous series, there must be a sharp cutoff; there can be no borderline cases. But the possibility of a sharp cutoff in this series is ruled out by P2. So, there is no case in which composition fails to occur. Or, composition is completely unrestricted (SU).

P1 seems to be relatively uncontroversial[24]. P2 trades on the intuition that if there *were* a sharp cutoff in some continuous series, it would be a metaphysically arbitrary one. I'll look below at this premise in greater detail. The most problematic premise is P3, and Sider defends it by showing that if composition were vague, then for some *n*, a sentence declaring that there are *n* concrete objects in the world would be indeterminate. But this is impossible, if we accept that vagueness is a semantic phenomenon, and note that in such a sentence there would be no plausible linguistic candidate on which to pin the vagueness. The argument is this. Stipulate that a concrete object is an object which does not fall into any of the following kinds:

sets and classes

numbers

properties and relations

universals and tropes

possible worlds and situations

[24] Two possible objections mentioned by Sider: (1) the assumption that there is a case of composition in which composition does occur begs the question against mereological nihilism, i.e. the claim that *no* class of objects has a fusion; (2) not every pair of cases can be connected by a continuous series. In particular, there is no continuous series between a case involving a finite number of objects, and a case involving an infinite number of objects. Since it seems unlikely that it is the fact of one case's involving an infinite number of objects, and the other's involving a finite number of objects which explains the difference in whether composition occurs, this seems unimportant. All that the premise requires is that there is some pair of cases which differ with respect to composition between which a continuous series can be constructed, not that between *every* pair of cases which differ with respect to composition a continuous series can be constructed.

The list can be amended if any class of abstract entity has been left out. Suppose that the third premise of the argument is false, i.e. that there is some class of concrete objects such that it is vague whether or not that class has a fusion. Now, if we were to count all the concrete objects in the world, we would count all the members of that class. But it would be indeterminate whether or not we should count the fusion of all the objects in that class. Now, assuming that the world contains a finite number of concrete objects, then for some *n*, there would be a sentence asserting that there are *n* objects in the world (call such a sentence a *numerical sentence*) which would be indeterminate. Numerical sentences contain only logical vocabulary and a predicate, 'C', for concreteness, so, assuming the linguistic theory of vagueness, the indeterminacy of this sentence will have to be attributed to the predicate 'C' or to some piece of logical vocabulary. According to the linguistic theory of vagueness, the phenomenon of vagueness is really attributable to semantic indecision; to our failure to choose between a number of possible precisifications of the vague terms. Sider's claim is that there is no term in a numerical sentence which we can blame for the indeterminacy of that sentence. Consequently, no such sentence can be indeterminate in truth value, and it can never be indeterminate whether or not a class of objects has a fusion.

So, it must be shown that logical vocabulary, and the concreteness predicate 'C', are not vague. 'C' cannot be vague, it is claimed, because it was defined with a list of ontological kinds that do not admit of borderline cases. The difficulty in formulating a definition of 'C' is parallel to the difficulty of giving a decent account of what an abstract object is. Sider's defence of the non-vagueness of 'C' is presumably this: no matter what difficulties we might have in formulating necessary and sufficient conditions for an

object's being abstract, presumably these difficulties are not such that any object could be 'vaguely' abstract. So 'C' cannot be vague in any appropriate sense.

The more interesting claim is that logical vocabulary is not a source of vagueness. That logical vocabulary is never vague is taken to flow from the claim that the logical terms do not have precisifications between which we have failed to choose. The likeliest candidate to have precisifications among the logical vocabulary are the quantifiers.[25] Clearly, if we are quantifying over a restricted domain, our quantifiers *will* be vague. If context determines that I am quantifying over spaces in my house when I say 'there is no beer', then the domain of the quantifier will be vague. It may or may not contain my shed. Sider's claim, rather, is that the *unrestricted* quantifier is non-vague. What possible competing precisifications are there for the domain of the unrestricted quantifier? The difference between the domain of the unrestricted quantifier, and the extension of a normal predicate is this: possibly vague predicates, that is, predicates which admit of competing precisifications, do so because it is not clear, or there is no fact of the matter, which subclass of the universal domain is their extension. But what comparable confusion can there be with regard to the unrestricted quantifier? The domain of that quantifier is no subclass of the universal domain; it *is* that domain! For sure, we might, as we have seen above, have differences over what is in that domain, but these differences constitute a fundamental dispute in ontology, not a conflict over the meaning of the logical apparatus employed to articulate our competing claims.

So, if a numerical sentence is indeterminate, this is not because it contains a vague term. But, according to the linguistic theory of vagueness, if a sentence is indeterminate,

[25] I will not discuss the claims that the logical operators and the identity sign are non-vague, although I believe that they are.

this can *only* be because it contains a vague term. So, no numerical sentence is indeterminate. And if there can be no indeterminate *n*-sentence, then composition cannot be vague, and in any case of composition, either composition definitely occurs or composition definitely does not occur. The first step of the argument seems to go through.

More definitions are required for step 2. An *assignment* is a function that takes times as arguments and assigns non-empty classes of objects that exist at those times as values. An object *x* is a *diachronic fusion* of an assignment *f* iff for every *t* in *f*'s domain, *x* is a fusion-at-*t* of *f*(*t*) for every *t* in *f*'s domain. A *minimal D-fusion* of *f* is a diachronic fusion of *f* that exists only at times in *f*'s domain. The argument to (DU) is closely parallel to the argument to (SU). The premises are these:

> P1': 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.
>
> P2': In no continuous series is there a sharp cutoff in whether minimal D-fusion occurs.
>
> P3': In any case of minimal D-fusion, either minimal D-fusion definitely occurs, or minimal D-fusion definitely does not occur.

The conclusion is:

> (U) Every assignment has a minimal D-fusion.

The argument works like this. Suppose that there is some assignment that does not have a minimal D-fusion. Then there is (by P1') a continuous series connecting that assignment

to a case in which minimal D-fusion does occur.[26] P3' demands that in this series there is a sharp cutoff, yet P2' prohibits this. So there is no assignment which does not have a minimal D-fusion.

Given (U), step 3 seeks to establish the existence of temporal parts. The argument is this: let A be the assignment with only t in its domain that assigns $\{w\}$ to t. By (U), there is an object, z, that is a minimal D-fusion of A. But z is a temporal part of w at t. We define *temporal part* as follows: 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 [Sider, 2001*a*, p. 59]. z satisfies all three conditions for being part of w. (1) z is a fusion of $\{w\}$ at t and, since z is a minimal D-fusion of A, z exists at but only at t; (2) every part of z is part of w, so z is part of w at t; (3) Let y be a part of w at t. Since z is a fusion of $\{w\}$ at t, y is part of z at t. So y is part of z at t. So z overlaps y at t. So z overlaps at t every part of w at t.

I will now consider a response to the argument from vagueness due to Ned Markosian [2004]. It attempts to deny P2', by arguing that there can be continuous series with a sharp cutoffs because composition can be brutal.[27] Markosian defends the following thesis:

> Brutal Composition (BC): There is no true, non-trivial, and finitely long answer to the question, *What are the necessary and jointly sufficient conditions for any class's having a fusion?*

[26] If the argument at this point appears to beg the question in favour of the existence of temporal parts, one should recall that the assignment may be a partial function. In particular, it may be well-defined for a single time only.

[27] Yuri Balashov [2005], on the other hand, claims that the failure of P2' lies in a disanalogy between synchronic and diachronic fusions, and roundly condemns the idea that composition could be brutal.

There are, as Sider would allow, four possible answers to the question of the conditions under which a given class has a fusion:

1. Mereological nihilism: deny that *any* class of objects has a fusion. Then there can be no continuous series of cases from a case of non-composition to a case of composition, and the argument from vagueness cannot get off the ground.

2. The principle of unrestricted diachronic fusions: every class has a fusion.

3. A 'moderate' answer, like Peter van Inwagen's [1990]. Van Inwagen parts ways with Sider at the very outset, in that he does not accept the Lewisian account of vagueness. Van Inwagen is committed to the existence of genuinely vague objects.

4. Brutal composition: there *can* be sharp cutoffs in continuous series of cases. If there can be sharp cutoffs in a continuous series, then Sider's argument does not go through, since we will not be committed to the claim that some *n*-sentence is indeterminate.

Sider considers (4), the claim that composition is brutal and finds it implausible: it is close to denying that composition supervenes on microphysical factors, particularly when it is noted that adjacent members in a continuous series can be rendered as similar as we like, by adding more cases to the series. Yet brutal composition, while perhaps 'close' to denying that composition supervenes on microphysical factors, does not really amount to denying supervenience. That would require one to say that there can be a case in which composition occurs, and another microphysically identical to the first in which composition does not occur. Markosian certainly need not say that. All he must claim is that there can be two cases, arbitrarily close with respect to the factors relevant to

composition, which differ with respect to whether or not composition occurs. Part of his argument is just this: given the four possible solutions: nihilism, universalism, ontological vagueness, and brutal composition, the latter is the least troubling. Common sense may favour this view, for the acceptance of arbitrarily similar cases which differ with respect to whether composition takes place may be easier to swallow than the existence of diachronic trout-turkeys. But Markosian [1998] has more to say about the unacceptability of options (1) to (3).

(1) Mereological nihilism: the mereological nihilist says, in effect, that there are no objects with proper parts. Some definitions are in order:

> x is a *proper part* of $y =_{df} x$ is a part of y but y is not a part of x.
>
> x is a *simple* $=_{df} x$ has no proper parts.

Following Markosian [1998] and van Inwagen [1990, section 8], nihilism is then the following thesis:

> Nihilism: Necessarily, for any *x*s, there is an object composed of the *x*s iff there is only one of the *x*s, i.e., the only objects that exist are simples.

A central problem with nihilism is obvious: the nihilist must deny the existence of not only footballs and cars, but animals and persons. For most, this is enough to tell against the theory. The nihilist, of course, is free to adopt some strategy so as to save our talk. One such is offered by van Inwagen, who is not himself a nihilist, but rejects the existence of most everyday things [1990, sections 10 and 11]. As Markosian stresses, the problem here is not solved by saving our everyday talk with some paraphrasing device.

The problem is that, speaking strictly, we think that sentences carrying ontological commitments to all sorts of composite objects, are *really* true.

(3) A 'moderate' answer: the best known moderate solution is due to van Inwagen [1990], and it is on this theory that Markosian concentrates. Following Markosian, I'll refer to this solution as Van Inwagen's Proposed Answer (VIPA):

> VIPA: Necessarily, for any *x*s, there is an object composed of the *x*s iff either (i) the activity of the *x*s constitutes a life or (ii) there is only one of the *x*s.

Obviously, again, VIPA suffers the failures of the nihilist: it denies the reality of many composite objects whose existence seems, to the pre-philosophical intellect, perfectly obvious. Another important problem is that van Inwagen is committed by VIPA to the claim that there is vagueness in reality. That is, he is committed to the claim that vagueness is more than a simply semantic, or epistemic phenomenon.[28]

(2) Given Markosian's arguments against nihilism and van Inwagen's moderate answer, his problem with universalism is predictable: just as van Inwagen and the nihilist accept too few of the entities which common sense tells us populate the world, the universalist must accept too many. Just as the nihilist is able to save talk of apples and cars by introducing some apparatus of paraphrase, the universalist is able to preserve the common sense scepticism about trout-turkeys by explaining that, usually, our quantifiers are restricted in such a fashion as to range over only those things which fall under sortal predicates. Markosian argues that, just as the nihilist's central problem is not that he fails

[28] Van Inwagen accepts this consequence of his theory, and sees nothing obviously ridiculous about the consequence. The road from VIPA to ontic vagueness and vague statements of identity is detailed in [1990, sections 17-19].

to save our talk, but rather that he is simply wrong about the contents of the world, the universalist's talk of restricted quantifiers does not change the fact that his claims about the population of the world are just wrong according to our intuitions. Strictly speaking, Markosian claims, trout-turkeys don't exist. I have one remark in response to Markosian's claim here, and I'll try to show that the intuition is not *merely* convenient. I find that, in general, my intuitions about what does exist are much stronger than my intuitions about what does not exist. The former are more resistant to revision than the latter: given comparable evidence, I can more easily accommodate a new object into my ontology, than eliminate one. Here's one example. On finding out that the space they thought was filled by solid tables was actually mostly empty, no-one eliminated tables from their ontology just because the reality radically deviated from expectation. The advance in knowledge produced no restructuring of our ontology when the only restructuring possible would have been eliminativist. In contrast, most of us are, unless we take our empiricism very seriously, quite open to the addition of new 'theoretical' entities to our ontologies. The result is that I find Markosian's argument against the nihilist, that he fails to recognise the existence of things which everyone just *knows* exist, much stronger than his argument against the universalist, *viz*. that his ontology admits the existence of things which we just *know* don't exist. So I think the argument by elimination to (BC) is inconclusive. Like the first, the issue here reduces to the face off of competing intuitions about which, brutal composition or the existence of trout-turkeys, is harder to swallow. My intuitions tell me that the former is the more distasteful claim but, as I am aiming only here to give a plausibility argument for four-dimensionalism, I may rest here.

4 Perdurantism, Stage Theory and Ambiguity

(MB) admits the existence of temporal parts. It also admits the existence of all times, and events and things located at them. Moreover, those accepting (MB) usually also accept mereological fusions of *x* and *y* for all *x* and *y*[29]. The semantic question which will occupy the remainder of this paper is this: which objects within this generous ontology are the everyday continuants; the persons, tables, cats and cars? I'll look in more detail now at the options available to those who accept (MB). There are at least three, perdurantism, stage theory, and the ambiguity theory, although only the first two have any defenders in the literature. The *perdurantist* (or worm-theorist) says that persons and tables are four-dimensional objects, which persist by virtue of having a temporal part at every moment at which they exist. These *space-time worms* have most of their properties derivatively, by virtue of their parts having appropriate properties. The *stage theorist*, on the other hand, considers persons and tables to be three-dimensional *instantaneous stages*. Stage theory requires a temporal version of modal counterpart theory in order to deal with claims ascribing both temporary and 'lingering'[30] properties [see Lewis 1968, Sider 1996, 2001*a*]. Consider:

0. Major was prime minister.

[29] Such fusions are accepted, at least, by David Lewis [1986], Theodore Sider [2001*a*] and Hud Hudson [2001]. They are not accepted by Yuri Balashov [2005], who nevertheless accepts (MB).
[30] I.e. properties which take some time to instantiate. This phrase is due to Hawley [2001, p. 54].

According to the stage theorist, 'Major' refers to an instantaneous stage. Stages manage to have been but no longer be something in virtue of bearing counterpart relations to other stages, in this case, to other stages that atemporally *are* prime minister. (This relation must also be exploited by the perdurantist in order to bind together the various Major-stages in order to unify the worm-theorist's Major-worm.) Properties which take time to instantiate - *being born*, *believing that*…- are had in a similar fashion. For it to be true of a stage that it is being born, that stage must be counterpart related to other stages in the vicinity which have the appropriate intrinsic properties. If these lingering properties are monadic properties of individual stages, then they are monadic properties that are had *in virtue* of relations borne to other stages. That is, they are monadic extrinsic properties.[31]

The debate between perdurantism and stage theory is not necessarily, as has been shown by Katherine Hawley [2001, p. 44], a merely semantic debate. In particular, if we embrace some kind of realism about properties, the debate between the perdurantist and the stage theorist engages the question of which entities have properties (whether the latter are construed as universals or tropes). Indeed, my arguments against the ambiguity theory below will be arguments from the unacceptable metaphysical consequences of that theory. In particular, the ambiguity theorist must accept that persons have persons as parts, and must deny, I claim, that sortal properties are real properties at all. This, I shall suggest, is an issue that a four-dimensionalist semantics should be silent about. Further,

[31] It is not clear that this notion of an monadic extrinsic property is coherent. In fact, it is not clear what is 'monadic' about the property beyond the fact that it is denoted by a one-place predicate. If the property is monadic only in the sense that its related predicate is one-place, then it seems reasonable to doubt that single (but not isolated) stages are really the bearers of lingering properties, and rather that such properties are had by collections of stages. If the stage theorist wants to say that single stages really do bear lingering properties, then she will have to endow 'monadic extrinsic property' with some content which makes them more than the extrinsic properties which cousin some one-place predicates, and yet less than full blown relations.

the ambiguity theorist will be forced to deny the four-dimensionalist claim that time is essentially like space.

My argument against stage theory presupposes the truth of the following claim about counting:

(CI) Counting is by identity

This is to say that when we count some collection of *x*s, we use a new integer when and only when we are confronted with an *x* that is strictly non-identical to every *x* which has been counted already. What can be said in favour of (CI)? It should first be noted that a good argument with (CI) as premise will be effective *ad hominem* against stage theorist Theodore Sider, who explicitly accepts the thesis [2001*a*, p. 189]. Nevertheless, independent support for (CI) would be desirable. As a first pass at defence, we should note the intuitive appeal of (CI). In fact, (CI) only becomes controversial against the background of the four-dimensionalist ontology, i.e. the claim, contra endurantism, that it is *never* the case that something wholly present at t_1 is numerically identical with something wholly present at t_2, where $t_1 \neq t_2$. Indeed, for an endurantist, there seems to be no coherent option *but* to count by identity. Not so for the four-dimensionalist. Consider the following caricature of perdurantism and stage theory. Suppose that, pre-philosophically speaking, there is a single person *X* in a room between t_1 and t_2. For the perdurantist, this is to say that there is a temporal part of the temporally extended worm *X* that is in the room between t_1 and t_2 . For the stage theorist, this is to say that there is an *X*-stage in the room at t_1 and t_2 and every point in between, i.e. a stage which qualifies as

X (as many other stages do). Now suppose that we attempt to count the people in the room through the window, and suppose also that we are able to pick out by demonstration an instantaneous stage. The perdurantist and the stage theorist should both, if the preservation of common-sense means anything to them[32], want to say that there is a single person in the room between t_1 and t_2. So they each point to the single two-legged thing in the room at t_1, and count 'one'. Later, they point to the single two-legged thing at t_2, but don't count 'two'. The perdurantist does not count 'two' because the pointed-to thing is a part of an extended worm that has already been counted. The stage theorist does not count 'two' because the pointed-to thing is *X*, like the already-counted thing. In neither case does the four-dimensionalist stop counting because the thing they have pointed to is identical with the thing that they pointed to before. By the basic premise of four-dimensionalism, these two things are non-identical.[33] So I suggest that the notion that counting is by identity is threatened only by the four-dimensionalist ontology. But deeply entrenched and hitherto unquestioned beliefs can be loosened if we swap our commonsense metaphysics for theoretically more satisfying alternatives. If four-dimensionalism is strongly preferable to three-dimensionalism, then (CI) might be expendable. But more than being deeply entrenched in our everyday beliefs, (CI) seems to have something like the status of a conceptual truth. To count some collection of objects is just to put those objects in a one-to-one correlation with a sequence of the positive integers, beginning with one. (CI) is not expendable. Correctly counting the

[32] As it clearly does for a notable perdurantist, David Lewis [1986], and a notable stage theorist, Theodore Sider, [2001*a*].

[33] I show below that the perdurantist can preserve (CI), while the stage theorist seems to have to do away with it.

number of cats in a room requires an egalitarian attitude toward the cats: one cat, one cardinal.

4.1 The Problem of Counting

Stage theory suffers from a pervasive failure to return the correct answer in cases of counting. One stage theorist [Sider, 2001*a*] admits that stage theory fails with cases of 'timeless counting'. A sentence like 'more than 10 trillion people have set foot in America before August 2004' comes out true on stage theory, but is false. It is not only on such relatively uncommon cases of 'timeless' counting that the stage theorist trips up.[34] In fact, the stage theorist seems unable to cohere with intuition in *any* case of diachronic counting, that is, in any case of counting *over time.* For each of the worm-theorist's person-worms, the stage theorist will have to admit as many people as there are temporal parts of the space-time worm, that is, an infinite number of people, if time is dense or continuous [Hawley, 2001 p. 51]. Consider a room filled with five cats (on a pre-philosophical count) between t_1 and t_2. An allergy sufferer sniffs and begins to count them, 'one, two, three…four, ah that's just a temporal counterpart of the first one, five…'. The counter is clearly not counting here by identity, for if he were then he shouldn't finish. Couched in the terminology of the worm-theorist, the different temporal stages of a cat-worm merely bear the *same-cat* counterpart relation to one another. Strictly speaking the stage theorist must say that between t_1 and $t_{2,}$, there are an infinite number (if time is continuous) of distinct cats in the room. Consider one of the (pre-philosophical) cats, Bob. An infinite number of instantaneous stages spatio-temporally

[34] This is a problem acknowledged by Hawley, [2001, p. 46-47].

located in the room between t_1 and t_2 count as being Bob, but none of them are numerically identical, and so by (CI), they each get assigned a different positive integer. A stage may bear the relation *same-cat* to an already counted cat, but if as a result the stage theorist does not assign a new integer to the stage, then he is not counting by identity.

I think that this example tends to show that a theoretical commitment to counting by identity is more expensive for the four-dimensionalist than we might have thought. But (CI) is, I have claimed, close to being a conceptual truth and so if it causes problems for stage theory, this should tell all the more strongly against that theory. If we are serious about (CI), and serious about the truism that there are only five cats in the room, then stage theory cannot be considered an adequate univocal semantic theory for the four-dimensionalist.

This is not to say that the perdurantist survives the problem of counting unscathed. Consider the case of the cats in the room. For the perdurantist, all that we have in the room are temporal parts of the larger space-time worms that are really the cats. So while the stage theorist seems to give far too high a count, the worm theorist might not be able to count enough. After all, there aren't *any* whole cats in the room, but just bits of them. The perdurantist can solve the problem while respecting (CI). She sees a temporal part of a cat-worm, and takes this as indication that that cat is partially present in the room. Further, as we saw above, she takes this as warrant for the claim that 'there is a cat in the room'. She uses a new positive integer only when she sees a temporal part of a cat-worm that has not already been counted. This temporal part is non-identical with the first one, but then the perdurantist is counting cats, not their temporal parts. The perdurantist *is*

placing the cats in a one-to-one correspondence with the first few positive integers, i.e. she is honouring (CI), but is doing this by taking the temporal part of Bob as an indication of Bob's partial presence in the room.

4.2 The Problem of Historical Predication

The problem of counting strikes me as a very serious one for stage theory. No acceptable theory should have the consequence that there have been an infinite number of people in the history of the universe. But stage theory has been the subject of two notable recent defences, by Katherine Hawley [2001] and Theodore Sider [2001*a*]. To that effect, it would be good to give another argument against it. I offer the following modest one. Consider:

1. Attlee was prime minister.

I take it that it would be an advantage to be able to give sentences like (1), of the form '*x* was *y*', a similar analysis to:

2. Blair is prime minister.

i.e. a sentence of the form '*x* is *y*'. This is to say that, intuitively speaking, *x* should refer to a similar entity in both forms, and the truth conditions of both forms should be aligned. What is the stage theorist to say of (2)? She will say that (2) is a singular proposition, a *de re* claim about a presently existing stage of Blair. Much the same would be said of:

3. Blair was the leader of the opposition.

This is a *de re* claim about a temporal property (had in virtue of appropriate counterpart relations) of a presently existing Blair-stage. (1), on the other hand, for lack of a presently

existing Attlee-stage, must be analysed differently. The stage theorist might maintain that (1) is about a stage, and further that whichever Attlee-stage we choose, the claim will be true in virtue of that stage bearing the appropriate counterpart relations to other stages. The problem with this analysis is that there is nothing in (1), or in most tokens of (1), that will determine which stage we are making reference to here. This kind of indeterminacy may seem harmless, since (1) is true for *every* Attlee-stage we care to choose. Nevertheless, the game is to accommodate our semantic intuitions and on this picture the stage theorist will have to say that (1) is *about* Attlee at some particular age, at some particular spatial location. That is, that (1) is true in virtue of some one of:

1_1. The temporal part of Attlee at t_1 was prime minister

.

.

.

1_n. The temporal part of Attlee at t_n was prime minister

being true, where t_1 is the first moment of Attlee's existence, and t_n the last moment. A more general analysis of (1) would be highly desirable. This is the route that Sider takes:

> 'What we must do is interpret the sentence as a *de dicto* temporal claim. Syntactically, the sentence should be taken as the result of applying a sentential operator 'WAS' to the sentence '[Attlee] is [prime minister]; the resulting sentence means that at some point in the past, there is [an Attlee-stage] that is [prime minister]. This is somewhat like, and somewhat unlike, the claim that "once there were dinosaurs that roamed the earth". The

> latter is not about any particular dinosaurs, but is rather about the past generally. The former is like this in not being about any particular [Attlee-stage] but unlike it in not being a purely "qualitative" claim about the past, since the notion of a [Attlee-stage] may not be qualitative or descriptive.' [Sider, 1996, p. 28]

The stage-theorist must deal with (1) differently to (2) and (3). The worm-theorist, on the other hand, is able to offer a unified account of (1) to (3). (1) is a claim about a temporary property of the Attlee-worm, a worm located wholly in the past. (2) and (3) are claims about temporary properties of the Blair-worm, which is (partly) presently located. Each of these worms have their temporary properties derivatively. The truth conditions are as follows:

(1) is true at t_1 iff there is a part x of the Attlee-worm that is (a) located before t_1, and (b) x is prime minister.

(2) is true at t_1 iff there is a part x of the Blair-worm that is (a) located at t_1, and (b) x is prime minister.

(3) is true at t_1 iff there is a part x of the Blair-worm that is (a) located before t_1, and (b) x is leader of the opposition.

There is no need to interpret (1) as a *de dicto* claim because the *de re* analysis suffers from no indeterminacy for the worm theorist. (1) is about the Attlee-worm, even though it is true in virtue of the properties of parts of that worm, and there is no important indeterminacy of reference when we are talking of 'the Attlee-worm'. (1) is still *about* Attlee, even though it is made true by *parts* of Attlee. While the stage theorist flip flops

between a *de re* analysis of (2) and (3), and a *de dicto* analysis of (1)[35], the worm-theorist is able to give a unified analysis of (1) to (3). While this is certainly not a knockdown argument against stage theory, I think that it tends to show the worm-theorist's ability to offer a more cohesive semantic account of (1) to (3) than the stage-theorist, and this is modest, defeasible support for the worm theory.

4.3 The Ambiguity Theory

So much for the stage theory. I will assume that the consequence that, strictly speaking, an infinite number of people have existed, is sufficiently serious to turn us away from that theory. The ambiguity theory, on the other hand, says that the perdurantist's space-time worms satisfy sortal predicates, and also that instantaneous stages of those space-time worms satisfy the same predicates. Whether we are referring to worms or stages is determined somehow by context. For instance, it will usually be the case that in counting things falling under sortals, we are counting worms.

The strict ontological consequence of this claim is that parts of persons are persons, parts of cars are cars, and so on. I have no knockdown argument against this conclusion, and I suspect that there are philosophers who wouldn't find it particularly troubling[36], but I am inclined to think that no proper part of me is a person.

---

[35] Although I don't think it is a particularly pressing problem for the stage theorist, we should also note that he will sometimes be unaware or mistaken about the type of claim he is making. Suppose stage theorist *y* utters (3) at some point in the future, a few minutes after Blair has ceased to exist but before *y* has heard the news. *y* thinks that he has made a *de re* claim, but it is in fact *de dicto*.

[36] Perhaps if my argument below is correct, i.e. if it is true that the ambiguity theorist should deny that *being a person* is a real property, then this may not be so troubling. On the other hand, the denial that *being a person* is a real property would most plausibly be twinned with the claim that the satisfaction of the predicate 'being a person' is a matter of one's having appropriate other properties. The ambiguity theorist would then have to say that 'being a person' can be satisfied by possessing the sorts of properties that both

The ambiguity theory has additional metaphysical commitments. First, if the satisfiers of some sortal predicate '*F*' are both three- and four-dimensional objects, then there is no convincing reason to think that *F* is a real property. Second, I claim that if the four-dimensionalist is to avoid Peter Unger's [1980] problem of the many, then she will be forced to renounce, to some extent, her claim that time is fundamentally space-like.

If we know what non-sortal properties a thing has, then we are supposed to know what that thing is *like*. If we know what sortal property a thing has, then we know what that thing *is*. But on the ambiguity theory, knowing what a thing *is* isn't enough to know even how many dimensions it has. Moreover, if a three-dimensional stage and a four-dimensional worm can share a single property, there is a clear conflict with a plausible principle, which can be found in Armstrong [1978] and Shoemaker [1984] of the identity of properties. This principle essentially states that

> (PI) Two properties are identical if and only if they confer the same powers on their bearers.

So, if two things have, in any robust realist sense, the property *being a person*, then in virtue of bearing that property they should have the same causal powers. What sort of powers might the sortal realist suppose that *being a person* bestows upon its bearers? We might say that *being a person* endows its bearer with some particular set of persistence conditions, i.e. the ability to survive certain types of events while being destroyed by others. But some people, on the ambiguity theory, persist by virtue of being temporally extended, while others persist in virtue of bearing counterpart relations to appropriate instantaneous objects. So *being a person* doesn't appear to confer even the same

---

instantaneous stages and temporally extended space-time worms can share, and it is not clear to me that this consequence is much better than the claim that persons have persons as parts.

persistence conditions on its bearers. We surely don't want to say that there are two *different* properties, *being a person*$_W$ and *being a person*$_S$, which are had by worms and stages respectively, and it is no more attractive an option to suggest that *being a person* is a disjunctive property, which bestows one causal power *or* another on its bearers. But if we don't say either of these things, then *being a person* fails the Armstrong test of identity for properties, and its reality seems in doubt.

The property realist might deny the metaphysical significance of this claim, and reply that although she accepts the existence of some properties, satisfying a sortal predicate is really just a matter of having an appropriate combination of non-sortal properties. The idea is that *being a person* doesn't really endow the bearer with any causal powers. 'Person' is some kind of honorific bestowed because of the *other* properties and causal powers that one has. We might then say that stages are able to satisfy sortal predicates in virtue of some combination of non-sortal properties, and that worms satisfy the same sortal predicates in virtue of their *parts* having the exact same combinations of non-sortal properties. Perdurantists and stage theorists alike, on this picture, think that being a person involves the bearing of non-sortal properties by instantaneous stages. All that is at issue is what things in our ontology deserve the honorific, 'person', and this really is just a semantic issue. This seems like a valid response, and so I should define the target of my argument explicitly. The aim is to show that the ambiguity theory is incompatible with realism about sortal properties as properties which bestow distinctive causal powers on their bearers, causal powers which cannot be reduced to the bearing of other non-sortal properties. How serious a

metaphysical commitment this is can be debated, but I submit that it is a commitment that a semantic thesis about continuants should not have to bear.

So the ambiguity theorist seems pushed to reject realism about sortal properties. But she may also have to reject the space-time symmetry thesis which supports (MB) [For a defence of that thesis, see Sider, 2001*a*, sect. 4.5]. According to that thesis, space and time are similar in at least the following respects:

1. Contra presentism, all times are real. Similarly, places which aren't *here* are just as real as here.
2. Objects can be extended in both space and time.
3. The mereological part-whole relations applies to time as it does to space.

But consider the troubles posed by Peter Unger's 'problem of the many' [1980], and related problems of overpopulation. Unger's problem draws on the intuition that in the vicinity of, say, a cat, there are any number of atoms that are neither definitely a part of the cat, nor definitely not a part of the cat. So it seems that there are any number of fusions which have, intrinsically, everything it takes to be a cat. But since all these things have different parts, they are distinct. So in the vicinity of what we had taken as a single cat, there are actually *indefinitely many* cats. Similarly, take the particular cat *S*. At the periphery of *S*, there are any number of objects which are not clearly parts of *S* and not clearly not parts of *S*. Consider the thing that is *S* minus the last centimetre of her tail. *S-less*. From the assumption that *S* could survive the loss of the last centimetre of her tail,

we should conclude that *S-less* has, intrinsically, everything that it takes to be a cat. So we need to reconcile three facts:

(i) $S \neq S\text{-}less$

(ii) *S* has, intrinsically, everything that it takes to be a cat, as does *S-less*.

(iii) There is just one cat in the immediate vicinity of *S*.

There are apparently two options available to the four-dimensionalist who accepts mereological universalism (as most four-dimensionalists do). The first is suggested by David Lewis. While *S* and *S-less* are distinct, they are almost one in that they have most of their parts in common. They are two cats, but we count only one because they overlap almost in full. Clearly, this solution to the problem is ruled out by (CI). The alternative is to say that sortal properties are *maximal*, where maximality is defined by Sider as follows:

> A property, F, is *maximal* iff, roughly, large parts of an F are not themselves Fs. [Sider, 2001*b*.]

Of course, in the case of *S* and *S-less*, it is the large *spatial* parts of *S* that are not, themselves, cats. But given (3) above, that the part-whole relation applies to time as it does to space, the defender of maximality should also say that for all space-time worms *x* bearing the maximal sortal *F*, *temporal* parts of *x* cannot themselves bear *F*. But this is precisely what the ambiguity theorist is forced to deny. For her, every instantaneous stage of a space-time worm which qualifies as a person is itself a person. It seems that the four-dimensionalist, if she wants to maintain that there is just one cat in the immediate vicinity

of *S*, must say that *spatial* parts (large or otherwise) of cats cannot themselves be cats. But *temporal* parts of cats *can* be cats. So, contrary to (iii), there is an asymmetry in the part-whole relation as it applies to space and as it applies to time, and the space-time symmetry thesis must be qualified.

4.4 The Problem of Coincidence Again

It was claimed in section 3.2 that four-dimensionalism's facility in providing a solution to the problem of coincidence was a major reason to prefer it over three-dimensionalism. But there is another version of these puzzles which cannot be solved merely by an appeal to temporal parts, a version on which the apparently distinct objects overlap at every time they exist. Sider [2001*a*, section 5.8] claims that these problems support stage theory, but I will dispute that.

Suppose that at t_1 a lump of leg-shaped clay is fused with a lump of torso and head-shaped clay. So at t_1 a large lump of clay is brought into existence, along with a statue. Suppose further that at t_2 the larger lump and the statue are annihilated. The larger lump and the statue are coincident throughout their careers, and so no appeal can be made to the *partial* overlap of their space-time worms in distinguishing them, for their space-time worms *completely* overlap. Yet there is still some pressure to distinguish between the two entities. They have, for instance, different modal properties. Were we to squash the statue, presumably it would cease to exist. But were we to squash the lump, presumably it would survive. So the lump and the statue have different modal properties. They are, therefore, distinct entities and yet share all their temporal parts. At this point, a

number of options are available to the perdurantist. She might deny that these modal properties are real properties, and thus claim that there is no pressure to distinguish between the lump and the statue in the first place. A second option would be to embrace some sort of counterpart theory in order to distinguish between the lump and the statue. This is the option that I advocate[37]. I should note that, unlike many critics of stage theory, the central role of counterpart theory for the stage theorist has been no strike against that theory for me.

The solution is this: the lump and the statue are identical. They could not but be identical, since they share all their parts. Still, the differing modal properties of the lump and the statue must be accommodated somehow. The perdurantist accomplishes this by adopting a counterpart theory of modality *de re*, even though he unequivocally denies that a temporal version of counterpart theory is required. The lump-statue's lump-counterparts can survive a squashing, but the lump-statue's statue-counterparts cannot survive a squashing. So the lump-statue *qua* lump has one set of persistence conditions, and *qua* statue, quite another. The adoption of this counterpart-theoretic approach to modality *de re* doesn't force us to adopt a temporal counterpart theory. That much is not required, and leads us to the serious problems with counting mentioned above. The appeal to modal counterpart theory is not, of course, a flawless solution to the problem. The perdurantist does not claim that when we refer to the lump, we are referring to some modal fusion, and when we refer to the statue we are referring to quite another, and so the perdurantist does owe an account of why we say that the lump has one set of persistence conditions, and the statue another, but do not say that they are distinct. This seems like a brazen affront to Leibniz's law. So, the perdurantist must give some account, in general,

[37] My attention was drawn to it by an anonymous reviewer for *Philosophical Studies*.

of what it is to bear a modal property. And, of course, there is one available. The lump-statue, in and of itself, does not have the property *able to survive a squashing*. Rather, it bears that modal property in so far as it is appropriately related to its lump-counterparts. The things to which the lump-statue is lump-counterpart related are able to survive squashings. To that extent, the thing *qua* lump has the modal property *able to survive a squashing*. The things to which the lump-statue is statue-counterpart related are unable to survive squashings. So, *qua* statue, the lump-statue does not have *able to survive a squashing*. But there is no problem with Leibniz's law here, for we do not say that the lump-statue both has and fails to have *able to survive a squashing* simpliciter. There is no such property.

Theoretically expensive this new commitment to counterpart theory undoubtedly is, but I still think that perdurantism is to be preferred. It rightly avoids stage theory's troubles with counting, and says only what seems perfectly reasonable: two things which share all their parts in the actual world are not two things at all. They are one. Counterpart theory is a device to accommodate the apparently contradictory modal properties of the lump-statue.

5 Conclusion

I have argued that the shared metaphysical background underlying perdurantism, stage theory and the ambiguity theory is, if not clearly correct, at least motivated. I think that eternalism and four-dimensionalism are true, and I think that the weight of the arguments adduced in their favour should incline us to adopt their conjunction. Having, however

incompletely, established the background assumption of the three semantic theses in question, I have argued that the problem of counting is fatal to the stage theory, and that the ambiguity theory is a non-starter as a four-dimensionalist semantics. Perdurantism, on the other hand, is able to stave off a main challenge, that is, the argument from permanently co-located entities. It is the most adequate semantics for those accepting (MB).

References

Armstrong, D. [1978] *A Theory of Universals* (*Universals and Scientific Realism*, ii), Cambridge, Cambridge University Press.

[1997] *A World of States of Affairs*

Balashov, Y. [1999] 'Relativistic Objects', *Nous*, 33, pp. 644-62.

[2000] 'Enduring and Perduring Objects in Minkowski Space-Time', *Philosophical Studies*, 99, pp. 129-66.

[2005]

Bigelow, J. [1996] 'Presentism and Properties', in James E. Tomberlin, ed., *Philosophical Perspectives*, 10, *Metaphysics*, Cambridge, Mass. Blackwell, p. 35-52.

Hawley, K. [2001] *How Things Persist,* Oxford, Clarendon Press.

Hudson, H. [2001] *A Materialist Metaphysics of the Human Person,* Ithaca, Cornell University Press.

Johnston, M. [1987] 'Is there a Problem about Persistence?' *Aristotelian Society*, suppl. Vol. 61, p. 107-35.

Lewis, D. [1968] 'Counterpart Theory and Quantified Modal Logic', *Journal of Philosophy*, 65, p. 113-126.

[1986] *On the Plurality of Worlds*

[1992] 'Review of D.M. Armstrong, *A Combinatorial Theory of Possibility*,' *Australasian Journal of Philosophy*, 70, p. 211-24.

Markosian, [1998] 'Brutal Composition', *Philosophical Studies* 92, pp. 211-249.

[2004]

McTaggart, J.M.E. [1908] 'The Unreality of Time', *Mind* 18, 457-84.

Mellor, D.H. [1998] *Real Time II*, London, Routledge.

Merricks, T. [1994] 'Endurance and Indiscernibility', *Journal of Philosophy*, 91, pp. 165-84

[1999] 'Persistence, Parts and Presentism', *Nous*, 33, pp. 421-38.

[2001] *Objects and Persons*, Oxford, Clarendon Press.

Putnam, H. [1987] *The Many Faces of Realism*, La Salle, Ill. Open Court.

Quine, W.V.O. [1976] 'Whither Physical Objects', in R.S. Cohen, P.K. Feyerabend, and M.W. Wartofsky, eds. *Essays in Memory of Imre Lakatos*, Dordrecht, Reidel Publishing Company.

Russell, B. [1903] *The Principles of Mathematics*, Cambridge, Cambridge University Press.

[1914] *Our Knowledge of the External World*, London, Allen & Unwin Ltd.

Saunders, S. [2002] 'How Relativity Contradicts Presentism', in *Time, Reality, and Experience,*, ed. C. Callender, Cambridge University Press.

Shoemaker, S. [1984] *Identity, Cause, and Mind*, Cambridge, Cambridge University Press.

Sider, T. [1996] 'All the World's s Stage', *Australasian Journal of Philosophy*, 74, p. 433-53.

[1997] 'Four-Dimensionalism', *Philosophical Review*, 106, p. 197-231.

[2001*a*] *Four-Dimensionalism,* Oxford, Oxford University Press.

[2001*b*] 'Maximality and Intrinsic Properties', *Philosophy and Phenomenological Research*, 63, p.357-364.

Unger, P. [1980] ‘The Problem of the Many’, in P. French, T. Uehling, and H. Wettstein, eds., *Midwest Studies in Philosophy*, v. Minneapolis, University of Minnesota Press.

van Inwagen, P. [1990] *Material Beings*, Ithaca, NY. Cornell University Press.

Zimmerman, D. [1996] ‘Persistence and Presentism’, *Philosophical Papers*, 25, pp. 115-26.

[1998] ‘Temporal Parts and Supervenient Causation: The Incompatibility of Two Humean Doctrines’, *Australasian Journal of Philosophy*, 76, pp. 265-88.