

# Endurantism vs. Perdurantism?: A debate reconsidered

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**Abstract:** One of the central debates in contemporary metaphysics has been the debate between endurantism and perdurantism about persistence. In this paper I argue that much of this debate has been misconstrued: most (if not all) of the arguments in the debate crucially rely on theses which are strictly orthogonal to the endurantism/perdurantism debate.

To show this, I note that the arguments in the endurantism/perdurantism debate typically take the following form: one presents a challenge that endurantists (/perdurantists) allegedly have some trouble addressing, and to which perdurantism (/endurantism) apparently has a straightforward response. I argue, however, that in each case, there are versions of endurantism (/perdurantism) that can offer precisely the same (or at least a highly analogous) response to the challenge, and thus the ability to provide this particular solution does not directly tell in favour of one of the two views.

In §1, I elaborate two views which will be particularly prominent in the discussion: liberal endurantism and restrictive perdurantism. In §2-6 I discuss in turn the central pro-perdurantism arguments: the argument from anthropocentrism, the argument from vagueness, the argument from recombination, the argument from temporary intrinsics, and the argument from coincidence. In §7-8, I discuss the main pro-endurantism arguments: the arguments from motion, and the argument from permanent coincidence. Finally, in §9, I discuss what conclusion can be drawn from this discussion.

## Introduction

One of the most prominent debates in contemporary metaphysics has been the debate between *endurantism* and *perdurantism* about persistence.<sup>1</sup> Roughly put, endurantism claims that objects persist by being wholly present at each moment at which they exist, while perdurantism claims that

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<sup>1</sup> For overviews of the debate see e.g. Sider (2008) and Hawley (2010). Note that some (but not all) authors use the terms ‘three-dimensionalism’ and ‘four-dimensionalism’ for what I here call, respectively ‘endurantism’ and ‘perdurantism’. Also, some use the latter terms with a slightly different meaning than the one defined above (on some uses of the term, stage-theory doesn’t count as a perdurantist view). But these terminological differences aside, for the most part the debate focuses on the views described above.

objects persist by having temporal parts at each moment that they exist.<sup>2</sup> There have been various attempts to make these vague characterisations more precise. An extremely helpful and widely accepted way to do so is suggested by Sider.<sup>3</sup>

First, say that  $x$  is an *instantaneous temporal part (ITP)* of  $y$  at  $t$  iff (i)  $x$  exists at, but only at,  $t$ ; (ii)  $x$  is part of  $y$  at  $t$ ; (iii)  $x$  overlaps at  $t$  everything that is part of  $y$  at  $t$ . Second, let *perdurantism* be the view that for every object  $x$  and for every time  $t$  at which  $x$  exists, there is an ITP of  $x$  at  $t$ . Finally, let *endurantism* be the denial of perdurantism.<sup>4</sup>

The literature on the topic consists of a wide range of arguments and counter-arguments in favour of each view. The typical form of a pro-perdurantism argument consists of presenting some apparent challenge to which perdurantism, it is argued, has a straightforward response, while endurantism apparently has more trouble addressing. Endurantists then typically respond to such arguments either by defusing the puzzle (showing there was no puzzle in the first place), or by arguing that they too can provide a satisfactory response to the puzzle. *Mutatis mutandis* for pro-endurantism arguments.

My main aim in this paper is not to assess these arguments (there is already voluminous literature doing that). Rather, I would like to argue that much of this debate has been misconstrued. It is widely recognised that those who accept perdurantism typically also accept a host of other claims which do not strictly speaking follow from the perdurantist doctrine. One example is the doctrine of universal fusion. Another is the claim that for every collection  $S$  of spacetime points which are occupied by

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<sup>2</sup> I use 'part' in a sense that it is trivial that everything is a part of itself. (Kearns (2011) argues that it is not trivial whether a thing is a part of itself, but we can take Kearns's point on board by replacing every use of 'part' in the paper with 'improper part' – where  $x$  is an improper part of  $y$  just in case  $x$  is a part of  $y$  or identical to  $y$ .) Also, except where otherwise stated, I speak of the temporalized parthood relation (part-at-a-time) rather than atemporal parthood relation (cf. Sider (2001), ch. 3). As Sider notes, this is the only way to state the debate in terms that do not completely prejudge the issue.

<sup>3</sup> Sider (2001), ch. 3. Some authors have objected to Sider's way of defining the two views (see e.g. Olson (2006)), but Sider's definitions are otherwise very widely accepted, and I will adopt them for the remainder of the paper.

<sup>4</sup> Sider, at least, argues that it is hard to construe endurantism using a more positive doctrine. Also, note that while technically all that endurantism requires is that there exists a single object  $x$  and a single time for which  $x$  does not have an ITP, I will for the most part focus on endurantist views which maintain that ordinary objects rarely have ITPs.

matter, there is an object which occupies all the points of S and no other points (call this ‘*liberalism*’). Similarly, endurantists typically endorse claims that do not strictly speaking follow from endurantism: for example the denial of universal fusion, and the denial of liberalism. Unfortunately, when it comes to the endurantism/perdurantism debate, little care has been taken distinguish between the role of the doctrines at stake in the arguments, and the role played by these additional claims that are usually packaged together with the doctrines.<sup>5</sup>

My claim is that most (perhaps even all) of the central arguments in the endurantism/perdurantism debate crucially rely on these orthogonal claims, and thus that the arguments do not directly target the doctrines they are allegedly used to support. Here is how I plan to show this. Take a typical pro-perdurantism argument. As noted above, such an argument consists of a challenge or puzzle that endurantists allegedly have some trouble addressing, and to which perdurantism apparently has a straightforward response. I argue, however, that there is some version of endurantism that can “mimic” the perdurantist response. That is to say, endurantism can offer the same, or at least a highly analogous response to the one perdurantism offers.<sup>6</sup> Mutatis mutandis for pro-endurantist arguments. To be clear: the claim is not merely that endurantism (/perdurantism) has *some* satisfactory way to respond to the arguments. Rather the claim is that endurantists (/perdurantists) can provide essentially the same response as the opposing view. This shows that the original argument cannot be plausibly construed as targeting the doctrine of endurantism (/perdurantism) per se.

In §1, I elaborate two views which will be particularly prominent in the discussion: liberal endurantism and restrictive perdurantism. In §2-6 I discuss in turn the central pro-perdurantism

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<sup>5</sup> That is not to say there haven’t been any discussions of this point in the literature. See for example Haslanger (1994) on an argument (not discussed in this paper) from Humean supervenience; Hawley (2010) on the argument from vagueness; Sider (2001) on the argument from permanent coincidence; and Balshov (2003a) on the argument from superluminal motion; Still, there seems to be few systematic discussions of the large impact this issue has on the debate as a whole. Also relevant are Hawthorne (2006) (especially. ch. 5), which in various place explores ways in which some claims which are orthogonal to the core views impact the endurantism/perdurantism debate but focuses on different features than the ones explored in this paper, and Miller (2005a) and Miller (2006) (but see n.10 below on some problems with the latter discussion).

<sup>6</sup> Perhaps less surprising but also relevant: in the case of some of the arguments, I also argue that there are versions of perdurantism (/endurantism) which cannot offer the standard ‘straight-forward’ response, so the response doesn’t rely exclusively on perdurantism (/endurantism) per se.

arguments: the argument from anthropocentricism, the argument from vagueness, the argument from recombination, the argument from temporary intrinsics, and the argument from coincidence. In §7-8, I discuss the main pro-endurantism arguments: the arguments from motion, and the argument from permanent coincidence.<sup>7</sup> Finally, in §9, I discuss what conclusion can be drawn from this discussion. To anticipate: I do not conclude that the whole endurantism/perdurantism debate has been in vain, but I do maintain that much of the debate has been misconstrued and that we would benefit from being much clearer about what it is that the arguments in this debate really do establish.

### **§1 Liberal Endurantism, Restrictive Perdurantism**

Let ‘liberalism’ be the view that for any set of spacetime points that are occupied, there is an object<sup>8</sup> which occupies all the points in that set and no other points, and let ‘restrictiveness’ be the denial of liberalism.<sup>9</sup> Thus liberalists must accept that there is an object that is currently located where my desk is but exists only for an instant; that there is an object which is located exactly where my desk and my nose are, but nowhere else; and so forth. Restrictivists, on the other hand, can deny this.

One prominent feature of the endurantism/perdurantism debate is that it is extremely common for perdurantists to be liberalists, and for endurantists to be restrictivists.<sup>10</sup> But it is crucial to realise that

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<sup>7</sup> I will not discuss how the theory of relativity impacts this debate. For an overview of this issue see Gibson and Pooley (2006).

<sup>8</sup> Except where otherwise stated, whenever I say ‘object’, understand ‘concrete or material object’, where this is intended to exclude both abstract objects that are not located in space or time, as well as spatio-temporal regions (that is, assuming one rejects supersubstantivalism). Without the latter restriction, liberalism would be trivial.

<sup>9</sup> There are various subtle issues concerning how to understand the notion of occupation which I will not discuss here (see Gilmore (2013) for an overview). The thesis I call ‘liberalism’ is what Hawthorne sometimes calls ‘plenitude’ (see e.g. Hawthorne (2006), p. 116). Note, however, that in other places in the book Hawthorne uses the term ‘plenitude’ for the stronger thesis that for any *modal* occupation profile there is an object whose modal pattern of spatiotemporal occupation is correctly described by that profile (see Hawthorne (2006), p. 53.)

<sup>10</sup> Some rare exceptions are Balshov (2003a) who is a restrictive perdurantist, and Haslanger (1994) who discusses the possibility of (though does not quite defend) liberal endurantism.

One might be tempted to think that Miller’s ‘Universalist Endurantism (UE)’ (Miller (2006)) is essentially the same view as liberal endurantism (LE). This, however, is not so: LE does not entail UE because, for example, UE requires that all simples are instantaneous, but LE does not. Nor does UE entail LE: for example, LE entails that there are point-sized objects, but UE does not. The differences between the views aside, Miller’s discussion suffers from various serious problems. To point to the main one: Miller assumes that the instantaneous object O1 constitutes the coinciding enduring object O (*ibid.* p. 413). But she defines constitution in terms material coincidence, which implies that O1 and O share all their parts, and in particular that O1 is a part of O. This in

the liberalism/restrictivism debate is logically independent from the endurantism/perdurantism debate. To see this note that the following two combinations are possible: restrictive perdurantism (RP) and liberal endurantism (LE). The former is easier to establish. Recall that all that perdurantism requires is that each object has an ITP at every moment in which it exists. Consider my ordinary, persisting desk (call it 'Desk'). Perdurantism requires that there is an object which at  $t$  is just like Desk, but exists only for an instant (call one such object 'Short Desk'). But on its own, the doctrine does not require any of the following: the existence of a point-sized object located in the left corner of my desk; the existence of an object which is just like my desk between three and four o'clock but exists only at those times; or the existence of an object located exactly where my desk and nose are.<sup>11</sup> Of course different versions of RP can differ in exactly what restrictions they impose. For now, all we need is to notice that perdurantists need not be liberalist.

Somewhat less obvious, one could be a liberal endurantist. The key idea behind the view is the following. Although liberalism does entail the existence of instantaneous objects such as Short Desk, it does not entail that Short Desk *is part of* Desk (at the relevant time). More generally, LE maintains that for any object  $x$  and any time  $t$  at which it exists, there is an object  $y$  that is co-located with  $x$  at  $t$  and exists only at  $t$ , but it typically denies that  $x$  ever has any instantaneous temporal *parts*.

If this kind of view is coherent then it is, by definition, an endurantist view (it denies that objects have ITPs at every moment at which they exist). Let me then make some remarks in defence of the view's coherence. First, endurantists do not usually deny the possibility of *instantaneous* objects (objects that

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turn entails that, by definition, O1 is an ITP of O and thus that contrary to Miller's assumption that UE is an endurantist view, the view collapses into perdurantism. Miller is explicit that she interprets material coincidence in terms of improper parthood (see Miller (2005b), p. 324). One could, however, try to avoid the above objection by instead defining material coincidence in terms of the mere sharing of *proper* parts, because in that case one can deny that O1 and O are parts of each other. However, since Miller accepts synchronic universalism, a rejection of the mutual parthood claim would require not only a rejection of the doctrine of Strong Supplementation, but also a problematic rejection of Weak Supplementation (see Varzi (2009), Cotnoir (2014), and my discussion in §3 below). As we will see below, setting up a feasible version of liberal endurantism requires a fair amount of care concerning the precise relations between enduring objects and instantaneous objects which are co-located with them.

<sup>11</sup> Note that liberalism does not follow from perdurantism even if one assumes universalism about composition (or even from classical mereology as a whole). To get liberalism we also need the claim that for each object  $x$ , if  $x$  is located at some spatial point  $p$  at  $t$ , then  $x$  has a point-sized part which is exactly located at  $p$  at  $t$ .

exist only for an instant) – e.g. one could accept that God could create an object and immediately destroy it. Second, endurantists certainly do not usually deny that distinct objects can have exactly the same spatial location at the same time. For example, consider a lump of clay (call it ‘Lump’) which is created on Monday and destroyed on Wednesday. Suppose that on Tuesday the lump is shaped into a statue (call it ‘Statue’) and then squashed at the end of the day. A very standard endurantist position is that on Tuesday, Lump and Statue are two distinct objects that are exactly co-located. Now one needs to be careful here: at least according to one popular version of this co-location view, at a time of co-location  $t$  Statue and Lump share all their parts – which in turn entails that Statue is a part of Lump at  $t$  and vice versa<sup>12</sup> (call this the ‘mutual-parthood’ model of coincidence).<sup>13</sup> This model of co-location will not do for current purposes: if Short Desk is part of Desk at  $t$ , then by definition, Short Desk will be an ITP of Desk at  $t$ . Generalising, if we combine liberalism with the mutual-parthood model of co-location we get perdurantism.<sup>14</sup>

Still, the idea of co-location without mutual-parthood is far from incoherent.<sup>15</sup> For a start, physics might well require (or at least allow for) two co-located fundamental particles, and it is not particularly natural to think of such particles as being parts of each other. What about composite, macro-object such as Statue and Lump? At least one reason to worry that these cannot be two distinct but co-located objects is the following: it is plausible to think that at a time  $t$  in which Statue and Lump both exist, they are composed of the same particles. One potential problem is that given some views of mereology, it would follow from the fact that Statue and Lump are composed of the same objects at  $t$  that they are identical.<sup>16</sup> But even if we allow that Statue and Lump are distinct despite

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<sup>12</sup> Recall that I am using ‘part’ in a sense that it is trivial that something is a part of itself, so this follows immediately.

<sup>13</sup> See Thomson (1983).

<sup>14</sup> Cf. Sider (2001), p. 157.

<sup>15</sup> Of course, a “cheap” way of getting such co-location is to consider Statue and the spatiotemporal region it occupies – which at least on most views – are co-located but do not share any parts. But as noted in n.8, the discussion is restricted to co-located material objects.

<sup>16</sup> This would follow on any view which accepts what Cotnoir calls ‘extensionality of sums’ (Cotnoir (2013)). The most obvious view which accepts this is CEM .

being composed of the same objects, using a very standard doctrine of mereology<sup>17</sup> – the principle of Strong Supplementation (SSP) – we can show that if Statue and Lump are composed of the same objects at  $t$ , then Statue is part of Lump at  $t$  (and vice-versa).<sup>18</sup> For exactly the same reason, by SSP, if Desk and Short Desk are composed of the same objects at  $t$  then Short Desk is part of Desk, which for current purposes will obviously not do. Nevertheless, there are options left on the table. The three most plausible ones seem to me the following:

**SSP-Free LE:** accept that Desk and Short Desk are composed of the same particles at  $t$  (indeed, we could even accept they have exactly the same proper parts), but deny SSP and with it the claim that Short Desk is part of Desk at  $t$ .<sup>19</sup>

**Duplicate Particles LE:** accept SSP but deny that Desk and Short Desk share *any* of their parts at  $t$ . Probably the least radical way to develop this view is the following. Suppose we standardly think that at  $t$ , Desk is composed of the atomic particles  $a_1, \dots, a_n$ . On the current view, for each  $i$ , there is a particle  $a_i^*$ , which is qualitatively identical and co-located with  $a_i$  throughout its lifetime, and Short Desk is composed at  $t$  of  $a_1^*, \dots, a_n^*$ . Note that this view is consistent with classical mereology, and that the idea of co-located yet non-overlapping particles is not in itself incoherent (indeed, it may even be mandated by physics). Still it is worth noting that this version of LE is perhaps the least attractive of the three I consider. Not only do we need to postulate myriads of co-located particles, but also accept

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<sup>17</sup> Note in particular, that there are many plausible views which accept both Strong Supplementation and the claim that at  $t$  Statue and Lump are composed of the same objects, but yet maintain that Statue is not identical to Lump. (Indeed, both standard perdurantism and mutual-parthood endurantism are such views. Both reject anti-symmetry for temporalized parthood).

<sup>18</sup> SSP for temporalized parthood is the following principle: if  $x$  and  $y$  exist at  $t$ , and  $x$  is not a part of  $y$  at  $t$ , then  $x$  has some part at  $t$  that does not overlap  $y$  at  $t$ . (This is the principle Sider calls ‘PO’ – see Sider (2001) p. 58 and p.65. Note that Sider simply assumes endurantists would endorse this principle). By SSP if Statue is not a part of Lump at  $t$ , it must have a part that does not overlap Lump at  $t$ . But this part must overlap some of the objects that compose both Statue and Lump, and hence must overlap Lump. So Statue must be a part of Lump at  $t$ .

<sup>19</sup> Cf. Simons (1987), who defends the rejection of SSP in light of the paradoxes of coincidence.

that these particles' properties (including properties we otherwise think of as additive), do not 'add up' – for example, they do not together have the sum of their masses, and so forth.<sup>20</sup>

**Abstract -parts LE:** accept that Desk and Short Desk share all their *purely spatial* parts at *t* but deny that they share *all* their proper parts. This can be achieved by arguing that Desk and Short Desk each has abstract parts (e.g. forms, properties, or tropes) that the other lacks.<sup>21</sup> This version of LE allows both to maintain that Desk and Short Desk share all their spatial parts while maintaining a fairly conservative mereology. In particular, we can keep both the anti-symmetry of parthood and SSP: since Short Desk now does have some (abstract) parts that do not overlap Desk, there is no problem in maintaining that Short Desk is not part of Desk.

No doubt, there are other logical possibilities. My point here is not to map out all the versions of liberal endurantism, but rather to show that there is a place in conceptual space for such a view.

## §2 The argument from anthropocentrism

Let us assume that we want our ontology to be conservative and charitable enough to our everyday ways of thinking that it accepts the existence of every-day ordinary objects such as people, cars, and islands. We might now ask whether there are objects which have other, more arbitrary-looking persistence conditions. For example, consider Hirsch's 'incars'.<sup>22</sup> The worry is that there seems to be no systematic way to accept objects such as cars while ruling out objects such as incars. If the only difference between cars and incars is that ordinary speakers have words and concepts for the former but not the latter, it would seem worryingly anthropocentric to assume that the ontology of the world exactly coincides with what humans happen to be interested in.<sup>23</sup>

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<sup>20</sup> See Wasserman (2002) and Hawley (2009) for a brief discussion of endurantist views on which, e.g., Statue and Lump have no shared parts, and for the additivity worry.

<sup>21</sup> For endurantist views which maintain that ordinary objects have such abstract parts see for example McDaniel (2001), Paul (2006), Fine (2008), and Koslicki (2008).

<sup>22</sup> An 'incar' is any 'segment' of a car that is inside a garage (thus when a car exists a garage, the corresponding incar – if there are such things – shrinks gradually, until it disappears). See Hirsch (1982), p. 32.

<sup>23</sup> See Sider (2001), pp. 156-157, Hawthorne (2006), p. 109, and Sider (2008), §4.



Standard perdurantism has a simple response to this worry: since the view is maximally liberal, it accepts both incars and cars – thus allowing us to have ordinary objects in our ontology without facing the charge of anthropocentrism. Since standard endurantism is highly restrictive, it cannot avail itself of this simple response. But it is easy to see that the only feature of the standard perdurantist package that plays a role in this response is its commitment to *liberalism* rather than to *perdurantism*.<sup>24</sup> Clearly, liberal endurantism can give precisely the same response to the argument from anthropocentrism and conversely, restrictive perdurantism faces the problem just as much as standard endurantism.<sup>25</sup>

### § 3 The argument from vagueness

The argument from vagueness is due to Sider, and goes roughly like this:<sup>26</sup> consider under what conditions a collection of objects compose a further object – be it synchronically or across time.<sup>27</sup> One option is to take an extreme position on this question (whether a maximally permissive universalist position or a maximally limiting nihilist position). The other option is to take a moderate position on this question. Sider argues that on any (plausible) moderate position, composition turns out to be vague – i.e. there will be scenarios where composition neither definitely occurs nor definitely fails to occur. But, Sider maintains, facts about composition entail facts about how many objects there are, so vagueness about composition would entail vagueness about how many objects there are (call this ‘count-indeterminacy’). However, since one can formulate claims about how many objects there are using purely precise logical vocabulary, this conclusion is untenable. The upshot, according to Sider, is that in order to block the argument from vagueness, we must take an extreme position to the questions of composition. Since standard perdurantists take a universalist position, they have a simple

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<sup>24</sup> That is, keeping fixed other aspects that are irrelevant to this debate, such as which spatial parts objects have at a time. (A very odd liberalist view according to which for each time *t*, all objects are extended simples might have trouble supporting arbitrary persistence conditions – at least in so far as the latter are phrased in terms of which parts objects can gain and lose).

<sup>25</sup> Note that Sider explicitly presents this as an argument in favour of *temporal parts*, not merely in support of liberalism (see e.g. Sider (2008), p. 261).

<sup>26</sup> See Sider (2001), pp. 120-139.

<sup>27</sup> I am being unspecific about what exactly is meant by ‘compose across time’, as it turns out this is a non-trivial and loaded question (see Sider (2001), pp. 132-139 and Magidor (*forthcoming*)).

response to the problem. Moreover, Sider argues that when one considers composition across time, the analogous principle of diachronic universalism entails perdurantism. This means that this response is not available to endurantists: endurantists, according to Sider, cannot accept diachronic universalism and (assuming we want to reject nihilism or other implausible “moderate” positions such as essentialism), the argument remains a serious challenge for endurantists.<sup>28</sup>

If Sider is right, then, the argument from vagueness really does seem to target endurantism per se, and even a fully liberal endurantist would not be able to respond to the argument in an analogous way to the perdurantist. Things turn out to be more complicated however. Below I briefly discuss various issues with Sider’s argument which undermine the thought that endurantists cannot block the argument in a parallel way to perdurantists. The first set of issues concerns the question of whether diachronic universalism really entails perdurantism, and the second, whether vagueness about composition really makes for count-indeterminacy.

### **§3.1 Does diachronic universalism entail perdurantism?**

For the purposes of this sub-section, let us grant that in order to block the argument from vagueness, we need to accept a principle of diachronic universalism. As noted above, Sider argues that diachronic universalism entails perdurantism and thus only perdurantist can block the argument in this way. This argument is important, because it threatens to show that endurantists cannot simply resist the argument by also adopting universalism (which on the face of it might seem orthogonal to the debate).<sup>29</sup>

However, elsewhere, I argue that Sider’s formulation of the principle of diachronic universalism is inadequate, and that when formulated correctly, the principle on the one hand does not entail

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<sup>28</sup> See Sider (2001), p. 138.

<sup>29</sup> Koslicki (2014), p. 122, for example, complains that two views ought to be orthogonal – I think she is right, but just leaving things with this remark does nothing to address Sider’s very specific argument that endurantists cannot accept diachronic universalism. I address Sider’s argument in Magidor (*forthcoming*), and briefly in my remarks above.

perdurantism, and on the other hand can still be used to block the argument from vagueness.<sup>30</sup> I cannot go into the details here, but I will merely note that if one accepts my argument, then there are after all versions of endurantism that can accept diachronic universalism (properly formulated), and thus both perdurantist and endurantists can block the argument from vagueness by adopting universalism.

My above argument aside, we might ask what follows if we grant Sider his own formulation of diachronic universalism. Sider provides a perfectly valid rigorous proof that diachronic universalism on his formulation entails perdurantism, but as he acknowledges, a crucial premise in his proof is the principle of Strong Supplementation (SSP)<sup>31</sup>: the principle of diachronic universalism (as formulated by Sider) entails that for any object O and time *t* at which O exists, there is an object z which exists at

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<sup>30</sup> See Magidor (*forthcoming*). Sider's formulation of the principle of diachronic universalism proceeds thus. First, let an *assignment* be a (possibly partial) function *f* from times to classes of objects that exist at those times. Second, given an assignment *f*, let a *D-fusion* of *f* be an object *z*, such that for every time *t* in *f*'s domain, *z* is a fusion at *t* of *f*(*t*). Third, given an assignment *f* let a *minimal D-fusion* of *f* be an object *z* which is a D-fusion of *f*, and exists only at the times in *f*'s domain. Finally, let *diachronic universalism* be the thesis that every assignment *f* has a minimal D-fusion. In very rough terms, the problem with this formulation is that it is not only a principle about how to use existing objects to 'build up' more complex objects (as one would expect of universalism), but also a principle about how to 'chop-up' existing objects into smaller parts.

My alternative formulation reads thus: Let *S* be a class of objects. Let a *D\*-fusion* of *S* be an object *z* s.t. (i) *z* exists exactly when at least one object in *S* exists and (ii) at each time *t* at which *z* exists, *z* is the fusion at *t* of  $S_t = \{x \in S: x \text{ exists at } t\}$ . Finally, let the (amended) principle of diachronic universalism be the claim that every class objects *S* has a *D\*-fusion*. It is easy to see that this alternative principle does not entail perdurantism (e.g. because it is consistent with there being no instantaneous objects), and is a closer analogue to the principle of atemporal universalism on which Sider's principle is (according to him) modelled.

The argument for why Sider is wrong to think that his stronger principle is needed to block the argument from vagueness is too complex present here in detail, but to give an example of one case, consider the example of Old and Young Ted (Sider (2001), p.136): suppose we know the world contains two people – Old-Ted which exists at *t*<sub>1</sub>, and Young-Ted which exists at *t*<sub>2</sub> and these two people are physically and psychologically connected/similar to each other to some intermediate degree. Sider suggests that unless we accept his own principle of diachronic universalism, we will be forced to say that it is vague whether there is an object composed of Young-Ted and Old-Ted, and hence vague whether there are two or three objects around. But note that my own formulation of diachronic universalism entails, just as Sider's principle, that there is an object composed of both.

See Magidor (*forthcoming*) for a detailed discussion of these issues.

<sup>31</sup> See Sider (2001), p. 138 and Sider (2003).

$t$  and only at  $t$ , and such that  $z$  is the fusion of  $\{O\}$  at  $t$ .<sup>32</sup> It remains, however to show that  $z$  is an ITP of  $O$  at  $t$ , and in particular that  $z$  is a part of  $O$  at  $t$ . This follows trivially if we accept SSP.<sup>33</sup>

It is worth recalling however, that at least one kind of endurantist view we are considering (SSP-Free LE) rejects SSP. Indeed, their rejection is precisely relevant to the case at issue: defenders of SSP-Free LE would maintain that  $z$  is an instantaneous object which at  $t$  is composed of precisely the same particles as  $O$ , but is nevertheless not a part of  $O$ . It seems, then, there is scope for an endurantist view which can consistently accept the principle of diachronic universalism (as Sider understands it), and this view can block the argument from vagueness in precisely the same way as Sider does.

One should note, of course, that this proposal faces some far-from-trivial challenges. For a start, as Sider notes<sup>34</sup>, since  $z$  fuses  $\{O\}$ , such endurantists would at least have to accept that the enduring object  $O$  is part (at  $t$ ) of the instantaneous object  $z$  - a conclusion that even a fully liberal endurantist might not find palatable.<sup>35</sup> Moreover, in the context of the current settings where universalism is endorsed, one would have to reject not only SSP but also the much less controversial principle of Weak Supplementation (WSP).<sup>36</sup> For assume that  $z$  is not a part of  $O$ , and consider the fusion at  $t$  of  $O$  and  $z$  (call this object ‘Oz’). Since  $O$  is a proper part of Oz ( $O$  is not identical to Oz, because  $z$  is a part of Oz but not of  $O$ ), then by WSP, Oz would have a part that does not overlap  $O$ . But all proper parts of Oz are either parts of  $O$  (so overlap  $O$ ), or parts of  $z$  (so overlap  $O$ , because  $z$  is the fusion of  $\{O\}$ ). It follows that WSP ought to be rejected as well.

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<sup>32</sup> This follows because for each object  $O$  and time  $t$ , we can define an assignment  $f$  which has only  $t$  in its domain and where  $f(t)=\{O\}$ . By Sider’s principle,  $f$  has a minimal D-fusion, i.e. an instantaneous object  $z$  which is the fusion of  $\{O\}$  at  $t$ .

<sup>33</sup> Recall that, by definition,  $z$  is a fusion at  $t$  of a class of objects  $S$  iff (i) every member of  $S$  is a part of  $z$  at  $t$  (ii) every part of  $z$  overlaps at  $t$  some member of  $S$ . By SSP, if  $z$  is not a part of  $O$  at  $t$ , then  $z$  has some part at  $t$  which does not overlap  $O$  at  $t$ , contrary to clause (ii) of the definition of fusion at  $t$ .

<sup>34</sup> See Sider (2003).

<sup>35</sup> This follows from clause (i) in the definition of fusion at  $t$  (see n. 33 above). It’s important to note, though, that standard perdurantists accept precisely this: namely, that persisting objects are parts (at a time) of their ITPs! (This follows because on the perdurantist view,  $x$  is part of  $y$  at  $t$  iff  $x$ ’s ITP at  $t$  is (atemporally) part of  $y$ ’s ITP at  $t$ . And indeed this definition is crucial in order to get claims such as ‘The table-leg is part of the table at  $t$ ’ to come out true, even if the leg is later detached from the table).

<sup>36</sup> The principle of Weak Supplementation says that if  $x$  is a proper part of  $y$ , then  $y$  has some part which does not overlap  $x$ . The argument that follows is based on Varzi (2009).

How difficult is it to live with such a rejection? Cody Gilmore has recently argued that WSP should be replaced with the weaker principle of Quasi-Supplementation (QS): if  $x$  has a proper part, then  $x$  has two disjoint parts.<sup>37</sup> This is relevant here because it does not seem that a defender of SSP-Free LE that accepts Sider's principle of diachronic universalism would need to reject QS. (After all, the objects in our examples, except the atoms, have disjoint proper parts). In contrast, Aaron Cotnoir argues that QS is too weak to rule-out various unwanted models of mereology.<sup>38</sup> I am sympathetic to Cotnoir's claim that QS is insufficient to rule out some of the models that make a rejection of WSP unpalatable (and thus it may not help to replace WSP with QS), but for what it's worth, I am willing to consider the possibility that mereology violates both WSP and QS.<sup>39</sup>

This is clearly not the place to resolve these complex issues. We can conclude by accepting that in so far as one is willing to reject both SSP and WSP (as well as accept that enduring objects are parts at a time of instantaneous ones), there are version of endurantism can resist the argument from vagueness in the precisely the same way Sider's perdurantist (namely, by adopting his principle of diachronic universalism), but endurantist might well want to resist these controversial commitments. Resisting the argument by adopting my revised formulation of the principle (see f.n. 30) is probably a more promising avenue for endurantists here. Either way, despite Sider's argument it is far from clear that endurantists cannot resist the argument just as perdurantists do, i.e. by adopting (some version of) diachronic universalism.

### §3.2 Does vagueness about composition entail count-indeterminacy?

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<sup>37</sup> Gilmore (*forthcoming*).

<sup>38</sup> See Cotnoir (2014).

<sup>39</sup> Here is one paradigmatic case of an odd model that QS rules out: suppose that  $a$  is an object that has only one proper part – a simple  $b$ . This model is certainly odd, but here is one rough thought that might help make the possibility of such a model a little more palatable. Suppose that  $b$  is an extended simple, and  $a$  is an object which extends over a region containing, but larger than, the region that  $b$  occupies. Let us assume  $b$  is a part of  $a$ , and in that case it will have to be a proper part (as  $a$  occupies a larger region than  $b$ ). Moreover suppose that  $a$  has no further proper parts. It is certainly hard to understand how  $a$  can extend beyond  $b$  without having any other proper parts, but note that anyone who accepts extended simples is already committed to the claim that objects can extend in space not in virtue of having parts that extend in space. I am not sure accepting an extended 'almost simple' such as  $a$ , should be much more problematic.

For the purposes of this sub-section, let us grant Sider that diachronic universalism entails perdurantism, and thus that endurantists cannot block the argument from vagueness by being universalists. Let us also grant, if you wish, that endurantist must thus accept that there are instances where composition is vague. Still, there are two reasons to think that, once we take on board the possibility liberal endurantist views, Sider's assumption that vagueness about composition makes for count-indeterminacy does not go through.

### §3.2.1 infinite domains

As Sider acknowledges, the problem his argument raises only comes up with respect to possibilities involving only finitely many (concrete) objects.<sup>40</sup> To see why, let us recall Sider's reason for thinking that vagueness about composition entails count-indeterminacy. The thought is something like this: suppose we start out with a collection of  $n$  objects, and it is vague whether these objects compose a further object. It would then be vague whether there were altogether  $n$  or  $n+1$  objects. It is easy to see, however, that this line of thought can only go through if we start out with a finite collection of objects.

Such a restriction is, however, quite surprising in the current context because if perdurantism is true, there will very few situations in which there are only finitely many objects. For suppose there is a single object which persists over any interval of time. It follows from perdurantism that the object would also have infinitely many distinct ITPs, and thus this scenario requires infinitely many objects. Moreover, it is not clear that it would help to restrict the argument to those rare situations where no object persists for any interval of time – for in such situations it is far from clear that Sider can present a sorites-like series of cases, needed to substantiate his claim that composition is vague.

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<sup>40</sup> Sider (2008), p. 127 and p. 136.

Sider could respond by maintaining that this is not a problem, because the argument is only targeted against endurantism, not perdurantism. Understood this way, perdurantists do not need to revert to universalism to block the argument from vagueness: the mere fact that they require that any (relevant) scenario contains infinitely many objects is sufficient. It is easy to see however, that in that case liberal endurantists can provide exactly the same response, as they too require that any situation containing even one object which persists over any interval of time contains infinitely many objects.

### **§3.2.2 composition and count claims in liberal settings**

Even if we focus on possibilities involving only finitely many objects, Sider's assumption that vagueness about composition makes for count-indeterminacy fails, in particular against the background of a sufficiently liberal setting.<sup>41</sup>

To see why, consider for a start composition in a purely spatial setting (leaving the temporal dimension aside). Suppose that there are exactly three spatial points. A liberalist would maintain that for any non-empty subset of these points, there is an object exactly located at those points. Assuming there is only one such object located at each spatial region, there will be seven objects all together. But even keeping fixed these facts about the number of objects and their locations, there are many different possibilities concerning the parthood and fusion relations amongst these objects. For example, we could maintain that all seven objects are simples; or we could opt for the view that the

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<sup>41</sup> In Magidor (MS), I argue that the connection between vagueness about composition and count indeterminacy can be resisted by epistemicists about vagueness, but I leave those arguments aside here.

objects have an isomorphic mereological-structure to that of the spatial regions they occupy; or we could go for some intermediate view.<sup>42</sup>

Similar considerations apply once we introduce time into the picture. Assume that for each spacetime region there is exactly one object located in that region. Keeping this fact fixed, there are many different options for which pairs of objects instantiate the parthood relation. The standard perdurantist picture is one according to which, if *S* and *T* are two spacetime regions such that *S* is part of *T*, then the object occupying *S* is part of the object occupying *T*. A liberal endurantist is likely to take a less universalist-friendly view.<sup>43</sup> Either way, the upshot is that in a sufficiently liberal settings, facts about composition do not make a difference to ‘count-facts’, so vagueness about composition does not entail count-indeterminacy. The argument from vagueness should thus have no sway against a liberal endurantist.

In this sub-section, I have argued in liberal settings we should not accept that facts about composition entail count-indeterminacy, and hence that the argument from vagueness should not trouble liberal endurantist. But my purpose in this paper is not merely to show that endurantists (/perdurantists) have some response or other to the arguments against their view. Rather, the purpose is to show that each view can mimic the response of the opposing view. In what way is the liberal endurantists response suggested in this sub-section analogous to the response of the perdurantist?<sup>44</sup>

Although Sider proposes that the perdurantist block the argument by adopting universalism, my remarks in this sub-section suggest that this is actually a redundant feature of the perdurantist solution. Since standard perdurantists are liberalist, they can block the argument from vagueness

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<sup>42</sup> See Korman (2010), pp. 894-895 who makes a similar observation.

<sup>43</sup> Note, however, that if we allow for more than one object to occupy a set of spacetime points we can get versions of liberal endurantism which allow for a kind of universalism. For example, we could allow that any set of instantaneous short objects compose a long-lived perduring object, which is co-located throughout its lifetime with an enduring object. (After all, it is not unusual for endurantist to allow for the existence of some perduring things – for example events – possibly even perduring things that are co-located with enduring objects).

<sup>44</sup> Interestingly, Hawley’s discussion of the argument from vagueness (in Hawley (2010)) raises the possibility of a liberal endurantist position, and maintains that this sort of view can mimic the perdurantist solution to the argument. However, Hawley presents the argument from vagueness in general terms, and the particular issue of how composition connects to count indeterminacy does not explicitly come up.



simply in virtue of their liberalism (because, as I argued above, their liberalism means that whether or not composition is vague, we need not accept count-indeterminacy). Thought of in this way, the (liberal) endurantist can provide precisely the same response to the argument as the (liberal) perdurantist.

#### **§4 The argument from recombination and Humean supervenience**

The argument from recombination and Humean supervenience appears in Lewis's postscripts to 'Survival and Identity'.<sup>45</sup> The bulk of the argument uses six premises in order to argue that the world contains a multitude of instantaneous 'stages' (at least one corresponding to each ITP the perdurantist postulates). The idea is roughly this: consider an ordinary persisting object – e.g. a desk *D*. For each instant *t* of *D*'s existence, there is a possible world in which an object which is just like *D* at *t* appears for an instant and then immediately vanishes. (Most endurantists accept this.) Principles of recombination are then used to show that there is also a world *w* in which all these possibilities co-occur – i.e. for every time *t* of *D*'s existence there is an instantaneous object which is just like *D* at *t*. Finally, since the actual world is locally and intrinsically just like *w*, a certain version of Humean supervenience entails that the actual world is exactly like *w*. The upshot then is that the actual world contains a multitude of such instantaneous 'stages'.

Even if the argument thus far is successful<sup>46</sup>, it does not establish perdurantism because the conclusion that the actual world contains such a multitude of instantaneous objects is compatible with (certain versions of) endurantism. In particular it is fully compatible with liberal endurantism. According to LE, the world *does* contain such a series of instantaneous objects but, as opposed to what perdurantists argue, ordinary long-lived objects are not fusion of these instantaneous ones.<sup>47</sup>

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<sup>45</sup> Lewis (1983), pp. 76-77.

<sup>46</sup> For reasons to doubt that it is, see Hawthorne, Wasserman, and Scala (2004).

<sup>47</sup> Suppose one thinks the parthood relation is among the local intrinsic qualities of worlds. This still leaves open either the possibility that both the actual world and *w* are perdurantist worlds and the possibility that they are both liberal endurantist worlds. What if in addition one thinks that neither endurantism nor perdurantism are necessary truths and thus that one of the worlds in question might be a perdurantist world, while the other a

Admittedly, Lewis augments his argument with a seventh premise, which simply states that long-lived ordinary objects such as D have the instantaneous ‘desk stages’ as parts. As noted above, this premise is independent of the considerations Lewis raises regarding Humean supervenience<sup>48</sup> and Lewis does little to defend it other than noting briefly that the desk and ‘desk stage’ spatially coincide at the relevant time, which Lewis takes to be explained by the claim that the desk-stage is part of the desk.<sup>49</sup> But as I argue in §6, endurantists – even fully liberal endurantists – can account for spatio-temporal coincidence using very similar features to those offered by the perdurantists while nevertheless falling short of accepting that the ‘desk-stage’ is an ITP of the desk.

Thus in so far as the argument from Humean supervenience is taken to establish the existence of instantaneous stages, it is not in itself an argument for perdurantism. In order to establish perdurantism, Lewis needs to rely on a further, entirely independent, argument from spatio-temporal coincidence which is addressed in §6.

## §5 The argument from temporary intrinsics

Another prominent argument for perdurantism is Lewis’s argument from temporary intrinsics.<sup>50</sup> Lewis’s remarks on the argument are quite brief, and there is some disagreement on how exactly to interpret them. It is clear is that Lewis wants to reject one standard way for endurantists to handle change over time: namely, the relativization of properties to times. But it is less clear precisely what his complaint about the relativization strategy is. The literature on the topic recognises two main construals of Lewis’s argument.<sup>51</sup> According to the first, the problem has to do with *intrinsicity*. The worry is that some properties (e.g. being square) are intuitively intrinsic. But according to the

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liberal endurantist world? In that case, the two worlds might not be alike in local and intrinsic qualities – but this just points to a deficiency in Lewis’s original argument (i.e. it shows that, contrary to what he assumes, Lewis’s description wasn’t sufficient to ensure that the worlds are alike in local and intrinsic matters).

<sup>48</sup> Indeed, it is quite telling that Hawthorne, Wasserman, and Scala do not even site this premise as part of Lewis’s argument.

<sup>49</sup> To be more accurate, Lewis mentions three features as if they are interchangeable: that the two objects are not distinct, that they share the same parts, and that the desk-stages are (atemporal) parts of the desk. But on some views these three features are not equivalent (cf. the discussion in §6 below).

<sup>50</sup> See Lewis (1986), pp. 203-4 and Lewis (1988).

<sup>51</sup> See e.g. Sider (2001), pp. 95-96, Wasserman (2003), and Sider (2008), §3.

relativizer when we say (at  $t$ ) that my desk is square, we are attributing to it the relational property of being square-at- $t$ . The problem is that since this is a property the desk has in virtue of a relation it has to something external to it (namely moments of time), the property presumably no longer counts as intrinsic. According to the second interpretation, the crux of the problem has to do with *simpliciter* properties. The line here is that while there is nothing wrong with the relational property of being square-at- $t$  (indeed, even on the perdurantist view this is the sort of property long-lived worms have), there must at least be *some* objects that have the property of being square *simpliciter*, not in relation to times.

The perdurantist presumably has a fairly simple response to both of these worries. First, according to the perdurantist, my desk is square at  $t$  in virtue of the fact that its  $t$ -temporal-part is square. At least on one natural understanding of intrinsicity, if a property is had merely in virtue of how one's *parts* are, it counts as intrinsic. Second, although according to the (standard, worm-theoretic) perdurantist, perduring objects such as my desk do not have the property of being square *simpliciter*, at least some objects do - namely the desk's instantaneous temporal parts.

Can the endurantist provide analogous responses? If what concerns us is the intrinsicity worry, then I'm not sure they can.<sup>52</sup> However, it is generally agreed that this worry is particularly weak.<sup>53</sup> For one thing, it is natural to take a property as intrinsic at a time  $t$  if and only if an object has it at  $t$  merely in virtue of how that object is at that time, and on this understanding the endurantist has no problem construing relativized shape properties as intrinsic.<sup>54</sup> For another thing, there are some properties that worm-theoretic perdurantists would take to be instantiated only by long-lived worms and not by their

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<sup>52</sup> Unless we are willing to consider a rather unusual version of LE according to which each enduring object  $O$  does have an instantaneous part at each moment at which it exists, but this part does not count as an ITP because it does not overlap every part of  $O$  at  $t$ . (One promising way to develop this idea is to maintain that enduring objects have abstract parts as in Abstract-Parts LE, but their instantaneous parts do not have any abstract parts, and thus do not overlap everything that is part of the enduring object at  $t$ ). In that case, we could say that  $O$  is square at  $t$  in virtue of having at  $t$ , an instantaneous part which is square *simpliciter*. (One would need to be a bit more careful in how to fully develop his thought, though, because one wouldn't want an object which, at  $t$ , has the shape of a large circle to count as square at  $t$  in virtue of having an arbitrary undetached part which is a small square.) At any rate, for the remainder of the paper, I will assume that we are ruling out such versions of LE.

<sup>53</sup> Note that Sider concurs (see Sider (2008), p. 246). See also Wasserman (2003), f.n. 3, who argues that this interpretation shouldn't be attributed to Lewis.

<sup>54</sup> See Haslinger (1989).

instantaneous temporal-parts, but that we would plausibly want to classify as intrinsic (examples include: being a person or being a long-lived object). But in so far as there is a tension between being intrinsic and being time-relativized, the ‘reduction to temporal parts’ strategy would not help to resolve the tension in this case of such properties, so worm-theoretic perdurantists would still face the problem.<sup>55</sup> Finally, even if we focus on intrinsic properties such as being square which are had by ITPs, it is far from clear that on the perdurantist picture, long-lived objects possess these at a time merely in virtue of the intrinsic properties of their parts. After all, my desk is square at  $t$  not just in virtue of the intrinsic properties of its relevant ITP – it is also crucial that the ITP in question has the relational property of existing at  $t$ , rather than at another time.<sup>56</sup> It thus does not seem that the perdurantist can fully avoid the relativization of intrinsic properties to times.

What about the second worry, the one concerning simpliciter properties? Here the endurantist certainly can mimic the perdurantist response. Since liberal endurantists (even moderately liberal endurantists) accept that there are instantaneous objects, it seems that these objects have their shape properties simpliciter. (Indeed, even a standard restrictive endurantist can presumably argue that *permanently* square objects are square simpliciter – but this is perhaps less close to the perdurantist response).<sup>57</sup>

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<sup>55</sup> John Hawthorne (p.c.) suggested to me an alternative version of the worry from intrinsicity: according to this version, there are time-relativized intrinsic properties. However, time-relativized properties cannot be perfectly natural and in addition, an object’s intrinsic character is fixed by the perfectly natural properties of, and perfectly natural relations among its parts. (The idea is then that we need temporal parts to be the bearers of those perfectly natural properties that form the supervenience base for intrinsic properties of longer-lived objects). I admit that this line of thought is also one which the endurantist cannot easily mimic, but I don’t think it is very strong either. After all, it is far from obvious that time-relativized properties cannot be perfectly natural (an endurantist would plausibly think of these on a par with maximally determinate mass properties, which are often taken to be perfectly natural).

<sup>56</sup> Thanks to Cian Dorr for bringing this point to my attention.

<sup>57</sup> Wasserman (2003) discusses an objection that a perdurantist can raise against an endurantist who accepts the relativisation strategy but maintains that instantaneous objects have shape properties simpliciter. The objection is that the endurantist needs two primitive properties (‘square-at- $t$ ’, and ‘square simpliciter’), where the perdurantist can reduce one to the other (using the temporal-parts reduction as above). As Wasserman (following Hawthorne) notes, the endurantist can respond by reducing shape-simpliciter to shape at a time (an object is square simpliciter if it is square throughout its life time). Note also that given liberal endurantism one could alternatively propose a reduction in the other direction (an object is square at  $t$  if there is an instantaneous object entirely co-located with it at  $t$  which is square).

A final note: Sider takes the argument from temporary intrinsics to provide not only support for perdurantism over endurantism, but also for *stage theoretic* over *worm-theoretic* perdurantism (the thought being that on the stage-theoretic version, it is not merely some objects, but rather ordinary objects that have their shape properties simpliciter). It is worth noting that there is a liberal endurantist view which mimics the stage-theoretic view, by arguing that although enduring objects exist, the referents of ordinary terms are instantaneous objects rather than enduring ones, and uses Sider's temporal-counterpart machinery to avoid error-theory. (I say a bit more about this in §6 below.) This stage-theoretic version of endurantism certainly can mimic Sider's solution to the problem of temporary intrinsics.

### **§6 The argument from coincidence**

Probably the most familiar argument for perdurantism is the argument from coincidence. Consider again the case of Statue and Lump. On the one hand, we have strong reasons to believe Statue and Lump must be non-identical, because they seem to have different properties (Lump was created on Monday, and Statue on Tuesday; Lump, but not Statue, could survive crushing; and so forth). On the other hand, this would make Statue and Lump non-identical but (at the relevant times) entirely co-located objects, and the worry is that – at least without further explanation – it is difficult to accept that two macroscopic objects can be co-located in this way (especially since their relevant properties don't 'add up' – e.g. they don't have double the mass of each of Statue and Lump).

Standard worm-theoretic perdurantism does not entirely escape this challenge, because it admits that Statue and Lump are non-identical yet co-located. (I will say something about stage-theoretic

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A related worry (suggested by an anonymous reviewer): doesn't the endurantist face the challenge of explaining how it is that the enduring object has the same property-at-a-time (e.g. being square at  $t$ ), as the corresponding co-located instantaneous object has simpliciter (being square)? I think the liberal endurantist has the resources to meet this challenge: in the case of shape properties (such as being square) the mere fact of co-location at a time explains why the two objects share a shape. In the case of more complex properties (such as having a certain weight at a time), this challenge can be met at least on some versions of LE. For example, given SSP-Free LE, one can explain this by the fact that the two objects are composed of precisely the same particles at  $t$ , and given Abstract Parts LE this can be explained by the fact that the two objects share all their purely spatial proper parts. (I admit that Duplicate Particles LE would have a harder time meeting this challenge, but as noted that is the least attractive version of LE).

perdurantism below). However, proponents of the view can point to a feature which sugar-coats this pill: at the times at which they are co-located, Statue and Lump share all their parts – which explains why they are co-located (as well as why, for example, they have the same weight but their weights don't add up).<sup>58</sup>

Can endurantists mimic this perdurantist response? Here it seems that we do not even need to appeal to any particularly revisionary version of endurantism. Consider again an endurantist view which adopts the 'mutual parthood' model of coincidence. This view accepts, just as perdurantism does, the claim that (at the relevant time), Statue and Lump share all of their parts (including their non-proper parts). Endurantism can thus offer exactly the same two explanations as perdurantists do, to make co-location palatable.<sup>59</sup>

Interestingly, Sider more or less concedes this point.<sup>60</sup> His objection, however, is that mutual-parthood endurantists face a dilemma. Either they are fairly restrictive concerning which sort of enduring objects they allow for (so, for example, they allow for statues, but not for incars), or they are maximally liberal. If they choose to be restrictive, they face the arguments from vagueness and from anthropocentrism. If they choose to be maximally liberal, their view collapses into perdurantism.

The first horn of Sider's dilemma is somewhat suspect in this context: it suggests that the argument from coincidence is not itself a problem for endurantism (Sider is thus merely reiterating here other, independent arguments against endurantism).<sup>61</sup>

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<sup>58</sup> See Sider (2001), p. 53. It is perhaps also worth noting that another version of the perdurantist's sugar-coating strategy appeals claim that Statue is (atemporally) part of Lump. But it is worth bearing in mind that this response will not help with other versions of the puzzle (e.g. ones where Statue later changes its matter to something completely different matter than the clay, and hence is *not* an atemporal part of Lump) and thus it is doubtful that it constitutes an essential component of the perdurantist response to the original puzzle. In these more complex cases, the perdurantist at best can point out that Statue and Lump atemporally *overlap*, but the endurantist has no problem mimicking the claim that the two objects overlap (at a time).

<sup>59</sup> See Wasserman (2002), §5 for further defence of the claim that the mutual-parthood endurantist solution to the problem of coincidence is highly analogous to that of the perdurantist.

<sup>60</sup> As he puts it: "Mutual parthood allows the three-dimensionalist to take over part of the four-dimensionalist's explanation of coincidence" (Sider (2001), p. 155).

<sup>61</sup> One could try to argue these arguments are not independent: the arguments from vagueness and anthropocentrism shows that one should opt for a liberal rather than a restrictive version of endurantism, but

With respect to the second horn, Sider is right that if mutual-parthood endurantists choose to be maximally liberal their view collapses into perdurantism. However, it is important to notice that while ‘mutual-parthood’ endurantism comes closest to mimicking the standard perdurantist response to the problem of coincidence, various other versions of LE come very close as well. Consider first SSP-Free LE. While the view falls short of accepting that Statue and Lump share *all* their parts, it can nevertheless accept that Statue and Lump share all their *proper* parts. And in so far as the sharing of parts was supposed to make the co-location of Statue and Lump more palatable, I am not sure that the sharing of all proper parts is any less helpful for this purpose than the sharing of all parts. Next consider Abstract Parts LE. While the view falls short of accepting that Statue and Lump share *all* their parts, it can nevertheless accept that Statue and Lump share all their *purely spatial* parts. Again, in so far as the sharing of parts of was supposed to make the co-location of the objects palatable, it seems that the sharing of *spatial* parts should suffice for this purpose. Thus even an endurantist who is swayed towards maximal liberalism (e.g. because of the argument from vagueness or the argument from anthropocentrism) can respond to the challenge of coincidence in at least very similar way to the perdurantist.

So far, I have discussed the worm-theoretic solution to the puzzle of coincidence. It is worth saying a few words about the stage-theoretic solution as well.<sup>62</sup> Stage theory agrees with worm theory about which objects exist, but maintains that ordinary terms such as ‘Statue’ and ‘Lump’ refer to instantaneous objects (those objects that worm-theorists would typically think of as being merely proper temporal parts of statues and lumps). The stage-theoretic response to the puzzle of coincidence is thus that Statue and Lump are in fact identical. As is familiar, stage theory then appeals to a temporal-counterpart theory in order to maintain that ordinary sentences such as ‘The lump was created on Monday’ or ‘The statue was created on Tuesday’ come out true. Again, my current purpose

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the puzzles of coincidence show that the endurantist needs to go for the mutual-parthood view. The problem is that mutual-parthood, liberalism, and endurantism are jointly inconsistent. For one thing, this complaint assumes that one endorses the arguments from vagueness and anthropocentrism. For another, it does not work because – as I argue below - liberal endurantist can also respond to the puzzle in a similar fashion, without accepting mutual-parthood.

<sup>62</sup> See Sider (2001), pp. 200-208.

is not to assess the merits of the view. I simply wish to note that there is nothing to block liberal endurantists from adopting precisely the analogous view. That is, LE can accept that there exist many long-lived, enduring material objects, but that our ordinary terms refer to objects which endure for only an instant. And just as ordinary stage theory does, the view can appeal to temporal-counterpart construals in order to avoid error theory.

One could of course argue that this view is completely unmotivated: given that we accept long-lived enduring objects, why would ‘Lump’ refer to an instantaneous object rather than to an enduring one? This objection, however, would apply just as equally to Sider’s stage view (which, recall, accepts long-lived *perduring* objects in its ontology).<sup>63</sup>

### **§7 The arguments from motion (restriction and collapse)**

So far, I have discussed the main arguments in favour of perdurantism. Let me now turn to the main arguments in favour of endurantism. Probably the strongest arguments against perdurantism have to do with how the view handles motion of objects.<sup>64</sup> One set of problems is that, taken at face-value, perdurantism seems to entail numerous violations of the laws of physics. For example, take two objects O1 and O2 that are extremely far apart, and consider an object which is a fusion of O1 at *t*, and O2 at an arbitrarily short time after *t*. Give the right values, the fused object would seem to travel faster than the speed of light.<sup>65</sup> A standard perdurantist response to this issue is to maintain that the relevant laws of physics involve quantification over a *restricted* set of objects, but this still leaves

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<sup>63</sup> Sider briefly contemplates the possibility of combining three-dimensionalism with a temporal counterpart theory (Sider (2001), p. 207), though he doesn’t explicitly consider a view such as LE in this context. His complaint against such views is that since they allow that some objects endure, those enduring objects would be more eligible candidates for referents of our terms. However, it is hard to see why this consideration would apply to liberal endurantism but not to Sider’s view (which has long-lived worms in the vicinity as potential referents). As far as I can tell, all that Sider offers on the latter point is that stages are more eligible than worms because they better account for our intuitions regarding counting (*ibid.* p. 196), but if he is right the same would be true of a ‘stage-theoretic’ version of endurantism over ordinary endurantism.

<sup>64</sup> For a helpful discussion of the puzzles brought up in this section see Hawthorne (2006), ch.6.

<sup>65</sup> See Hudson (2002) and Balshov (2003a) for ways to raise this problem in relativistic settings.



perdurantism with the challenge of specifying the restriction in question (following Hawthorne, call this ‘The restriction problem’).<sup>66</sup>

A related, and particularly troubling set of issues, concerns the Kripke-Armstrong rotating disc problem and similar scenarios.<sup>67</sup> Intuitively, it seems possible for there to be a perfectly homogenous disc which is stationary, and possible for there to be a duplicate homogenous disc (that is another disc of the same size, volume, material, etc.) which is rotating. Without saying more, however, standard perdurantism has trouble construing and distinguishing these two possibilities. For plausibly, the disc counts as stationary/rotating in virtue of how its spatial parts move. But on the standard perdurantist picture any way of ‘carving up’ spatiotemporal sub-regions of the disc corresponds to a part of the disc, and thus the two discs have duplicate spatial parts, and in particular, each disc has parts that behave in the way we would expect a stationary disc’s part to behave, as well as ones that behave the way we expect a rotating disc’s to behave. One way to sharpen the problem (following Hawthorne (2006)) is as one of *collapse*: what we intuitively think of as two distinct possibilities seem to collapse into a single possibility. But I think this understates the difficulty of the problem. This is so because we can consider a view which argues that each of the two possibilities contains two discs – one rotating and one stationary. While this sort of view would still face the problem of collapse (that is, in so far as we are not distinguishing *de re* differences amongst possibilities), it would at least allow us to coherently construe the possibility of a spinning (/rotating) disc. The immediate picture suggested by standard perdurantism, on the other hand, does not even allow for this: each of the two scenarios contain discs which have both ‘rotating’ parts and ‘stationary’ parts so (depending on precisely how the rotation of the whole is supposed to depend on that of its parts) we would be forced to accept some untenable consequences such as that the disc is both rotating and stationary.

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<sup>66</sup> Note that one should not conflate this kind of ‘restriction-of-laws’ solution with the solutions offered by restrictive perdurantism/endurantism (see below). In the former case, no metaphysical restriction is placed on which objects exists, but rather the laws are formulated so that their quantifiers only range over a specified subset of objects.

<sup>67</sup> See Sider (2001), pp. 226-236, Hawthorne (2006), pp. 119-123, and references within.

As with the previous problem, a natural way for the (standard) perdurantist to try and address the problem is to argue that disc's pattern of motion is determined not by how any of its parts behave, but rather by how a *restricted* set of 'special' parts behave. However, it is widely recognised that the rotating disc problem puts extra pressure on such restriction based solutions, because it does not allow one to require that the specified restrictions involves properties which supervene on local intrinsic qualities of the disc.<sup>68</sup>

Endurantism presumably has a simple solution to both these problems. Since the view as it is standardly construed denies liberalism, it can simply deny the existence of an object which occupies the spatio-temporal region of O1 at  $t$  and the distant O2 at time shortly after  $t$ . Similarly, the view can construe the two discs as having crucially different profiles: suppose for example that the disc has at  $t$  a part O occupying its top-left quadrant. Let  $S$  be the space-time region occupying the top-left quadrant of the disc at  $t_1$ . Let  $S_1$  be a space-time region containing the same spatial locations as in  $S$  but at a slightly later time  $t_2$ . Let  $S_2$  be space-time region consisting of a slightly shifted quadrant of  $S$  at the later time  $t_2$ . In the case of the stationary disc, the endurantist can argue that there is no object occupying the spacetime region which is the union of  $S$  and  $S_2$  (and thus in particular, O did not shift to the new spatial location by  $t_2$ ), while in the case of the rotating disc, the endurantist can argue that there is no object occupying the spacetime region which is the union of  $S$  and  $S_1$  (and thus in particular, O hasn't remained in place between  $t_1$  and  $t_2$ ). But put this way, it is easy to see that the key component to the endurantist solution is its restrictiveness rather than endurantism itself. Indeed, exactly the same response to the problems of motion is available to versions of perdurantism which deny liberalism.<sup>69</sup>

In the case of super-fast motion, it should come as no surprise that liberal endurantism faces the problem of how to restrict the laws of physics just as much as standard perdurantism. I think the view does, however, have more interesting possibilities when it comes to the problem of collapse. Let us

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<sup>68</sup> See e.g. Hawley (1999), and Sider (2001), pp. 225-6.

<sup>69</sup> Balshov (2003a) and Balshov (2003b) defends restrictive perdurantism as a solution to the problem of superluminal motion.

simplify things by looking at a toy model on which our ‘disc’ occupies only two spatial points  $p_1$  and  $p_2$ , at only two moments of time  $t_1$  and  $t_2$ . Given LE’s commitment to liberalism we must accept the existence of objects with the following profiles:

SS1 (small stationary 1): occupies  $p_1$  at  $t_1$  and  $p_1$  at  $t_2$ .

SS2 (small stationary 2): occupies  $p_2$  at  $t_1$  and  $p_2$  at  $t_2$ .

SM1 (small moving 1): occupies  $p_1$  at  $t_1$  and  $p_2$  at  $t_2$ .

SM2 (small moving 2): occupies  $p_2$  at  $t_1$  and  $p_1$  at  $t_2$ .

Large: Occupies both points at both times.

Note, however, that this leaves completely open which of the smaller objects (if any) are parts of Large. Thus even without proposing any restrictions on which objects the laws of motion apply to, we can describe two distinct possibilities: one involving the object Large having SS1 and SS2 as parts (this would be a possibility in which Large counts as stationary), and one in which Large has SM1 and SM2 as parts (this would correspond to Large ‘rotating’). Of course, this is a highly simplified model, but I take it that the point generalises. While liberal endurantism faces the restriction problem, it is far from clear that the view faces the (probably more troubling) problem of collapse.

We have seen that denying liberalism (for either perdurantism or endurantism) is sufficient to block the spinning disc problem, but what the above discussion shows is that other manoeuvres are also available: one can maintain liberalism if one denies that, in the case of the stationary disc, the ‘small moving bits’ are parts of the large stationary disc. The standard perdurantist view has the spatiotemporal sub-region relation be isomorphic to the (atemporal) parthood relation, and thus in particular accepts the small moving bits must be parts of the large disc. But one might wonder whether liberal perdurantists can avail themselves of a similar resolution to the spinning disc problem as liberal endurantism, by adopting a non-standard version of perdurantism which while liberalist,

nevertheless denies that that the moving bits are parts of the stationary disc. It turns out, however, that it is difficult for perdurantists to achieve this result. For (to use the above toy model again) if the disc is stationary, then SS1 and SS2 are each parts of it at both  $t_1$  and  $t_2$ . By the perdurantist's definition of part-at-a-time, this requires (among other things) that SS1's ITP at  $t_1$  (an object which exists only at  $t_1$  and occupies only  $p_1$ ) be part of the disc's ITP at  $t_1$ ; Similarly, SS2's ITP at  $t_2$  (an object which exists only at  $t_2$  and occupies only  $p_2$ ) must be part of the disc's ITP at  $t_2$ . Now consider SM1. It shares SS1's ITP at  $t_1$  (the ITP which occupies  $p_1$  at  $t_1$ ), and it shares SS2's ITP at  $t_2$  (the ITP which occupies  $p_2$  at  $t_2$ ).<sup>70</sup> It thus follows, again from the perdurantist definition of part at a time, that SM1 must be part of the stationary disc at both times!

### **§8 The argument from permanent coincidence**

Another well-known problem for perdurantism is the problem of permanent coincidence. Consider a variant of the Statue and Lump scenario in which Statue and Lump are created and destroyed at exactly the same time. Even in this case, there are strong reasons to think that Statue and Lump are non-identical objects— for example, they seem to have different modal properties (Statue could survive squashing, but Lump could not). Standard perdurantism, however, maintains that in this case Statue and Lump are identical. This means that the view faces the challenge of explaining away the appearance that Statue and Lump have different properties.<sup>71</sup> Moreover, standard perdurantism has the somewhat unattractive feature of offering an entirely different solution to the problem of temporary coincidence and the problem of permanent coincidence. (In the latter case, the view concedes the objects are non-identical and explains how this is possible; In the former case, it maintains that they are identical and explains away data which suggests otherwise.)

Endurantism on the other hand, can offer the same solution to both problems. Recall again the solution put-forward by 'mutual-parthood' endurantism: in the case of both permanent and temporary

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<sup>70</sup> I suppose the one remaining option for the perdurantist here is to maintain that SM1 and SS1 have co-located but not identical temporal parts at  $t_1$ , but this risks bringing the view dangerously close the problems encountered with Duplicate Parts LE.

<sup>71</sup> In the case of modal properties, the most common way to do this is to appeal to a counterpart-theoretic machinery (see Lewis (1971)).

coincidence the view maintains that Statue and Lump are distinct, but share all their parts. (And the liberal endurantist solutions discussed in §6 can also provide the same responses to both puzzles).

In the case of the problems of motion, standard perdurantism faces a problem that standard endurantism does not because the view is highly liberal about which objects there are and how they compose. But in this case, the problem is rather that in other respects standard perdurantism isn't liberal enough: while the view maintains that for any collection of occupied spacetime points there is an object exactly located at that region, it also maintains that there is *only one* such object. Endurantism, on the other hand, allows for two objects to occupy exactly the same spatial regions for their entire lifetimes.

But here again, we need to note that the uniqueness of occupation does not follow from perdurantism per se: one can contemplate versions of the view that do not have this feature, and indeed, those versions *can* mimic the endurantist solutions to the problem of permanent coincidence. For example, perdurantist could mimic the mutual-parthood solution by rejecting the anti-symmetry of atemporal parthood<sup>72</sup>, and conceding that in the case of permanent coincidence Statue and Lump share all their parts and are parts of each other (both at any time of their existence, and atemporally), yet are nevertheless distinct. Alternatively, perdurantists could mimic responses such as those offered by Abstract Parts LE, by maintaining that in addition to their spatial and temporal parts, Statue and Lump have abstract parts which they do not share with each other.<sup>73</sup> In either case, perdurantists would not need to deny that Statue and Lump are distinct in the case of permanent coincidence.<sup>74</sup>

## §9 Conclusion

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<sup>72</sup> As already noted, standard perdurantist already reject anti-symmetry for temporalised parthood.

<sup>73</sup> One would need to be careful though, to ensure that given a perduring object O, its ITP at *t* still satisfies the condition that it overlaps at *t* every part of O at *t*.

<sup>74</sup> See Sider (2001), p. 221 for other endurantist strategies that the perdurantist can mimic. Of course, one might worry that if perdurantism accepts the analogue of the endurantist solutions in the case of permanent coincidence, it cannot complain that the endurantist solutions are inferior in the case of temporary coincidence. Thus those who are motivated to accept perdurantism over endurantism because of the arguments of temporary coincidence are unlikely to endorse such solutions. (Cf. Sider (2001), p. 222). But as I noted in §6, many endurantist solutions to the problem of temporary coincidence are already very close to those of the standard perdurantist. And at any rate, my point here is not to adjudicate between the different versions of perdurantism, but rather to argue that the debate targets more than just the endurantist/perdurantist doctrines.

In this paper I have argued that much of the endurantism vs. perdurantism debate has been misconstrued: most (if not all) of the central arguments in the debate crucially rely on additional theses, ones that are standardly packaged with each of the core views but are in fact orthogonal to them.

Does this show that the whole debate has been in vain? Certainly not. For a start, so far as the arguments in the debate are successful, they do serve to support some of these orthogonal claims. For example, in so far as we are swayed by the argument from anthropocentrism we should prefer liberal views (whether endurantists or perdurantists) over restrictive ones. Conversely, the problems of motion might give us reason to prefer restrictivism over liberalism.

Nor are the arguments in the debate irrelevant to adjudicating between endurantism and perdurantism *per se*. They can still play a role in *that* debate, albeit a much more indirect one than they are normally taken to play. This is so, because one might be ultimately convinced that the best *package* is one that contains perdurantism or endurantism. For example, suppose one is convinced by the arguments that one should prefer liberalism over restrictivism. This does not directly adjudicate between perdurantism and endurantism because either view can be combined with liberalism. But liberal perdurantism offers a different package than liberal endurantism. For example, liberal perdurantism allows for a potentially attractive picture on which the mereological structure of spacetime regions is isomorphic to the (atemporal) mereological structure of physical objects, and liberal endurantism requires some additional non-trivial commitments (such as the denial of SSP or acceptance of the claim that physical objects have abstract parts).<sup>75</sup> On the other hand, we have seen that liberal endurantism potentially offers an attractive solution to the spinning disc problem which is not readily available to liberal perdurantism. Thus in so far as one prefers one of these overall packages over another, this provides reason to prefer one of the two views concerning persistence.

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<sup>75</sup> Concerning the denial of SSP, though, one needs to be careful here, because SSP is denied with respect to temporalized parthood, and it's worth remembering that when it comes to temporalized parthood, standard perdurantism also rejects classical mereology.

Nevertheless, I think it is well worth being careful about what positions the arguments in this debate do directly target. One obvious reason is that we should strive to say *true* things, and in many cases it is simply false to claim that certain arguments, if they are sound, establish perdurantism /endurantism. A second reason is that if we misconstrue the target of an argument, we might be tempted towards a view for the wrong reasons. For example, one might be tempted to accept perdurantism because of the argument from anthropocentrism, without realising that this argument does not directly establish perdurantism and that one can be sympathetic to the line of argument and nevertheless be an endurantist. Finally, paying more careful attention to the different components of the standard packages might lead us to notice new packages, ones that we did not recognise before. For example, we might notice various versions of liberal endurantism. (Indeed, one might even find some of the new packages particularly attractive – e.g. because they allow us to respond to the standard ‘pro perdurantism’ arguments, while providing an interesting solution to the spinning disc problem). The arguments in the perdurantism-endurantism debate thus certainly advance our metaphysical understanding, but what precisely these arguments establish needs to be carefully reconsidered.<sup>76</sup>

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