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## ENDURANTISM AND PERDURANTISM

### 1. INTRODUCTION

#### 1.1 Terms of Art

If you do not know what ‘perdure’ or ‘endure’ mean then do not worry, you’re in good company. Even amongst contemporary metaphysicians, there is a great deal of dissent when what agreeing these terms mean. This chapter does not seek to resolve which is the ‘correct’ definition (indeed, when it comes to terms of art it is wrong-headed to think there is a correct usage [cf Hawthorne 2006: 85]). What it does do is lay out three different ways of understanding what ‘perdurance’ and ‘endurance’ have been taken to mean. The populationist says that the difference between the two is over what objects there are. The dimensionalist says that the difference is over how many dimensions the object is extended in. Finally, the occupationalist thinks the difference concerns how objects are related to regions of spacetime. We’ll then turn to the arguments for the populationist versions of the theories, before turning to arguments for the dimensionalist and occupationalist portrayals. Whilst I survey fewer arguments in the case of the latter two, this is because many of the arguments for the populationist versions do double duty e.g. an argument for the populationist version of perdurantism doubling as an argument for the dimensionalist version. This isn’t surprising, for that these arguments can be shared, and that the positions are very similar, is what has resulted in the confusion over what ‘perdure’ and ‘endure’ mean. Finally, having made clear the different ways to understand the terms, and surveyed the arguments for the various positions, I end with some concluding thoughts and a brief sketch of some more ways of defining the terms.

#### 1.2 A rough (and misleading) sketch of persistence

Before we begin a rough sketch for the neonate is in order. Objects are extended over regions of space and have spatial parts (a car has wheels; my body has a hand; a cup has a handle). Caricature perdurantists think objects are both stretched out in time (i.e. are four-dimensional) and have parts analogous to spatial parts – temporal parts. So I have a 1979

temporal part of me, which is all of me from my birth to the end of 1979; a 1980 temporal part of me; a 1981 temporal part of me etc. Should I live to be a hundred, I would be composed of a hundred such year-long temporal parts. Nor need they be a year-long, for temporal parts can be finer grained. If I perdure I have day long temporal parts; minute long temporal parts; instantaneous temporal parts etc.

The caricature endurantist denies just that. We are three-dimensional objects that move through time rather than simply occupying it in a way analogous to how spatially extended objects occupy the regions that they do. Objects have no temporal parts, instead being wholly present at every instant at which they exist (that is, whenever you find the object you find the entire object and all of its parts).

This traditional view of endurance/perdurance is crude at best, and at worst portions have been thought to be unintelligible gibberish. For instance, everyday mereological relations are temporally relativised (my car has a wheel at a certain time, I have my hand as a part right now etc.). But the caricature perdurantist says that there is an atemporal parthood relation, which temporal parts stand in to their respective wholes (so I just have my temporal parts as parts simpliciter, with no temporal qualification). Not everyone understood this ‘atemporal parthood’, nor did everyone understand what a temporal part was meant to be. So the caricature perdurantist had a problem even making themselves understood [Chisholm 1976: 143; Geach 1972: 311; van Inwagen 1981: 133].

Similar problems plague the endurantist. If perduring objects do not ‘move’ through time whereas endurers do,<sup>1</sup> then we might wonder what this ‘moving’ amounts to [Sider 2001: 54; see also Gilmore 2006: 205-6]. Or we might take issue with understanding ‘wholly present’, fearing that we cannot define that term such that everyday objects meet it, whilst simultaneously ensuring that perduring objects do not [Sider 2001: 63-8; Carrara 2005; Crisp and Smith 2005; Hughes 2005]. That is why the rough sketch of persistence has been clarified over the years, albeit in different, competing, ways.

### 1.3 Temporal Parts

One such clarified term is ‘temporal part’.<sup>2</sup> The most popular definition currently used is Sider’s<sup>3</sup>. Taking seriously the fear that ‘atemporal parthood’ might be unintelligible, Sider gives his definition in terms of temporally relativised mereology [2001: 53-62]:

$\underline{x}$  is a temporal part of  $\underline{y}$  during interval  $\underline{T}$  =<sub>df</sub> (i)  $\underline{x}$  is a part of  $\underline{y}$  at every moment during  $\underline{T}$ ; (ii)  $\underline{x}$  exists during, but only during,  $\underline{T}$ ; and (iii) for any sub-interval  $\underline{t}$  of  $\underline{T}$ ,  $\underline{x}$  overlaps every part of  $\underline{y}$  at  $\underline{t}$ .

So an instantaneous temporal part, the most commonly discussed type of temporal part, would be a temporal part of something that existed at but one instant. Given the definition uses the readily intelligible relations of temporally relativised mereology, everyone should admit that they can understand what it means. Further, as §2.2 explains, everyone can say the existence of such things is contentious, therefore worthy of a rigorous philosophical examination. For the rest of this chapter I'll stick to using Sider's definition, concentrating instead on the variation between the definitions of the theories of persistence.<sup>4</sup>

## 2. POPULATIONISM

### 2.1 Populationist Definitions

The most popular implicit understanding of perdurantism is as a commitment to things having temporal parts (and, interestingly, the first recognised perdurantist – 18<sup>th</sup> century philosopher Jonathan Edwards – seems to have endorsed just this style of definition [see Helm 1979]). Endurantism, then, would be the denial that things have temporal parts (although some demur, thinking that endurantism must make some specific positive claims rather than simply a negative denial [Miller 2005b: 314; Sider 2001: 53-73]). Call this position populationism, and let the populationist definitions be:

Perdurantism<sub>p</sub>: All objects have an instantaneous temporal part at every instant that they exist at.

Endurantism<sub>p</sub>: Perdurantism<sub>p</sub> is false.<sup>5</sup>

Populationists think the persistence debate concerns what material objects exist i.e. what the population of the world is. Both endurantist<sub>p</sub> and perdurantist<sub>p</sub> may agree there are, say, cars, but they disagree over whether there are in addition lots of instantaneous temporal parts of cars. The vast bulk of the extant arguments for, and against, perdurantism concentrate on a populationist reading: offering arguments for, and against, the existence of such instantaneous temporal parts.

## 2.2 Against Perdurantism<sub>p</sub>

The arguments for perdurantism dwarf the arguments for endurantism. Most endurantists instead rest content with believing perdurantism to be counterintuitive, offering no benefits to outweigh such counterintuitions, and thus it is false and endurantism is true. Their first claim, that perdurantism is counterintuitive, proves tricky if we are dimensionalists or occupationalists. Both of those positions make perdurantism a thesis concerning what spacetime regions an object is exactly located at. But, given that the notion of spacetime is a technical one, it would be tricky to say we have strong intuitions about the location of objects within it.

The counterintuitiveness of endurantism is, however, more straightforward given populationism. For perdurantists<sub>p</sub> there are scads of extra objects in the universe. God could never just create a tree in the quad; God must create a tree plus an infinite number of instantaneous temporal parts. Such objects, says the endurantist<sub>p</sub>, don't exist according to our folk ontological beliefs: either they say we don't perceive such temporal parts when we observe objects persisting [Gibson and Pooley 2006: 158] or that it just seems weird that an infinite number of instantaneous objects keep appearing ex nihilo and then vanishing again [see Thomson 1983: 213; Sider 2001: 216-8 for discussion]. So there appears to be a prima facie case for them being strange entities.<sup>6</sup> Populationism, then, gives us a good reason for thinking that perdurantism<sub>p</sub> comes with costs (and endurantism<sub>p</sub> is the default option). Not that these are the only costs one might think perdurantism<sub>p</sub> incurs, but it will suffice for now to fixate on this objection.<sup>7</sup> Note that being the default option doesn't mean endurantism<sub>p</sub> is true – a lot of good philosophy is, after all, about demonstrating that such default positions are false. Perdurantism<sub>p</sub> might provide excellent theoretical benefits to outweigh these costs, or there might be some other compelling line of reasoning to think perdurantism<sub>p</sub> is true. Hence the endurantist<sub>p</sub>'s commonly accepted obligation to undermine such arguments and defray such alleged benefits of perdurantism<sub>p</sub>. With that in mind, let's turn to motivations perdurantists<sub>p</sub> advance in favour of their enterprise.

## 2.3 The Analogy With Space

The exposition from §1.2 relied upon analogies with space to explain the position of the caricature perdurantist. Not only is this an illustrative device, but this supposed analogy between space and time has also been a motivation for supporting perdurantism<sub>p</sub> [Hofweber 2009: 305-6; Taylor 1955: esp. 600; Williams 1951: 463; for discussion see Rea 1998 and Sider 2001: 87-92]. The argument has two premises

Premise one: If an object exactly occupies (spatial) region R then, for every sub-region of R, the object has a part that exactly occupies that sub-region.

Premise two: Space and time are analogous, in particular the temporal analogue of premise one is true.

So we get:

Doctrine of Arbitrary Temporal Parts (DATP): If x persists through interval T then x has a temporal part that exists during T. [cf van Inwagen 1981: 133]

DATP clearly entails that things have temporal parts, and we have an argument for perdurantism<sub>p</sub>. Both premises come under fire. The first premise has problems if extended simples can exist i.e. objects that exactly occupy an extended region but have no proper parts (Bigelow [1995: 21-7], Markosian [1998] McDaniel [2007] and Simons [2004] are just some who subscribe to such a possibility). The second premise comes under pressure because of the fear that space and time aren't analogous. For instance, that time is disanalogous from space in the sense that things have spatial, but not temporal, parts is exactly what the endurantist<sub>p</sub> endorses in the first place. So the perdurantist<sub>p</sub> has quite a task to motivate the analogy in a way that will be compelling to the unbelieving endurantist<sub>p</sub>. Nor need the endurantist<sub>p</sub> rely solely on a brute intuition that space and time are disanalogous in that manner. They might offer positive reasons for thinking there is such a disanalogy, say by endorsing presentism (the thesis that only the present exists). In that case, the allegation goes, objects could not be extended in time for there are not times to be extended over. Similarly, they cannot have temporal parts at other times, because nothing exists at other times (so the temporal parts wouldn't exist either). See Carter and Hestevold [1994, 2002] and Merricks [1995, 1999] for more on the connections between the ontology of time and persistence (and Brogaard [2000], Haslanger [2003: 320-26],

Lombard [1999], Lowe [1998], Rea [1998: 236-40]; Sider [2001: 68-73], and Vallicella [2002] for discussion).

#### 2.4 Properties: The Semantic Issues

Perdurantism was traditionally part of a package deal, alongside eternalism (the thesis that every time exists) and the B-theory of time. B-theory holds that the world is fundamentally tenseless (that is, the only fundamental temporal relations are tenseless relations such as ‘earlier than’, ‘later than’ and ‘simultaneous with’). It is to be contrasted with A-theory: that the fundamental temporal properties are tensed (e.g. ‘is past’, ‘is present’ and ‘is future’). Rightly or wrongly, the debate over which theory is true historically centred on whether tensed statements could be translated into tenseless statements without loss of meaning. Many (again, rightly or wrongly) have taken the answer to this debate about meaning to inform the metaphysical debate about tense: if such translations can be offered then the world is fundamentally tenseless, and if not then it is fundamentally tensed.<sup>8</sup>

As part of this enterprise, perdurantism gets conscripted in [Parsons 2005: 1; Quine 1960: 170ff inter alia]. The general analysis is:

Perdurantist Analysis of Temporary Predication (PATP):  $x$  is F at  $t$  =<sub>df</sub>  $x$ 's instantaneous temporal part at  $t$  is F.

So:

‘Right now, the cup of coffee is hot’

can be translated as:

‘There is a time  $t$ ;  $t$  is simultaneous with this utterance; and the instantaneous temporal part of the cup of coffee at  $t$  is hot’

Clearly PATP entails perdurantism<sub>P</sub>. However, it looks like PATP is unnecessary to get the desired tenseless translations [Butterfield 1985; Gallois 1998: 264-5; Sider 2001: 76-8]. We could just have had

‘There is a time  $t$ ;  $t$  is simultaneous with this utterance; and the cup of coffee is hot at  $t$ ’.

There are no fundamentally tensed predicates involved in that sentence either, but also no mention of temporal parts. So the B-theorist can do without perdurantism<sub>P</sub> and this line of argument appears to be fruitless (see also Kroon [2001] who replaces the perdurantist semantics with a fictionalist treatment). Nonetheless, it is worth mentioning as many perdurantists<sub>P</sub> believe that, once you accept perdurantism<sub>P</sub>, you should endorse PATP anyhow.

### 2.5: Properties: Sortals and Stage Theory

This common endorsement of PATP causes further problems. For instance, given mereological universalism (the thesis that for any ys the ys compose a further object) there will be an object composed of all of the temporal parts of Pavarotti until New Year's Eve 1999, as well as the temporal parts of some turnip from that point forth. That weird, gerry-mandered, object is such that, given PATP, it is (at some time) a tenor and (at another, later, time) a turnip. But no turnip has ever been a famous tenor, so PATP must be false [Braddon-Mitchell and Miller 2006; Parsons 2005; Varzi 2003 for discussion].<sup>9</sup>

There are a few ways to rescue PATP. One rejoinder is to say that PATP doesn't apply to sortal predicates (etc.). Instead, an object falls under a given sortal at a given time not by having a temporal part at that time that falls under it, but by the object simply falling under the sortal atemporally. So my temporal parts aren't human, although the object composed of my temporal parts (i.e. me) is a human simpliciter. It's true that I am a human at a given time solely because I am human simpliciter, pace PATP. So we can avoid the problem if we build exceptions for sortal predicates (etc.) into PATP.

However this does give rise to a new problem. In cases of fission, where one cell splits into two, the perdurantist<sub>P</sub> will say that before fission occurs the two post-fission cells are sharing temporal parts at those pre-fission times. But if the cells are the four-dimensional objects composed out of the temporal parts then, before fission takes place, there are two cells present. Compare to a spatial analogy: imagine two conjoined twins. At the location where they are conjoined (say, where their conjoined arms are located) there are two people present there. Similarly, when the cells are sharing temporal parts before fission takes place, both of them are present. Yet it seems wrong to think that two cells exist

before fission takes place, or that the number of objects present at any given time depends on what goes on in the future (for if fission did not occur, there would be but one cell).<sup>10</sup>

It's at this juncture that perdurantism breeds a cousin: stage theory (sometimes called 'exdurantism') [Hawley 2001; Sider 2001]. Stage theorists accept the ontology that perdurantists<sub>p</sub> believe in, but identify everyday things with the instantaneous objects not the four-dimensional wholes composed out of them. If everyday objects are the instantaneous things then, in the pre-fission scenario, we are looking at just the one instantaneous thing (which is a cell). Ergo, unlike before, we are looking at just one cell, not two. That's the upside; the downside is that objects now seem to only exist for an instant, which isn't right at all. Here stage theorists make a move analogous to Lewis's move for talking about objects existing at different possible worlds [cf Lewis 1986: 192-263]. For Lewis, things only exist at one possible world. But facts about what could be the case are true in virtue of those things having (numerically distinct) counterparts at other worlds. Similarly, the stage theorist says that while the cell might not exist at other times, it did or will exist at other times in virtue of standing in counterpart relations to (numerically distinct) cells that exist at those times.

Just as there are problems with defining perdurantism and endurantism, there are problems with defining stage theory. For instance, Hawley sets up the difference as whether or not the sortal terms apply to the temporal parts (in which case stage theory is true), or to those things composed of them (in which case, standard perdurantism is true). But some perdurantists do think the sortal terms apply to the parts [Noonan 1985; Wasserman 2003b], and instead opt for some other way out of the problems posed above. So we might instead define stage theory in terms of what it is in virtue of which de re temporal predications are made: the perdurantist saying it is in virtue of having an instantaneous temporal part at t that an object was/will be F at t, whereas the stage theorist says it is in virtue of being counterpart related to an F-thing that exists at t.<sup>11</sup>

Whatever the merits of stage theory, I shall press on only with standard perdurantism in mind. The reader will be left to her own devices to determine what stage theorists should say about issues raised in the rest of this chapter.

## 2.6 Properties: The Metaphysical Issues



In addition to the semantic issues concerning properties, there are also metaphysical concerns. There are a few problems in this area [see Wasserman 2006] but here I'll concentrate just on the problem of temporary intrinsics. Imagine there is a man who is sitting in the morning, whilst in the afternoon he is standing. So he is sitting, and he is standing – which is a contradiction [Lewis 1986: 202-4]. The challenge then is to give an explanation which dissolves the alleged contradiction (although see Hansson Wahlberg [2007, 2010] who argues that there is no contradiction to be dissolved). Not everyone takes this challenge seriously, saying it can be solved trivially by merely talking about the man sitting at one time and standing at a totally different time [Hofweber 2009]. I don't think we should underplay such moves, but as more ink has been spilt on the side of those who do take the problem seriously, I shall press on.

The perdurantist<sub>P</sub> tale is to endorse a metaphysical analogue of PATP: that an object is F at a certain time in virtue of its instantaneous temporal part at that time being F. So the man sits at one time in virtue of his temporal part at that time sitting, and stands at another time in virtue of his temporal part, at a totally different time, standing. There is no contradiction anymore than one spatial part of me being one way (e.g. my hand having five fingers) and another part being another way (e.g. my head not having five fingers). The problem, then, is avoided – although not everyone is happy with this. Some worry that now the objects themselves aren't sitting or standing, only parts of them are [Sider 2001: 92-98; also Olson 2007: 102-6, 122-5]; others are worried that there are similar problems of change that can't be answered using temporal parts [Egan 2004].

Those endurantist<sub>P</sub> who take the problem seriously have a variety of options. One standard move is to say that properties like sitting and standing are in fact relations [Mellor 1981; van Inwagen 1990b]. So the man is 'sitting related' to one time, and 'standing related' to a different time. This is no more a contradiction than, say, the fact that I stand in the 'brother of' relation to one man, but not to another. But, so goes one reading of Lewis's rejection of this option, if we know anything we know that properties like sitting aren't relations. An alternative reading of Lewis's problem is that this makes sitting, an intrinsic property, into something extrinsic for it now depends on the existence of other things (i.e. times). Exactly what Lewis's problem was, and whether it does

indeed turn out to be problematic, is still an open question [Wasserman 2003a; also see Rodriguez-Pereya 2003 and Stone 2003 for different problems with the relationist view]. There are alternatives to this relationist approach. We could take properties to be time-indexed (so there is the property of sitting-at-10am-on-June-16<sup>th</sup>-2010 rather than sitting). Alternatively, just as there are different ways to scream – e.g. loudly or ferociously – we might say that there are different ‘timely’ ways to instantiate a property. We can instantiate sitting in a ‘10am-ly’ way and standing in a ‘11am-ly’ way [Haslanger 1989; Johnston 1987; Rea 1998: 240-46]. Or there are even stranger variations where we think objects are relations between times and properties (or times are relations between properties and objects) [MacBride 2001]. These approaches are, for better or worse, riffs on the relationist approach, but there are some quite different moves. We might endorse presentism, for as the present moment moves on the state of affairs of the man sitting ceases to exist, and we then have an explanation of why the proposition that he sits and the proposition that he stands are not both true [Hinchcliff 1996; Merricks 1994; Zimmerman 1998]. Or we might think there are ‘distributional properties’ [Parsons 2004], or resolve it by invoking momentary tropes [Ehring 1997]. In each case, of course, the perdurantist<sub>p</sub> will make the same move as above, accusing the endurantist<sub>p</sub> of having mangled our common sense conception of properties in the process, thus incurring a cost that perdurantism<sub>p</sub> manages to avoid (and the endurantist<sub>p</sub> will demur, or alternatively argue that the costs are, on reflection, worth it).<sup>12</sup>

## 2.7 Humean Supervenience

Lewis has another argument for perdurantism<sub>p</sub> [Lewis 1983: 76-7; see also Noonan 2001]. It relies on the following principles:

Supervenience Thesis: If two worlds are identical with regards to all local matters of fact then they are identical with regards to all other qualities.<sup>13</sup>

Recombination Thesis: If x happens intrinsically at one region and y happens intrinsically at another distinct region (where ‘happens intrinsically’ means that its happening doesn’t depend upon things that take place outside the region) then there are worlds at which any combination of x and y occur.

Lewis then says that it is possible for there to exist objects which are qualitatively identical to what would be my temporal part at this instant if I had one. That is, given I exist at  $t$  and have certain intrinsic properties at  $t$ , it's possible for there to be someone who pops into existence at  $t$  and who has exactly the same intrinsic properties I have at  $t$ , but exists for but one instant. This possibility applies mutatis mutandis to everyone and everything, and given the recombination thesis there is therefore a world,  $w$ , at which, for every instant at that world, there exist qualitative duplicates of what would be the instantaneous temporal parts of things at this world were such things to exist. Intuitively, even the endurantist can agree with that: there could be a world which contained scads of objects being brought into existence and then instantly annihilated by some evil demon, where each object was qualitatively identical to an object at the actual world at the corresponding time that it existed at. But  $w$  would be identical to our world with regards to the local matters of fact, and so given the Supervenience Thesis the actual world and  $w$  are qualitatively identical in all regards. So temporal parts actually exist.

Pressure has been applied to the principle of supervenience [Wasserman, Hawthorne and Scala 2004: 309-17], as well as its application, with worries that there is no non-question begging reason to believe that a world of perdurers is qualitatively locally identical to a world of endurers [Gallois 1998: 265-7; Haslanger 1994; Rea 1998: 246-51]. The principle of recombination has also come under fire [Noonan 2003; Wasserman, Hawthorne and Scala 2004: 303-9], on the understanding that the endurantist is unlikely to endorse it.

## 2.8 Cultural Prejudice

The Trobriand islands are full of yams, although the Trobriander people do not believe yams exist. Instead they believe 'taytu' and 'yowanna' exist. A 'taytu' corresponds to what we think of as an unripened yam, whereas a 'yowanna' corresponds to what we think of as a ripened yam. [Lee 1950: 91]. However, where we think a ripened yam is numerically identical to some unripened yam, the Trobriander people believe that the taytu and yowanna are numerically distinct. So our cultures disagree over what objects exist (we say yams do, they say they don't; we say taytu and yowanna don't exist, they say they do).

If there's no principled method to discover which culture is correct, we have a problem, and at first blush that seems to be the case. If we turn to physics, there is no magical 'yam particle' which stays with the yam throughout the ripening process, nor some 'taytu particle' that departs. If we turn to botany, then whilst botanists may talk about yams, that's only because they're influenced by Western culture. Had things played out differently and it had been the Trobriander people running universities across the world, we would instead be looking askance at any botanist who didn't know what a taytu or a yowanna was. If this thinking is right then it'd be sheer prejudice to think one culture is correct and the other false. Thus we should – so runs the argument from cultural prejudice – believe that either both are right or both are wrong.

The yam case is just a placeholder for all kinds of examples along these lines [see Korman 2010: 121n6 for a roster], and we can imagine more exotic cultures that thought that, for any filled spacetime region, there was an object that exactly occupied that region. The same reasoning holds for these exotic cultures: so either every filled spatiotemporal region is exactly occupied by an object, or none are. As it's weird to say none are so occupied (how can they be filled if there is no object there to fill it?), we should say they all are. If every filled spacetime region contains an object, clearly any sub-region an object occupies must contain an object, which entails DATP (a fortiori perdurantism<sub>p</sub>) [see Sider 2008: 257-61 for one version of the argument; see Effingham Forthcoming<sub>a</sub> and Korman 2010 for discussion].

## 2.9 Vagueness

Sider [2001: 120-39; 2008: 257-61] extends Lewis's argument from vagueness for mereological universalism [Lewis 1986: 212-3] into an argument for perdurantism.<sup>14</sup> Take the following scenario. We make a teddy bear in a factory, and then feed it into a wood chipper. We take snapshots of the process with a camera that captures a picture every billionth of a nanosecond. In some snapshots it is definitely the case that the teddy bear is intact (e.g. a minute before we pass it through the whirling blades of the chipper) and other snapshots definitely depict cases where the teddy has ceased to be (e.g. as all of the fluffy body of the bear has passed through the chipper, leaving only a pile of tatters

and stuffing). In between there are cases where it is vague whether the teddy bear has been destroyed or not.

Sider thinks this scenario entails perdurantism<sub>P</sub> because he accepts a semantic theory of vagueness: that vagueness is a matter of language, not of the world. For instance, a man might be n centimetres in height, where being n centimetres in height qualifies for being ‘vaguely tall’. On this view, that vagueness is a result of our linguistic community failing to have a consensus that being n centimetres in height makes you tall (although we do have a consensus that, say, a man 120cm in height is definitely not tall whereas someone 187cm in height definitely is). So the sentence being vague is because of facts about language, not the world itself. One motivation for thinking this is that it is somewhat reprehensible to think that the world itself could be vague (when it comes to existence, at least), for the vaguely existing objects would have to hover in some shadowy realm between existence and non-existence. This is, allegedly, conceptually impossible: existing seems to be the kind of thing that an object either does or does not do – you’re either in, or you’re out.

So if vagueness is semantic, then in those situations where we want to say it’s vague whether the teddy bear exists this isn’t because there are vague objects, but because it is vague which objects our words refer to. Perdurantism<sub>P</sub> (combined with mereological universalism) allows us to say just that. Given perdurantism<sub>P</sub> each snapshot depicts an instantaneous object that exists at some given time. Given mereological universalism, any set of photos we select depicts a set of instantaneous temporal parts that all belong to some object. At some instant t it is vague whether the bear exists, and this vagueness is a result of our linguistic community never having settled whether ‘the teddy bear’ refers to an object composed of temporal parts that doesn’t include the instantaneous object depicted in the snapshot taken at t, or whether it does. Both those objects definitely exist (so the world isn’t vague), but we just haven’t settled which object ‘the teddy bear’ refers to (so language is the source of vagueness). Thus, says Sider, to save the idea of vagueness being a semantic phenomenon, we must endorse perdurantism<sub>P</sub> (plus universalism).

As noted above, the vagueness argument for perdurantism<sub>p</sub> is very similar to the vagueness argument for universalism, so attacks on the latter often work as attacks on the former. For instance, some deny that vagueness is semantic, saying that the world itself can be vague [see e.g. Barnes Forthcoming; van Inwagen 1990a: 213ff]. Others argue that we are too quick to suppose that there are cases of vague composition [Merricks 2005 (for discussion see Barnes 2007); also see Nolan 2006], and perhaps there are sharp cut-off points in the series of when things compose (so the bear always goes from definitely composing to definitely not) [Hudson 2000; Markosian 2004]; amongst others [e.g. Cameron 2007: 115-6; Effingham Forthcoming<sub>c</sub>]. Other rejoinders specifically target the argument for perdurantism<sub>p</sub>. For instance, Balashov [2005b] argues, in a similar vein to Thomson's objection from §2.2, that the vagueness argument carries a burdensome commitment to objects that appear *ex nihilo* contrary to the laws of physics. Indeed, there is a small cottage industry of papers arguing against Sider's argument [Gallois 2004; Varzi 2005; see also Sider 2004 for a response to some of the above].

One popular approach for avoiding the problem bears mentioning. Some believe that the endurantist can say exactly what the perdurantist says: that there are scads of objects that exist, exactly as many as the perdurantist says exists, but that these objects endure instead of perish [Haslanger 1994: 354-6; Koslicki 2003; Lowe 2005; Mackie 2008: 761-2; Miller 2005<sub>c</sub>; Steen Forthcoming; see Varzi 2007 and Correia 2005 for discussion]. Call this position promiscuous endurantism given that it populates our ontology so promiscuously. Promiscuous endurantism is one of the theoretical positions that highlights so vividly the lack of consensus concerning what the terms of art mean. If one is a populationist then promiscuous endurantism makes no sense – to be promiscuous is what it is to be a perdurantist<sub>p</sub> [cf Effingham 2009a: 302; Olson 2006a: 744-5]. Sider, an explicit perdurantist<sub>p</sub>, will therefore be unfazed by enduring promiscuity – such endurantists simply agree with him and label themselves differently. Equally, though, it works the other way. If one endorses a different set of definitions then the argument from vagueness won't turn out to be an argument for a different version of perdurantism (but then it was never meant to be).

## 2.10 Material Constitution

Perdurantism<sub>P</sub> offers one of the more popular solutions to the problem of material constitution (although see Benovsky [2009: 60-2], McGrath [2007a], Steen [Forthcoming], and Wassermann [2002] for a variety of response that is becoming increasingly more standard). However, as there is another chapter in this volume dedicated to material constitution, I shall say no more about it here.

### 2.11 Supersubstantivalism

Supersubstantivalists believe that objects are numerically identical to the regions of spacetime that they exactly occupy – that we are, literally, made of spacetime. Various arguments for supersubstantivalism have been proposed [see Schaffer 2009; Effingham 2009b: 42 also lists more supporters]. The argument goes that as spacetime has temporal parts, and so perdure<sub>SP</sub>, if supersubstantivalism is true then so too must objects perdure<sub>P</sub>. There hasn't been much discussion of this argument, for supersubstantivalism isn't overwhelmingly popular, however one response comes from Nolan. The supersubstantivalist probably won't take every region to be an object – instead, certain regions will be objects. So persisting objects will have regions as temporal parts, but might not have regions which are objects as temporal parts. Now we have a supersubstantivalist ontology where there aren't scads of instantaneous objects (although there are scads of instantaneous regions – but surely even the endurantist believes in them?). That, says Nolan, seems to be very against the spirit of perdurance<sub>P</sub> [Nolan Forthcoming]. Notably, in this ontology things needn't perdure<sub>P</sub> but they are extended in time and are thus four-dimensional. So it seems that having temporal parts is not inimically tied up with being a four-dimensional object. With that in mind, move to the next way to define the terms of art.

## 3. DIMENSIONALISM

### 3.1 Dimensionalist definitions

The most popular explicit understanding of perdurantism is as a commitment to things being four-dimensional (that is, extended in time), and endurantism as a commitment to things being three-dimensional (that is, not extended in time).<sup>15</sup> Call such people dimensionalists:

Endurantism<sub>D</sub>: All objects are three-dimensional.

Perdurantism<sub>D</sub>: All objects are four-dimensional.

Whilst dimensionalism is the traditional understanding of the theories of persistence, it is somewhat incongruous with the bulk of the debate. Only rarely are arguments advanced specifically for objects being three- or four-dimensional, more often aiming instead at the populationist reading of terms. Though this isn't to say the two positions are worlds apart. For instance, look back at the analogical argument (§2.2). That argues for both varieties of perdurantism. First, it argues that objects are extended in time (e.g. perdurantism<sub>D</sub> is true) and then that DATP is true and they have temporal parts (e.g. perdurantism<sub>P</sub> is true). So historically the dimensionalist and populationist readings of the terms have been tightly knit.

Nor is that the only overlap. It's not an uncommon assumption that anything that has temporal parts, in having bits at different times, must be extended over time (and anything that lacks them is three-dimensional). Given such assumptions, any argument for perdurantism<sub>P</sub>/endurantism<sub>P</sub> is an argument for perdurantism<sub>D</sub>/endurantism<sub>D</sub>. If we believe the assumption is often an unnoticed suppressed premise, this also explains why people are often unclear whether they are dimensionalists or populationists, for the two positions would then amount to the same thing.

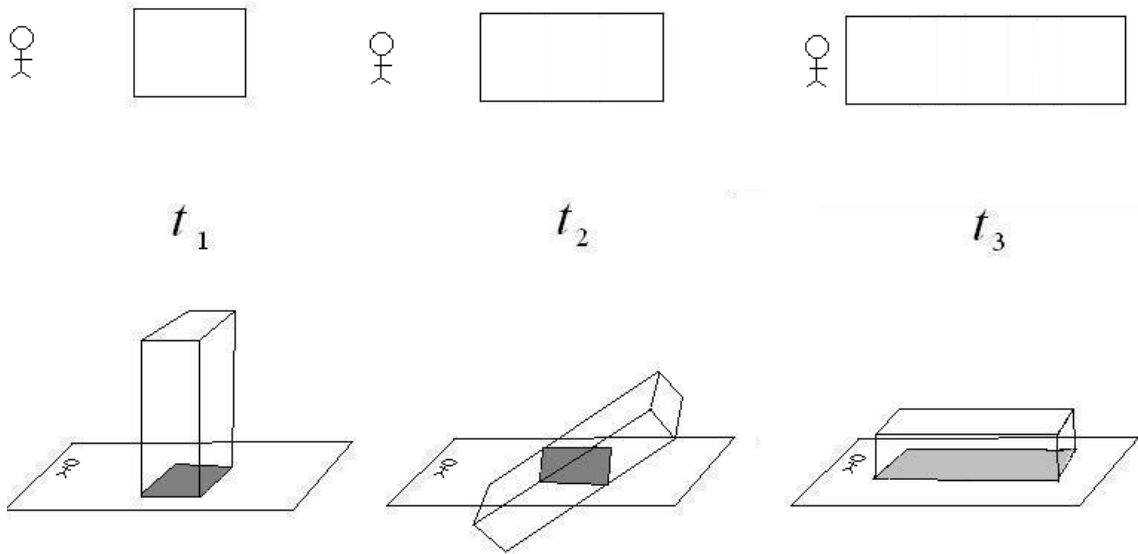
But the assumption isn't mandatory so they can come apart. We've already seen this with Nolan's theory where objects perdure<sub>D</sub> but do not perdure<sub>P</sub> (Parsons says the same – see below). Or another case. We could imagine a man (composed of temporal parts) who lives for 70 years, but time travels back in his own life time so he lives out two sets of 35 years concurrently. Imagine another man who is a qualitative duplicate (and so is also composed of temporal parts), but who time travels back three times and lives out three sets of  $23\frac{1}{3}$  years concurrently. And another who travels back four times and lives out four sets of  $17\frac{1}{2}$  years concurrently etc. Eventually, at the limit, we have a man who only ever exists at a single instant (such a scenario is imagined by Gödel [1949: 561]). At the end of every instant, he travels back in time to the instant he just left, living out 70 years of personal time in a single moment of external time. He has temporal parts (so perdures<sub>P</sub>) but is not extended in time (so endures<sub>D</sub>). So, again, we have a case where the two positions come apart.



### 3.2 Special Relativity

Whilst support for perdurantism<sub>D</sub> and endurantism<sub>D</sub> is usually parasitic on arguments for perdurantism<sub>P</sub> and endurantism<sub>P</sub> there are some arguments specifically for the dimensionalist versions [for instance, see Lowe 1998]. For the remainder of this section, we shall concentrate on an argument from special relativity that argues specifically for perdurantism<sub>D</sub>.

The key part of Einstein's theory of special relativity is that simultaneity is relative to what inertial frame you are in. That is, as you change how fast you are going relative to other things, what is simultaneous with you will be different from what is simultaneous with them. As a knock on effect of this (we shall leave the details aside) the size and shape that objects appear to have from different inertial frames likewise changes. So in one frame of reference an object has one shape (e.g. a pole appearing to be quite long if it is at rest relative to you) whilst in another frame it has a quite different shape (e.g. it appears to be a lot shorter when travelling very fast relative to you). Balashov [1999] argues that this indicates objects are four-dimensional, and perdurantism<sub>D</sub> must be true. His reasoning is to imagine that we are two-dimensional flatlanders observing the passage of a three-dimensional object. The flatlander perspective (at three different instants) is depicted in the top of the nearby diagram: it appears to be a two-dimensional object changing shape. But it can be explained by the rotation of a three-dimensional object, whereby the flatlander is only seeing cross-sections of it (as depicted in the bottom of the diagram). Balashov argues that we are in a similar position, and that the best explanation of the changing shape of objects relative to inertial frames is that they are four-dimensional objects being seen from different three-dimensional perspectives. Obviously, then, the endurantist<sub>D</sub> steps in and tries to offer their own, allegedly superior, explanations [see Miller 2004; Sider 2001: 79-87 and Balashov 2009 for discussion].



There are other arguments based on special relativity,<sup>16</sup> but this is the one that argues specifically for the four-dimensionality of objects. Interestingly, one of the other arguments from special relativity is concerned with the occupationalist's definitions, to which we now turn.

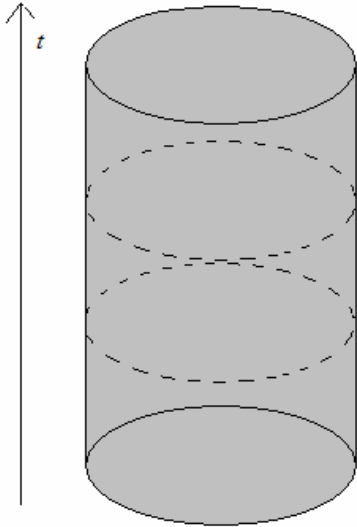
#### 4. OCCUPATIONALISM

##### 4.1 Chorology

Rather than concentrating on what parts persisting objects have, as the populationist does, we might concentrate on how objects are located in spacetime. As far as I know, these relations haven't as yet been grouped under an appropriate name, so (for the time being at least) call the relations between an object and a region a chorological relation.<sup>17</sup>

Chorology has become a recent concern in metaphysics [Gilmore 2007: 179; Hudson 2005: 97-106; McDaniel 2007: esp. 132-4; Parsons 2007; Sattig 2006]. Much attention has been focused on the notion of 'exact location' (and whether it can hold between multiple regions).<sup>18</sup> To get a grip on the notion, imagine an instantaneous two-dimensional circle. It exactly occupies just one spacetime region, namely a two dimensional circular shaped region. I've used an instantaneous non-persisting object as an example because what spacetime regions a persisting object exactly occupies is the very bone of contention. Look at the nearby diagram, depicting a two dimensional circle, but now persisting through time. Does it exactly occupy multiple spacetimes regions?

That is, does it exactly occupy each transverse slice of that shaded region (examples are marked on the diagram with dotted lines)? Or does it exactly occupy just one region – namely the entire shaded region?



The occupationalist thinks that whether an object perdures or endures depends upon the answer to that question. The endurantist, says the occupationalist, will say the object is multiply located at the infinite number of transverse slices of the shaded region. We can give an explicit definition by introducing some terminology. Take as primitive ‘path’. The path of the object is just that shaded region shown in the diagram – that largest spacetime region where, uncontroversially, the object can be found such that nothing else can be found there without interpenetrating that object. To make the exposition simple, pretend spacetime is Newtonian, and define an instant as follows:

Region  $\underline{r}$  is an instant =<sub>df</sub> (i) every part of  $\underline{r}$  is simultaneous with every other part of  $\underline{r}$  and (ii) nothing is simultaneous with any part of  $\underline{r}$  that is not itself a part of  $\underline{r}$ .

Then define endurantism as:

Endurantism<sub>O</sub>: Every object is exactly located at every spacetime region which (i) is a sub-region both of the object’s path and some instant  $\underline{t}$ ; and (ii) has as a sub-region every sub-region of the object’s path that only overlaps  $\underline{t}$ .

Parsons says that there can be no multi-location (see n18), but nonetheless calls himself an endurantist. Call his position ‘Pardurantism’:

Pardurantism<sub>O</sub>: Every object is exactly located at just its path, and does not have any temporal parts. [Parsons 2000, 2007]

So perduring objects are four-dimensional (thus perdure<sub>D</sub>) but don't have temporal parts (so endure<sub>P</sub>). Whereas perdurantism is:

Perdurantism<sub>O</sub>: Every object is exactly located at just its path and has temporal parts at every instant that it exists at.<sup>19</sup>

Obviously, then, perdurers<sub>O</sub> perdure<sub>P</sub>. Doubtless, some will disagree with Parsons and think pardurantism<sub>O</sub> is a form of perdurantism [cf Hawthorne 2006: 103-4], just defining perdurantism as an object being exactly located at just its path. Again, such worries highlight the problem of getting our terms straight, and just as before I don't believe there is any substantive debate to be had here. I will continue to distinguish pardurantism<sub>O</sub> from perdurantism<sub>O</sub>, but nothing hangs on it – treat it as a version of perdurantism if you wish, just as long as you are clear what you mean by the terms I shan't complain.<sup>20</sup>

#### 4.2 Arguments for Endurantism<sub>O</sub>, Pardurantism<sub>O</sub> and/or Perdurantism<sub>O</sub>

The dimensionality of an object sounds like a geometric feature of it, and the geometric features of objects depend upon the geometric features of the regions they are exactly located at (e.g. an instantaneous cube has to be exactly located at a cube shaped region). Perdurers<sub>O</sub> (and pardurers<sub>O</sub>) are exactly located at temporally extended four-dimensional regions so will be four-dimensional; endurers<sub>O</sub> are exactly located at lots of regions, all of which are three-dimensional, thus will be three-dimensional. So occupationalism might just be a more sophisticated form of dimensionalism, which makes clear what it is to be three- or four-dimensional (compare with Merricks [1999: 126-7] who thinks we have to cash it out in populationist terms). Unsurprisingly, then, dimensionalist versions of persistence and occupationalist theories are tightly connected; an argument for one will bear on your position on the other. Because of this, just as many of the arguments for perdurantism<sub>P</sub> from §2 entail perdurantism<sub>D</sub>, many of those arguments will work just as well for perdurantism<sub>O</sub> (mutatis mutandis for endurantism<sub>O</sub>).

There aren't many arguments specifically for endurantism<sub>O</sub>/perdurantism<sub>O</sub>. Of those that there are, they are – like most arguments concerning persistence – pro-perdurantist. Hawley [2008] argues that introducing chorological notions, and being a perdurantist<sub>O</sub>,

will help solve problems that perdurantists have with material constitution. Another is Gilmore [2006], who offers up an argument from special relativity for perdurantism<sub>O</sub>. Crudely, the problem is that the above definitions relied upon the notion of an instant, defined in terms of simultaneity. As we move from considering Newtonian spacetimes to the relativistic arena, this makes it a lot harder to say what regions an endurer<sub>O</sub> should occupy. From one inertial frame of reference one set of regions will count as instants, so one set of regions will be good candidates for being the regions an endurer<sub>O</sub> exactly occupies. But from a different inertial frame, as simultaneity is relative to such frames, different regions will count as instants a fortiori a different set of regions will be the best candidates for being the regions an endurer<sub>O</sub> should exactly occupy. So whereas the perdurantist<sub>O</sub> just sticks with saying that objects exactly occupy but one region (the path) endurantists<sub>O</sub> are going to have a task saying which regions an object should exactly occupy [see Balashov 2008; Gibson and Pooley 2006 for discussion].

## 5. CONCLUSION

### 5.1 Multifarious Definitions

As the above discussion demonstrates, there are many different ways of understanding the positions concerning persistence – each very similar, but such that there are circumstances where they can be pried apart in interesting ways. When navigating the literature on persistence it is often important to first settle which definition is being considered [cf Wasserman 2003b: 288]. However, do note that not every theorist will slot neatly into one of the above categories. Especially in earlier texts, they may be vague over the details of what they mean. Alternatively, they may endorse multiple definitions – for instance saying that perdurantism is the thesis that objects are four-dimensional and have temporal parts (which is not, of course, illegitimate for they may define the terms of art however they want). To compound matters they may concentrate on part of that definition for the rest of their discussion – for instance, solely concentrating on whether or not objects have temporal parts and ignoring whether they are four-dimensional. So do be on your guard when plowing through what has been written on the subject.

Such clarity of definition is not just helpful when it comes to evaluating the arguments for those positions. For instance, some have argued that there isn't any difference

between the two theories: that perdurantism and endurantism are two ways of talking about the same thing. This is the position of Hirsch [2009].<sup>21</sup> He says that whilst the perdurantist endorses the existence of temporal parts, and the endurantist does not, this is just the result of a verbal dispute about how to use the word ‘exist’. If we correctly resolve this dispute then we shall see that the perdurantist’s use of the word ‘exist’ is such that temporal parts clearly do exist, whilst given the endurantist’s use of the word, they clearly do not (in a way that is crudely analogous to an American and an Englishman both being correct about what the shape of a football is).<sup>22</sup> This sort of approach is only applicable to a populationist reading of the debate concerning persistence, for it is only on that reading that we are concerned with what things exist [see Sider 2009 and McGrath 2007b for discussion of Hirsch’s argument]). As soon as we move, say, to the occupationalist definition we still have a live debate (unless one thinks Hirsch can run similar arguments against, not what exists, but what regions existing things exactly occupy). In any case, it is clear that the plausibility of claiming that perdurantism and endurantism are, in fact, two ways of saying the same thing will depend upon what one defines those theories as in the first place. So, again, clarity of definition is paramount.

## 5.2 How Things Persist?

The debate over persistence began by asking ‘How do things persist?’. Somewhere along the way, this question seems to have become obscured. Populationism concerns what things there are; dimensionalism, what those things are like; occupationalism, what relations hold between those objects and the regions they occupy. It is not clear that any of this has much at all to do with how things persist.

We might think the problem is the question itself – it is difficult to see what one would even mean by asking how things persist, nor obvious what kind of answer would be appropriate. Perhaps the oddness of the question is what leads metaphysicians to concentrate instead on simpler questions like what things there are, and what those things are like, rather than debating how an object pulls off the simple trick of persisting. There is an alternative: that one thinks there is a specifically metaphysical explanation of certain facts. For instance, an apple is green, and we might think that this has a metaphysical explanation: it is green in virtue of it instantiating the universal green (or having a green

trope etc.). If you buy into such explanations, we could do the same here and look for something to explain how objects exist at multiple times (and thereby persist).

The answers to such a question will likely connect with the above positions. For instance, we might assume perdurantists<sub>P</sub> would say that temporal parts are the fundamental things that exist, and persisting wholes exist at different times in virtue of such parts. Notably, though, the perdurantist<sub>P</sub> need not accept this claim about fundamentality, believing that the perdurer<sub>P</sub> and its temporal parts are on a par [Heller 1992: 700], or even that the former is more fundamental than the latter [see Hawthorne 2006: 99-100].<sup>23</sup> Also, it is not clear to me what the endurantist<sub>P</sub> would say (although, if anything, that just looks bad for the endurantist<sub>P</sub>). Similar moves might work for other answers e.g. that it is in virtue of being exactly located at multiple regions that an enduring<sub>O</sub> object persists, or in virtue of being four-dimensional that a perdurer<sub>D</sub> persists etc. So whilst the above positions ignore the ‘how’ question, some assumptions about metaphysical explanation might restore that feature.

### 5.3 Alternative Definitions

The above definitions are the most popular, but not exhaustive. One division thus far ignored is the nature of properties and relations. For instance, one might think that whether an object endures or perdures depends upon one’s treatment of parthood (whether it is simpliciter, or a relation to a time) [Miller 2005b; Olson 2006a]; or upon whether objects from different times can be related by the composition relation [Steen Forthcoming]; or the nature of the composition relation [Crisp and Smith 2005]; or whether properties are had intrinsic to a region [Hofweber 2009]; or the manner in which an object is present at a region of spacetime [Fine 2006; see Simons 2008 for discussion]. Space prohibits a full discussion of these definitions, which of the above arguments are relevant to such definitions, and whether there are arguments unique to those definitions (although, notably, Fine [2006] offers one of the few extant arguments specifically for endurantism – and that argument is for endurantism as he has defined it).

But do bear in mind that nothing crucial could possibly hang on the definitions themselves. It is of little value to debate such terms of art, when the real philosophical debate comes about by demarcating two contrary positions, neither of which is obviously

true nor obviously false, and offering compelling arguments for/against those positions. The definitions only tell you what the positions are – they don't, in themselves, make for a fruitful avenue of philosophical investigation. Nor should you think that not devoting space to these alternative definitions means they are somehow relegated to being less interesting – it is simply that less has been written on them. Almost certainly, if in ten years time I wrote an article like this we would still discuss divided terminology (although, if we're lucky, each position will have found their own terms by then rather than sharing 'perdure' and 'endure' between them). But, I would imagine, some of these recent definitions will have more prominence than they are given here.

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<sup>1</sup> This is the position of Wiggins [1980: 25] and Oderberg [2004: 687].

<sup>2</sup> See Gallois [1998: 255-6] for a brief survey of early, and unsuccessful, attempts to define the term.

<sup>3</sup> It is used (in this form or a close extension of it) by Caplan and Matheson [2006: 60], Crisp and Smith [2005: 323], Hawthorne [2006: 86], Hudson [2005: 8], Miller [2005b: 321], McKinnon [2002: 291] and Wasserman [2002: 207] *inter alia*. Note that there are some worries that this definition breaches the mereological principle that an object cannot have a proper part 'as big as it itself' at any given time [Olson 2006a: 742-4].

<sup>4</sup> This is not the only definition of 'temporal part'. Thomson [1983: 207] offers up her own definition; Zimmerman [1996: 122] is worried that Sider's definition can't account for gunky spacetimes and offers his own; whilst Parsons and Noonan endorse a definition in chorological terms [Parsons 2007: 216; Noonan 2009].

<sup>5</sup> There is debate over whether these theses have to be necessarily true. Indeed, there is debate whether there could be mixed worlds where some things endure and others perdure (in which case neither perdurantism<sub>P</sub> nor endurantism<sub>P</sub> would be true). Because this chapter is merely expository, set aside such quibbles for purpose of argument and let us imagine that the true metaphysics of persistence is necessarily true of all things.

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<sup>6</sup> Not everyone agrees that temporal parts are counterintuitive [Sider 2001: 218] but certainly your average perdurantist will agree with this (for, after all, if they did not then they are expending an awful lot of effort coming up with arguments for a position that is allegedly true intuitively).

<sup>7</sup> For instance, there have been arguments against perdurantism<sub>P</sub> on the grounds that you end up with incorrect de re modal predications being made of objects [Olson 2006b: 412-4; van Inwagen 1990b; Wiggins 1980: 168; see also Gallois 1998: 269ff] although that move has to weather a lot of flak [Copeland, Dyke and Proudfoot 2001; Djukic 2004; Hawley 2001: ch. 6; Heller 1993; Noonan 2001: 130-2; Sider 2001: 218-24]).

<sup>8</sup> See Le Poidevin [1998] for an introduction to the history of the debate, and both Markosian [2001] and Dyke [2003] for a discussion of the role of the semantic facts, and how they bear on the metaphysical facts.

<sup>9</sup> There are other problems along similar lines. Hudson argues universalist-perdurantism<sub>P</sub> commits us to superluminal objects [2005: 123-36], and Balashov [2003a, b] agrees but takes it to be a reductio of universalism [see also Balashov 2007b]. See also Sattig [2002, 2003, 2006], Stone [2007] and Gallois [1998: 267-69] for other problems with PATP that don't rely upon universalism.

<sup>10</sup> Sattig [2008] offers a quite different problem for fission when combined with perdurantism<sub>P</sub> to do with identity across time.

<sup>11</sup> See Balashov 2007a, 2008, Hansson Wahlberg 2008 and Moyer 2008 for more problems and discussion concerning stage theory and its definition.

<sup>12</sup> Sider tries to bolster the argument from temporary intrinsics by discussing what goes on in timeless worlds and cases of time travel [Sider 2001: 98-109; for discussion see Effingham and Melia 2007; Hawley 2006; Markosian 2004; Miller 2006a; Sider 2004; Simons 2005]. Nor is this the only place that time travel is relevant to the metaphysics of persistence. For instance, if we built an object out of many copies of a single time travelling atom this might pose problems for both endurantism<sub>P</sub> [Effingham and Robson 2007; Effingham Forthcomingb; Smith 2009] and perdurantism<sub>P</sub> [Gilmore 2007; for discussion see Eagle 2010a, b and Gilmore 2010, Forthcoming].

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<sup>13</sup> As noted by Wasserman, Hawthorne and Scala [2004: 314-7] Lewis actually relies on a slightly weaker principle – but for this short exposition we need not worry about such details.

<sup>14</sup> Heller [1991], Le Poidevin [2000] and Miller [2006b] discuss other connections between perdurantism and vagueness.

<sup>15</sup> Obviously in universes with varying numbers of spatial and/or temporal dimensions ‘three-dimensional’ and ‘four-dimensional’ will be innocuous misnomers.

<sup>16</sup> See Balashov [1998] (and Gilmore [2002], Balashov [2005a] for discussion); Hales and Johnson [2003] and Rea 1998: 231-36.

<sup>17</sup> From the Greek ‘khoros’ meaning ‘space’ or ‘site’. ‘Topology’ has the superior etymological claim but is, of course, already taken. ‘Chorology’ is also a term in geography, having been first coined by the ancient Greek geographer Strabo in his Geography and latter resurrected by Richard Hartshorne [1939]. Presumably there won’t be any confusion.

<sup>18</sup> Parsons [2007, 2008; see Hudson 2008 for discussion] thinks it is conceptually impossible for objects to be multi-located [see also Schaffer 2009: 141-2], and others think it entails a paradox [Barker and Dowe 2003, 2005; see Beebe and Rush 2003, McDaniel 2003, and Hansson Wahlberg 2009 for discussion]. If they are correct then, presumably, the only theories that could be true would be perdurantism<sub>O</sub> or pardurantism<sub>O</sub> (q.v.).

<sup>19</sup> The definitions of pardurantism<sub>O</sub> and perdurantism<sub>O</sub> are presented here in a somewhat cruder fashion than Parsons himself presents them as. But it will suffice for expository purposes to overlook some nuanced details.

<sup>20</sup> Indeed, Endurantism<sub>O</sub>, Pardurantism<sub>O</sub> and Perdurantism<sub>O</sub> aren’t exhaustive of the possible combinations of chorological relations. However, a lot of the alternatives will be deviant theories no-one endorses so I shall deal with these three options as they are the only current extant options.

<sup>21</sup> See also Miller [2005a], and McCall and Lowe [2003; 2006] for different arguments for the same conclusion.

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<sup>22</sup> I've taken the example from Manley [2009: 8], although he thinks the example itself doesn't get to the heart of the matter. Refer to his article for a, far less crude, discussion of the issues.

<sup>23</sup> And, of course, if fundamentality and 'in virtue of' come apart (e.g. it's not the case that for all true propositions, the Ps, and the collection of fundamental things, the xs, that the Ps are true in virtue of the xs) then there will be yet more ways of distinguishing different varieties of perdurantism and endurantism, some concentrating on what things are fundamental; some on what it is in virtue of which that the propositions are true; some concerned with neither etc.