

## The Argument from Vagueness for Modal Parts

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### ABSTRACT

It has been argued by some that the argument from vagueness is one of the strongest arguments in favor of the theory of temporal parts. I will neither support nor dispute this claim here. Rather, I will present a version of the argument from vagueness, which – if successful – commits one to the existence of *modal* parts. I argue that a commitment to the soundness of the argument from vagueness for temporal parts compels one to commit to the soundness of the argument from vagueness for modal parts. I say compels, but not entails; an objection to one of the arguments highlights analogous ways to reject the other, making it difficult (but not impossible) to endorse one and reject the other. This would be a significant conclusion, if true, since there are far fewer (if any) who currently commit themselves to modal parts than the many who currently commit themselves to temporal parts (and who do so in part because of the argument from vagueness).

### 1. Introduction

One of the more controversial arguments for the theory of temporal parts is the argument from vagueness. The controversy primarily comes from disagreement over its effectiveness.<sup>1</sup> My interest in this paper is not to determine whether the proponents or opponents are right, but to present a version of the argument from vagueness, which – if successful – commits one to the existence of *modal* parts. I maintain that those who endorse the argument from vagueness for temporal parts now face the burden (or benefit, depending on your metaphysical inclinations) of adopting a parallel argument for modal parts. In what follows, I will (i) briefly summarize the argument from vagueness for *temporal* parts, (ii) present a parallel argument from vagueness for *modal* parts, and (iii) consider (and reject) some of the ways a proponent of the argument discussed in (i) might try to resist the argument I present in (ii).<sup>2</sup>

I will assume in the pages that follow that the argument from vagueness for temporal parts *is* successful. Those who reject this argument (for whatever reason)

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<sup>1</sup> Proponents include Lewis (1986), Sider (1997; 2001), Varzi (2005). Note: Lewis gives an argument for vagueness for unrestricted composition, not for temporal parts in particular. Opponents include Koslicki (2003), Lowe (2005), Markosian (1998). For summary and discussion, see Korman (2010).

<sup>2</sup> To my knowledge, the argument from vagueness for modal parts is not discussed anywhere in current philosophical literature. Brian Weatherson, in a blog discussion in 2003, discusses the topic briefly. He expresses skepticism of the project and (admittedly) doesn't develop the view in much detail.

might nonetheless find the following discussion beneficial since it lends itself to a modus tollens against the argument for temporal parts: if the success of the argument for temporal parts ties us to the success of a modal version of the argument, then this would commit proponents of the argument for temporal parts to modal parts as well, which is untenable. So, one may argue, we should reject the assumption that the argument from vagueness for temporal parts is successful. Of course, whether or not a commitment to modal parts *is* untenable would have to be established. But certainly there far fewer (if any) who currently commit themselves to modal parts than the many who currently commit themselves to temporal parts.<sup>3</sup> It would be significant, then, both to friends and foes of the argument from vagueness, to show that an endorsement of one argument compels one to an endorsement of the other.

## 2. Sider's argument from vagueness for temporal parts<sup>4</sup>

Most of us grant that there are ordinary objects – e.g., rocks, trees, tables and chairs. We also grant that these objects did not always exist, nor will they always exist. The chair you are sitting on now, for example, was not around at the beginning of time. Now it is. Later it won't be. This may lead us to wonder: under what conditions does the chair go into and out of existence over time? Under what conditions do objects *in general* come into and go out of existence over time?

Let us grant that there are lots of different times – yesterday, today, tomorrow at noon, etc. – and let us grant that there are lots of different objects that exist at those times – the collection of molecules in your chair yesterday, the collection of molecules in your chair right now, the collection of molecules in your chair tomorrow at noon, etc.<sup>5</sup> Given these, when do we think that there is an object that is composed of these various different objects at various different times? We can call this the *Diachronic Composition Question*<sup>6,7</sup>:

<sup>3</sup> Although see Graham (2014), Wallace (2014) and Wallace (ms).

<sup>4</sup> My summary of Sider's Argument from Vagueness is adapted from Varzi (2005). I use Varzi's version of the argument because it makes certain controversial premises more explicit.

<sup>5</sup> Assuming that there are times other than now (or worlds other than the actual one, as we'll see in the case of the modal argument from vagueness) is an assumption some might have difficulty accepting (e.g., presentists and other A-theorists). Nonetheless, let us merely flag the assumption for now; I will discuss it later after I have presented the argument for modal parts.

<sup>6</sup> This question is the diachronic version of Van Inwagen's Special Composition Question. See Van Inwagen (1990).

<sup>7</sup> More precisely, Sider presents us with several definitions:

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

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

Minimal D-fusion: *x* is a minimal D-fusion of an assignment *f* iff (i) *x* is a D-fusion and (ii) *x* exists only at those times in the domain of *f*.

The DCQ then becomes: when does a given assignment have a minimal D-fusion?

*Diachronic Composition Question* (DCQ): given various times and various objects existing at each, under what conditions will there be some object that is composed of all and only those objects at those times?

There are three logically exhaustive and exclusive answers to DCQ: (i) under no conditions (never), (ii) under some conditions (sometimes), and (iii) under all conditions (always). The argument from vagueness for temporal parts (TP) begins with these options and proceeds as follows:

#### TP

- (1) There are three answers to DCQ: (i) never, (ii) sometimes, (iii) always.
- (2) If (i), then we are nihilists about composition
- (3) But nihilism is false; objects do have parts.
- (4) So not (i).
- (5) If (ii), then we can construct a sorites series (of composition).
- (6) If we can construct a sorites series (of composition), then there is vagueness involved in statements about composition.
- (7) If there is vagueness involved in statements about composition, then the vagueness is either in our language or in the world.
  - (7.1) But statements settling the question of whether composition occurs (or not) can be rephrased as count statements.
  - (7.2) And count statements involve only logical terms, which cannot be vague.
  - (7.3) So statements involving composition do not contain any vague terms.
  - (7.4) So it cannot be that the vagueness involved in the composition sorities series is due to vagueness in our language.
  - (7.5) So, it must be that the vagueness is in the world.
  - (7.6) But this is absurd.<sup>8</sup>
- (8) So it must not be the case that, as far as composition goes, there is either vagueness in our language or in the world.
- (9) So there must not be vagueness involved in statement about composition.
- (10) So we must not be able to construct a sorites series (of composition).
- (11) So it is not the case that the answer to DCQ is (ii).
- (12) So, by elimination, the answer to DCQ is (iii).
- (13) The only metaphysical view that can adequately maintain (iii) is one that committed to temporal parts.
- (14) So there must be temporal parts.

As I mentioned at the outset, I will not defend the soundness of the above argument. I will assume that it is valid and that the premises are plausible. I am interested in

<sup>8</sup> This is assuming the Linguistic Theory of Vagueness, which I won't defend here. See Lewis (1986), Sider (1997; 2001), etc., for discussion.

determining whether a commitment to the soundness of the above argument for temporal parts compels one to commit to the soundness of a parallel argument for modal parts. In the next section I present the argument from vagueness for modal parts, followed by objections and replies.

### 3. *The argument from vagueness for modal parts*

Let me mention several points before I present the modal argument. First, the argument from vagueness for temporal parts (TP) – as I have stated it – assumes that there are times. Likewise, the argument from vagueness for modal parts (MP) – as I will state it – assumes that there are possible worlds. One might wonder whether TP, and analogously MP, could be phrased in a more ontologically neutral way. Perhaps one could give an argument from vagueness for temporal parts that does not ontologically commit to times other than the present. If so, then perhaps one could give an argument from vagueness for modal parts that does not ontologically commit to worlds other than the actual world.<sup>9</sup> I have my reservations about the effectiveness of such arguments, but I will hold off discussion of this topic until section 4. For now, let us investigate the modal parallel of TP, which will commit to possible worlds other than the actual world; later we will investigate the consequences of dropping this assumption.

Second, neither argument need take a stand on whether these times or worlds, or the individuals in these times and worlds, are abstract or concrete. Admittedly, this issue is more controversial in the case of possible worlds than with times, since a commitment to concrete possible worlds (but not concrete times) is often met with outrage and incredulity (Lewis 1986, 133–135). I grant that both arguments are more easily understood if we assume that times and worlds are concrete. Indeed, the definition of both ‘temporal part’ and ‘modal part’ (given below) involve notions of existence *at a time* or *at a world*, respectively. These relations are likely less intuitive if either times or worlds are abstract rather than concrete.<sup>10</sup> However, let us set this complication aside for now and assume concrete temporal and modal realism. I will discuss the consequences of dropping these assumptions in section 4.

Third, I intend for any view that is committed to modal parts to be parallel in structure to a view that is committed to temporal parts. To begin, the definition of a modal part can be analogous to the definition of a temporal part. Sider gives the following mereological definition of a temporal part: *x* is an *instantaneous temporal part* of *y* at an instant  $t =_{df}$  (i) *x* exists at, but only at, *t*, (ii) *x* is part of *y* at *t*; and (iii) *x* overlaps at *t* everything that is part of *y* at *t* (Sider 2001, 59). A parallel

<sup>9</sup> Thanks to an anonymous referee for *dialectica* for raising this point.

<sup>10</sup> Although, as I discuss below, this does not make the relevant notions incoherent or mysterious.

(initial) definition of modal part is:  $x$  is a *world-bound modal part* of  $y$  at a world  $w =_{df}$  (i)  $x$  exists at, but only at,  $w$ , (ii)  $x$  is part of  $y$  at  $w$ ; and (iii)  $x$  overlaps at  $w$  everything that is part of  $y$  at  $w$ .<sup>11</sup> This definition may ultimately need some tweaking, but let us begin with it.

One way to understand modal parts is to imagine that individuals are trans-world (and trans-spatio-temporal) sums or *lumps*.<sup>12</sup> Ordinary individuals are mereological sums of (at least) *world* parts. Each of these world parts is world-bound in much the same way that an instantaneous temporal part is temporally bound. Let us call this *lump theory*.<sup>13</sup> According to a temporal parts *worm* theory, what makes it the case that you used to be 3ft. tall is that you – an extended, four-dimensional object (worm) – have a temporal part that *is* 3 ft. tall. Similarly, according to lump theory, what makes it the case that you could have been president is that you – an extended, trans-world object – have a modal (or world) part that *is* president. One would take the ‘part’ part of ‘counterpart’ seriously; things are possible or impossible for you because your world *parts* are doing (or not doing) various things in various possible worlds.

Another way to understand modal parts is to accept Lewis’s modal realism with counterpart theory. Ordinary individuals are world-bound, yet they have other-worldly individuals as counterparts. Each of these counterparts is world-bound in the same way that an instantaneous temporal stage is temporally-bound. According to temporal parts *stage* theory, what makes it the case that you used to be 3ft tall is that you – an instantaneous temporal stage – have a temporal counterpart that is 3ft tall. Similarly, according to modal parts counterpart theory, what makes it the case that you could have been president is that you – a world-bound individual – have a counterpart that is president. Counterpart theory commits to modal parts just as temporal stage theory commits to temporal parts, but denies that trans-world lumps (or sums) are metaphysically relevant just as the stage theorist denies that trans-temporal sums are metaphysically relevant.<sup>14</sup>

<sup>11</sup> I’m assuming that the modal equivalent of *instantaneous* is *world-bound*.

<sup>12</sup> Weatherson dubs these trans-world objects “lumps” in Weatherson (ms). I adopt the terminology here as well.

<sup>13</sup> One might be tempted to call this Five Dimensionalism since, according to the view, individuals have three spatial, one temporal, and one modal dimension. See Rini and Cresswell (2012) and Graham (2014), for example. But since it is theoretically possible to be an endurantist and endorse modal parts, lump theory should not entail a commitment to temporal (or spatial) parts. Of course, if one is led to adopt lump theory *because* of the argument from vagueness for modal parts, and if I am right that the argument from vagueness for modal parts stands or falls together with the argument from vagueness for temporal parts, then such a person will be under some pressure to accept spatial, temporal, and modal parts. But one could theoretically endorse lump theory for reasons other than the argument from vagueness, in which case one’s view on space and time and objects in space and time are left open.

<sup>14</sup> See Lewis (1986: section 4.3) and Sider (1996), for example.

So the details of a modal parts view may vary (just as the details of a temporal parts view may vary), but I intend modal parts to be analogous to temporal parts in the appropriate ways.<sup>15</sup> In what follows, I will focus primarily on a lump theory of modal parts, since this view has enjoyed much less press than Lewis's counterpart theory. One of the upshots of this paper will be that if the argument from vagueness for modal parts is successful, then we have a relatively new metaphysical theory of ordinary objects that deserves our attention: lump theory.

One might be thinking at this point that I've already stacked the deck *against* the modal argument, and that there is no point in moving forward. After all, *I've assumed modal realism to get it going*. But I do this to emphasize particular similarities between the argument for temporal parts and the argument for modal parts, which will prove to be instructive. One of the interesting features of the argument from vagueness for modal parts is that it challenges our (often) un-argued-for metaphysical prejudices. Most of us are pretty certain that modal realism is false. And among those of us who think modal realism is false, some of us also think that the argument from vagueness for temporal parts is sound. But if – in light of the argument from vagueness for modal parts (MP) – we admit that one way *out* of MP is to deny the existence of concrete possible worlds, then we will have to admit – by parity of reasoning – that one way out of TP is to deny the existence of concrete times. This doesn't yet show that a commitment to TP compels a commitment to MP. But it does serve as a quick example of how the rejection of one argument admits of a parallel move of resistance in response to the other. So I fully recognize that many will not want to grant the existence of concrete possible worlds – in fact, I'm counting on it. It is upon investigation of the tension between the two arguments – that many will wish to accept TP yet reject MP – that we discover the weaknesses of TP (or, going the other way, the strengths of MP). So grant me modal realism for a moment; in section 4 I will discuss the consequences of rejecting this assumption.

Finally, the argument from vagueness for temporal parts (TP) is intended to settle the debate between endurantists and perdurantists – that is, it is supposed to

<sup>15</sup> For another analogy: adopting modal parts has the advantage of solving traditional metaphysical puzzles, just as temporal parts theory does. However, a commitment to lump theory yields an even more unified solution than just adopting temporal parts, since one would not have to appeal to other theoretical machinery to answer, say, colocation worries where the relevant entities have completely overlapping temporal careers (e.g., Goliath and Lump). Sider (2001), for example, supplements worm theory with a different answer to puzzles involving spatio-temporally co-located objects than with puzzles involving merely spatially (but non-temporally) co-located ones. (One might think this bodes well for stage theory over worm theory. Sider himself explains, "a stage theorist need not switch gears when moving to the modal case" (Ib., 206). But a stage theorist loses this advantage in the spatial case – e.g., solutions to spatial versions of co-location worries explanation presumably do not involve an appeal to spatial counterparts.) For further discussion of these issues, see Wallace (ms).

decide between those who think that individuals are wholly located at every time in which they exist and those who think that individuals are trans-temporal objects, stretched out in time the way roads are stretched out in space. Similarly, the argument from vagueness for modal parts is supposed to settle the debate between the modal analogs of endurantism and perdurantism. The modal analog of endurantism claims that individuals are wholly located in every world in which they exist. Let us call this Trans-World Identity (TWI), since this view maintains that an object  $x$  in world  $w_1$  can be truly identical to an object  $y$  in another world  $w_2$ . The modal analog of perdurantism claims that individuals are either trans-modal objects, as lump theory describes, or else world-bound with modal counterparts, as Lewis's modal realism describes – i.e., both views accept modal parts (as discussed above). The distinction between TWI and a modal parts view will be important to keep in mind as we investigate particular details of the argument from vagueness for modal parts.

Once we've granted that there are possible worlds (and individuals in them), there is a question parallel to DCQ – namely, a question concerning *dia-cosmic* (or trans-world) objects. We typically do not ask about these sorts of trans-world objects – at least not explicitly – but this seems metaphysically irresponsible. If we quantify over possible worlds and individuals in these possible worlds (either abstract or concrete), then we should have an answer to the following question: given various possible worlds and various individuals in these worlds, under what conditions is an object composed of all and only those objects at those worlds? This is the possible worlds analog to Van Inwagen's Special Composition Question (SCQ) and Sider's Diachronic Composition Question (DCQ). Let us call this the *Dia-cosmic Composition Question* (CCQ)<sup>16</sup>:

*Dia-cosmic Composition Question* (CCQ): given various worlds and various objects existing at each world, under what conditions will there be some object that is composed of all and only those objects at those worlds?

Parallel to DCQ, there are three logically exhaustive and exclusive answers to CCQ: (i) under no conditions (never), (ii) under some conditions (sometimes), and (iii) under all conditions (always). The argument for the existence of modal parts begins with this choice and proceeds in a parallel fashion:

<sup>16</sup> We could even modify Sider's definitions as follows:  
 $f$  is an *assignment* :  $f$  is a function that takes one or more worlds as arguments and assigns non-empty classes of objects that exist in those worlds as values.  
 Dia-Cosmic fusion (C-fusion):  $x$  is a dia-cosmic fusion of an assignment  $f$  iff for every world,  $w$ , in  $f$ 's domain,  $x$  is a fusion-in- $w$  of  $f(w)$ .  
 Minimal C-fusion:  $x$  is a minimal C-fusion of an assignment  $f$  iff (i)  $x$  is a C-fusion and (ii)  $x$  exists only in those worlds in the domain of  $f$ .  
 The CCQ then becomes: when does a given assignment have a minimal C-fusion?



**MP**

- (1\*) There are three answers to CCQ: (i) never, (ii) sometimes, (iii) always.
- (2\*) If (i), then we are nihilists about composition.
- (3\*) But nihilism is false; objects do have parts.
- (4\*) So not (i).
- (5\*) If (ii), then we can construct a sorites series (of composition).
- (6\*) If we can construct a sorites series (of composition), then there is vagueness involved in statements about composition.
- (7\*) If there is vagueness involved in statements about composition, then the vagueness is either in our language or in the world(s).
  - (7.1\*) But statements settling the question of whether composition occurs (or not) can be rephrased as count statements.
  - (7.2\*) And count statements involve only logical terms, which cannot be vague.
  - (7.3\*) So statements involving composition do not contain any vague terms.
  - (7.4\*) So it cannot be that the vagueness involved in the composition sorites series is due to vagueness in our language.
  - (7.5\*) So, it must be that the vagueness is in the world(s).
  - (7.6\*) But this is absurd.
- (8\*) So it must not be the case that, as far as composition goes, there is either vagueness in our language or in the world(s).
- (9\*) So there must not be vagueness involved in statements about composition.
- (10\*) So we must not be able to construct a sorites series (of composition).
- (11\*) So it is not the case that the answer to CCQ is (ii).
- (12\*) So, by elimination, the answer to CCQ is (iii).
- (13\*) The only metaphysical view that can adequately maintain (iii) is one that committed to modal parts.
- (14\*) So there must be modal parts.

Let me say a bit in favor of the above premises; in the next section I will address objections.

Premises (1\*)–(3\*) are true for the same reasons premises (1)–(3) are (if they are). Once we've quantified over worlds and individuals in those worlds, then we think that these things compose other objects: never, sometimes, or always. If we say never, then we presumably have a principled reason for thinking so – either we think that it is never the case that composition occurs, or we think that it does, but only *intra*-worlds not *inter*-worlds. In the first case we are eschewing common sense and contemporary science, and in the second we are in need of a non-ad-hoc explanation as to why composition is world-bound, which will not be easy to do. Moreover, if you think that composition is world-bound, then you think



that composition sometimes occurs (when it is intra-world) and sometimes does not (when it is inter-world). But then this is just to answer ‘sometimes’ to CCQ.

Perhaps you think that it is possible to answer ‘sometimes’ in the case of possible worlds because, e.g., you think intra-world composition occurs but inter-world composition does not, but you think that this does not admit of a modal sorites series of composition. But this would be to deny premise (5\*), not premises (1\*)–(3\*). We will get to (5\*) in just a moment, and I will discuss it further in section 4.

(4\*) follows from (1\*)–(3\*).

As for (5\*): we can construct a sorites series of composition *dia-cosmically* just as easily as we can construct a sorites series of composition *diachronically*. Indeed, Chisholm’s (1967) Adam and Noah example is just such a sorites series – even though he uses this example to prove a different point. And while this example is not explicitly a sorites series *of composition*, we could easily make it one. Chisholm asks to imagine a series of possible worlds, each one differing only slightly from the preceding one, and only with respect to certain properties of Adam (or Adam candidates<sup>17</sup>). We are then to ask ourselves, after a succession of so many of these worlds, whether Adam has survived. It is a trans-world version of a puzzle of identity (or change) over time. In Chisholm’s version, however, the concentration is on properties such as *being 930 years old*, *being named ‘Adam’*, etc. But we could alter the puzzle so that it (explicitly) involves parts. Imagine that in  $W_1$  Adam is composed of tiny molecular parts  $p_1, \dots, p_n$ . And imagine that  $W_2$  is just like  $W_1$  except that in  $W_2$  part  $p_1$  has been removed; the Adam candidate is composed of only parts  $p_2, \dots, p_n$ .  $W_3$  differs from  $W_2$  only with respect to part  $p_2$ ; in  $W_3$ , unlike  $W_2$ , the Adam candidate is missing  $p_2$  and is only composed of parts  $p_3, \dots, p_n$ . And so on. We can imagine a continuous series of such worlds, each one differing only slightly from the preceding one, and only with respect to the parts composing the Adam candidates. Clearly, in the last world, where the Adam candidate is composed of just one small part,  $p_n$ , we do *not* have Adam. As far as Adam is concerned, the last world is a clear case of non-composition, whereas the first world is a clear case of composition. No world differs from an adjacent one by more than just a small molecular part. But after each successive world we can ask: in which worlds along this series does Adam stop existing? In this way, we have a *world* sorites series of composition, which would mirror a *temporal* sorites series of composition (e.g., the Ship of Theseus); we have a *dia-cosmic* sorites series that parallels a *diachronic* sorites series.

To adequately parallel the diachronic composition question, however, we need more than just the intuition that in  $W_1$ , something (i.e., Adam) is composed of

<sup>17</sup> I say ‘candidates’ since whether the relevant individuals in any particular world are indeed Adam or Noah is the very question under consideration. Also, I am leaving Noah out of the example since it is irrelevant to my point here.

$p_1, \dots, p_n$ , and in  $W_2$ , something (i.e., Adam) is composed of  $p_2, \dots, p_n$ , etc. All that this does is secure the intuition that *in each world* there either is or is not a particular composite object. This does not by itself invoke *cross-world* composite objects. We do not yet, for example, have an object composed of  $p_1, \dots, p_n$  in  $W_1$  and  $p_2, \dots, p_n$  in  $W_2$ , etc. But this is where we emphasize the fact that the members of this sorites series are *possible worlds*. If it is admitted that Adam exists in  $W_1$  and  $W_2$  and  $W_3$ , etc., then intuitively Adam – himself, the one and only – survives over these possible worlds. The point is to exploit our loose talk about possible worlds and the objects in them. If we think that *possibly* Adam survives the loss of one small part, and if we think that what makes this modal fact true is that Adam – himself – is in a possible world composed of certain parts, then it incumbent upon us to ask how it is that Adam survives across worlds, and then we can ask about this one(!) thing that exists in more than one world, i.e., is trans-world. If we think that what makes Adam's modal facts true is that some counterparts of Adam (who are non-identical to Adam) are in different possible worlds doing various things, then it is incumbent upon us to ask whether there is something composed of Adam and all of his counterparts.

Clearly, Adam and his possible worlds counterparts have an important relationship – Adam's counterparts doing or not doing certain things in various possible worlds *makes it the case* that certain things are possible and impossible for Adam. This is a significant enough relationship to question whether all of these cross-world things are unified in some significant way, and perhaps by composition. But this is just to query about whether there is a cross-world object composed of Adam and his counterparts. So once we've got the array of worlds, differing by minimal bits, and once we've granted that the goings-on in these worlds is what makes certain modal facts true (and if we assume that the answer to CCQ is not 'never' or 'always'), then it seems we can construct a cross-world sorites series of composition, analogous to the temporal sorites series.<sup>18</sup>

So (5\*) is true if (5) is.

(6\*) is true if (6) is.

(7\*), (7.6\*): If we think that there is no ontic vagueness (in the world), we presumably think that this is a metaphysically necessary fact. It's not just that the actual world happens to be such that there is no ontic vagueness in it. Rather, there is something metaphysically necessary about the prohibition of ontic vagueness. And so, in no metaphysically possible world is there ontic vagueness. And so in no metaphysically possible world is it vague how many objects there are. What's more: take some object that is composed of all and only various different objects in (at) various different world, and take another such object, and another and another, etc. Take these objects and count them. It will never be the case that it is

<sup>18</sup> I will discuss this point in more detail (and in light of possible objections) in section 4.

vague how many such objects there are. Vague cross-world counts inherit their vagueness from vague counts at-a-world; cross-world counts won't be vague unless there is a count in a particular world that is vague – which there never is.<sup>19</sup>

(7.1\*)–(7.5\*): whether statements about composition can be recast as count statements, whether count statements contain only logical terms, and whether logical terms are non-vague are all matters that can be settled independently from issues of dia-cosmic or diachronic composition. So (7.1\*)–(7.5\*) are true if (7.1)–(7.5) are.

(8\*)–(12\*) follow from the truth of preceding premises. (13\*) will be left undefended, but is true if (13) is. And (14) follows from preceding premises.

#### 4. *Objections, worries, replies*

My aim in presenting the argument for modal parts is not necessarily to endorse it but rather to see if a commitment to the soundness of the temporal version compels one to commit to the soundness of the modal version. Suppose one wanted to commit to temporal parts because of the argument from vagueness. Could such a person then reject modal parts given the modal analog I've just presented? She *could*. But not without some duplicity. For whichever premise in the modal argument she might resist, she will have to admit, *mutatis mutandis*, that such a move is available in the temporal argument. In other words, finding a flaw in the modal argument will reveal a parallel flaw in the temporal argument, making it difficult to endorse one and reject the other. Below, I consider (and reject) several ways in which she might resist my charge. Each one, I argue, is either implausible in its own right or is in tension with the endorsement of the soundness of the argument for temporal parts.

(i) CCQ assumes that there are possible worlds, which I reject.

At the outset of the presentation of MP, I had noted that the argument from vagueness for temporal parts (TP) – as I present it – assumes that there are times; likewise, I claimed, MP assumes that there are possible worlds. But perhaps, I suggested, one might be able to rephrase TP in presentist-friendly terms, and – analogously – rephrase MP in actualist-friendly terms. I do not want to explore this option here – perhaps it can be done and perhaps not. But I have my doubts about whether a denial of times (in response to TP) or the denial of possible worlds (in response to MP) would be successful – even granting that a non-time-committing and non-world-committing version of TP and MP were available. Focusing just on the modal case for a moment, if one denies that there are possible worlds, then one is left with the theoretical burden of accounting for our modal truths. One *could*

<sup>19</sup> Again, this is assuming the Linguistic Theory of Vagueness, which I won't defend here.

take modal facts as brute, but it is not clear that having brute modal truths is any more theoretically elegant than positing possible worlds.<sup>20</sup> While many philosophers will not commit to *concrete* possible worlds (e.g., Lewis's modal realism), most *are* inclined towards some kind of ersatzism – that possible worlds are abstract sorts of things, sets or classes, or some kind of linguistic entities, etc.<sup>21</sup> But then the question isn't whether you think a commitment to possible worlds is ontologically excessive, but whether you take a stand on the metaphysical nature of these worlds once you've already invited them into your ontology – and this is a different point (which I'll get to below). So denying that there are possible worlds is not going to be an easy position to maintain in light of the wealth of theoretical benefits possible worlds afford.

Moreover, the relevant issue is not how the modal argument from vagueness fairs on its own, but rather how someone who endorses the temporal argument from vagueness could respond. And if it is admitted that one could simply deny that there are possible worlds in order to get out of the above argument, then one would have to admit that a parallel move could be made in the temporal case – that is, one could simply deny that there are times in order to get out of the argument from vagueness for temporal parts. Perhaps it is more plausible to deny the existence of possible worlds than it is to deny the existence of times. But this is shifting the focus away from the argument from vagueness and onto other debates, such as (in the temporal case) the debate between A-theorists and B-theorists. And certainly such topics are lively enough not to consider it an uncontroversial matter whether times exist or not.

- (ii) I deny (5\*). There is a disanalogy between the possible worlds sorites series and the temporal sorites series. In the case of worlds, there is a clear cut-off between world-bound composition and trans-world composition; in the case of times, there is no clear cut-off between instantaneous composition and trans-temporal composition. This disanalogy affects any attempt to create a sorites series – in the temporal case we can generate one but in the modal case we cannot.

My initial definition of modal part assumed that the modal notion of 'world-bound' is the modal analog of the temporal notion of 'instantaneous'. Imagine someone who attempts to argue against the argument from vagueness for temporal parts (TP) as follows: 'I deny premise (5). One cannot create a sorites series of

<sup>20</sup> One could also be a fictionalist about possible worlds, in which case one would get to use possible worlds talk without committing to them. But modal fictionalism has its fair share of burdens, which arguably outweigh the benefits of getting rid of worlds to begin with. See Brock (1993), Hale (1995), for example.

<sup>21</sup> The temporal parallel would be those who commit to times, but think that times (except for the present, perhaps) are abstract.

composition because there is a clear cut-off between temporally-bound objects and trans-temporal objects.' In one sense they are right: there *is* a clear cut-off between temporally bound, instantaneous composite objects – i.e., those objects that are spatially but not temporally extended and are nonetheless composite because, e.g., they are composed of various spatial (but not temporal parts) – and those objects that are trans-temporal. It is the difference between intra-temporal composition and inter-temporal composition. But I assume that someone who endorses the argument from vagueness for temporal parts does not think that such a clear cut-off is significant enough to block the temporal argument at premise (5). If so, then the modal analog – i.e., the cut-off between world-bound composition and trans-world composition should not be significant enough to block the modal argument at premise (5\*). I do not need to take a stand here as to whether I think that such a cut-off does or does not successfully block either argument; my point is merely to show that if someone wanted to block the modal argument at premise (5\*) for the very reason that there is a non-arbitrary clear cut-off between intra-world composition and inter-world composition, then such a person would have to admit that, similarly, one can block the temporal argument at premise (5) for the analogous reason – i.e., that there is non-arbitrary clear cut-off between intra-temporal composition and inter-temporal composition.<sup>22</sup>

- (iii) I accept possible worlds, but deny that they are concrete. The modal argument needs to assume worlds are concrete in order to go through – in particular, premises (7.1\*)–(7.3\*).

One of the more controversial assumptions I began with in order to get the modal argument going was a commitment to modal realism – i.e., that there are concrete possible worlds. But the definition of modal part uses world-talk such as 'exists-at' and 'world'. I assume that an ersatzer has an adequate concept of world-talk. One of the main motivations for being an ersatzer in the first place is to take advantage of the theoretical benefits of having possible worlds, but to avoid the ontological burden of the concreteness of them. So, at the very least, the world-talk needed for making the definition of (world-bound) modal parts coherent does not assume a metaphysics of worlds. This means that whether (7.1\*)–(7.3\*) are true does not

<sup>22</sup> Related to this worry, one may think that nihilism about trans-world composition is more palatable than nihilism about trans-temporal composition. This may be so – indeed, I am hoping that this is so (at least initially). As stated at the outset, one may interpret my thesis as relying on the (initial) un-intuitiveness of modal parts as a modus tollens on the argument from vagueness for temporal parts. What is of primary interest to me is the parallel argument structure of the two arguments from vagueness, not whether nihilism about one kind of object (trans-world) is more acceptable than nihilism of another (trans-temporal). Moreover, and importantly, the intuitiveness or un-intuitiveness of the respective nihilisms fails to be reason enough to reject any one of the premises for MP, including (5\*).

depend on the metaphysics of possible worlds (likewise, premises (7.1)–(7.3) in the temporal argument do not depend on the metaphysics of time).<sup>23</sup>

But perhaps the above objection is generated not by an aversion to concrete possible worlds, per se, but because if one is committed to abstract possible worlds then one cannot generate the count statements needed for premises (7.1\*)–(7.3\*) to go through. Motivating this objection is sensitivity to Sider's arguments for premises (7.1)–(7.3), which rely on counting *concrete* objects.<sup>24</sup> However, if we are quantifying over objects in our ontology – if we are using numerical statements to count them – then it seems irrelevant whether the objects we are counting or quantifying over are concrete or abstract. Consider statements of the form:  $\exists x \exists y (Ax \ \& \ Ay \ \& \ x \neq y \ \& \ \forall z (Az \rightarrow (z = x \vee z = y)))$  where we let 'Ax' stand for 'x is an abstract object.' This would leave us with a sentence that only contained logical terms. And it would be a determinate count statement about how many abstracta there are.

Perhaps one thinks this is implausible since the above schema is only helpful if we are considering finite entities. And one might think that if we allow in abstracta, then clearly we allow in infinitely – and importantly, *uncountably* many – abstracta. But if we can restrict the domain of discourse to talk about finitely many concrete objects, there seems to be no reason why we cannot restrict the domain of discourse (whenever and if we so pleased) to finitely many abstracta. We might talk about the real numbers between one and ten, or we might want to count up all of the sets that have only me as a member, etc.

Perhaps one thinks that considerations of composition simply do not apply to abstracta. Our notion of composition, some might argue, only concerns concrete objects. But we do, in fact, use parthood talk when we discuss traditionally abstract objects. Lewis talks about trigonometry being part of mathematics, omniscience being part of god; the number three is part of the real numbers, etc. (Lewis 1991). And we do not just talk about abstract entities (e.g., mathematics) having abstract parts (e.g., trigonometry). We think that concrete objects can have abstract parts – or at least, we talk as if they do. We talk about bowling balls having an axis of symmetry, the earth having an equator; Plato talks about the mathematical axis and circumference of a spinning top (the *Republic* Book IV), Peter van Inwagen talks about the mathematical point of a knife (van Inwagen 1981), etc. One might think that these particular examples of parthood are metaphorical, not literal. But it is generally accepted that our notions of parthood are topic-neutral, and that we use the word 'part' ecumenically.<sup>25</sup> Rather than trying to discern metaphorical part-hood talk from literal parthood talk, I am – following Lewis (1991) – taking all of our

<sup>23</sup> If one is worried that the metaphysics of worlds or times affects the *coherency* of the definition of modal part or temporal part, respectively, I address this objection briefly below.

<sup>24</sup> The details of how and why this is will have to be left for another time.

<sup>25</sup> See Simons (1987), Lewis (1991), and McDaniel (2004; 2010), for example.

parthood talk as instructive, and letting all of our part-hood talk define the primitive notion of parthood. In which case, we should allow abstract entities as parts.

Moreover, the primary point is whether we think that there can be borderline abstracta. Someone who is already committed to the Linguistic Theory of Vagueness will think not, since they think there is no vagueness in the world *tout court*. And so it won't matter that we are not committed to *concrete* possible worlds – if we are committed to worlds at all, in any form, then the argument from vagueness for modal parts goes through (assuming Sider's argument from vagueness for temporal parts does).

- (iv) I deny premise (7.6\*); I do not think that there is anything metaphysically necessary about the fact that there is no vagueness in the world.

I suppose one could say that there is nothing metaphysically necessary about the fact that there is no vagueness in the world. But this doesn't seem to me to be the heart of the Linguistic Theory of Vagueness that Sider, Lewis, etc. endorse. Their mantra of 'no ontic vagueness' is generated from a sense of necessity. Indeed, Lewis says that having vagueness in the world – or, at least, it being a vague matter about whether composition occurs – is "impossible". But even if we allow someone to claim that there is nothing metaphysically necessary about the prohibition of ontic vagueness, then there is little reason to think that there is never – at some point – ontic vagueness in the actual world, which would infect the argument from vagueness for temporal parts. So: (iv) is an implausible position in its own right, and a denial of (7.6\*) in this way seems to directly undermine any plausibility for (7.6).

Someone might be motivated to deny (7.6\*) (or (7\*)) not because he thinks that the Linguistic Theory of Vagueness is only contingently true, or because he thinks that there can be vague objects in other (metaphysically) possible worlds, but rather because he thinks that there is indeterminacy or vagueness regarding modal profiles in general. So, for example, it may be vague whether you could have been a monkey (or: it is vague whether your DNA or your fingerprints could have varied in the teeniest little way, etc.). But we mustn't confuse our tolerance for indeterminacy with respect to our modal profiles with the thesis that there is vagueness in any possible world. For let us grant that it is vague whether you could have been a monkey. In some cases, when the context is just so, your modal profiles include worlds where you (or your counterparts) are monkeys. In other cases, when the context has changed, your modal profiles do not include such worlds. The 'vagueness' or indeterminacy here concerning whether you could or could not have been a monkey can be cashed out in terms of which worlds we accept as accessible from this one (the actual world), or which worlds include counterparts of you.<sup>26</sup> But this

<sup>26</sup> Sometimes, even granting a particular context, there may be disagreement about which worlds to include or not. But this, I take it, would not be indeterminacy but a genuine, substantial disagreement.



is just an understated trans-world Problem of the Many. We understand that there are lots of different worlds that may or may not be included in any particular modal profile or other – just as there are many different (distinct) collections of water molecules that might be viable candidates for the one(!) cloud in the sky. But just because we grant that there is a trans-world problem of the many, this does not mean that there is vagueness *in* any of these worlds. One should not confuse the fact that our modal profiles are vague (if they are) with the claim that the linguistic theory of vagueness is contingent. So one should not deny (7.6\*) on the grounds that our modal properties are vague, flexible or context-sensitive.

- (v) The definition of *world-bound modal part* – unlike the definition of *instantaneous temporal part* – is unacceptable. This is largely due to the fact that the most plausible account of possible worlds claims that possible worlds are abstract, making ‘exists at a world’ mysterious. How can an abstract thing *exist at* another abstract thing?

Crucial to the definition of instantaneous temporal part is the idea of *existence at a time*. Likewise, crucial to the definition of world-bound modal part is the idea of *existence at a world*.

*x* is an *instantaneous temporal part* of *y* at an instant  $t =_{\text{df}}$  (i) *x* exists at, but only at,  $t$ , (ii) *x* is part of *y* at  $t$ ; and (iii) *x* overlaps at  $t$  everything that is part of *y* at  $t$ .  
*x* is a *world-bound modal part* of *y* at a world  $w =_{\text{df}}$  (i) *x* exists at, but only at,  $w$ , (ii) *x* is part of *y* at  $w$ ; and (iii) *x* overlaps at  $w$  everything that is part of *y* at  $w$ .

Sider explains that the *exists-at* relation in the definition of instantaneous temporal part is “analogous to the spatial predicate ‘is located at’ . . .”. Similarly, then, we should understand the *exists-at* relation in the definition of world-bound modal part as analogous to the spatial predicate ‘is located at’. But if this is right, one may argue, then if we think that possible worlds are abstract rather than concrete then the definition of a modal part becomes mysterious at best and incoherent at worst.<sup>27</sup>

But the same point can be made in the temporal case. If one thinks that times (other than the present) are abstract rather than concrete, then the definition of temporal part – and in particular, the relation of existing-at – becomes mysterious at best and incoherent at worst. Yet rarely (and to my knowledge: never) does anyone object to the argument from vagueness for temporal parts on the grounds that if one takes times (other than the present) as abstract then the notion of a temporal part is incoherent. I suspect this is either because very few are committed to abstract times and so it is not often (as far as I know) considered as a response to the argument from vagueness for temporal parts, or else because it is assumed that anyone who endorses abstract times has a relation that fills in and does the theoretical duty that the *exists-at* (a time) relation is supposed to do for the temporal

<sup>27</sup> Thanks to an anonymous referee for *dialectica* for raising this point.

parts theorist. So either there is a problem with the argument for temporal parts because the definition of temporal part does not accommodate those who believe in abstract times, or else in the modal case, we can assume (as is done in the temporal case) that anyone who endorses abstract possible worlds has a relation that fills in and does the duty of the *exists-at* (a world) relation. Either way, this is not a problem for the modal argument alone: TP and MP stand or fall together on this issue.<sup>28</sup>

- (vi) There is no antecedent motivation for CCQ. We are already intuitively compelled to answer DCQ because we already believe (or keep as a live option the idea) that objects persist through time and may require identity over time – e.g., puzzles of identity (or change) are so prevalent in the philosophical literature precisely because we find the topic of cross-temporal objects so intuitively compelling. None of us ever worry or wonder about cross-world objects; we are not at all compelled to answer CCQ. So any argument relying on our answer to CCQ is unmotivated as well.

It is true that we do not explicitly think about cross-world objects. But we do think a lot about – and have strong intuitions about – the persistence conditions of ordinary objects. I can admit that we don't think of ourselves as trans-world objects, for example, but we do think an awful lot about what is possible and impossible for us, and we do think that such modal attributes are *part of* what makes us who we are. I do not mean to be leaning too heavily on our metaphorical talk about what is *part of* us. But it is the case that we all have strong intuitions about various objects and their persistence conditions or modal facts, and there are various philosophical puzzles that rely on them, e.g., Goliath and Lump1 (Gibbard 1975). And if it is the case – as many of us assume – that our modal facts and properties are made true by various things going on in various possible worlds (whether these worlds are concrete or abstract), then CCQ is a poignant question, and one that we should be prepared to have an answer to.

Finally, one may object not to any particular premise in the argument from vagueness for modal parts, but for the significance of the conclusion. The argument as I present it concludes: there must be modal parts. It does not say that you or I or ordinary objects have modal parts. Fair enough. But neither does the argument from vagueness for temporal parts conclude that you or I or ordinary objects have temporal parts. Both arguments from vagueness, I take it, merely aim

<sup>28</sup> To be clear, I am not assuming that those who accept abstract times or worlds *should* accept the above definitions of temporal and modal parts, respectively. My claim is merely that if one accepts abstract times or worlds, one *could* accept the relevant definitions without the notion of 'existence-at' being mysterious, since making sense of such talk is presumably already built in to the relevant view. Thanks to an anonymous referee for *dialectica* for raising this point.

to show that there are certain composite objects made up of particular parts. It is up to other arguments – arguments from the best unified theory, for example – to show that these composite are metaphysically significant. So, again, TP and MP are on equal footing.

### 5. Conclusion

There is much more work to be done here. But I hope the above discussion has laid the groundwork for an investigation of the parallels between the argument from vagueness for temporal parts and the argument from vagueness for modal parts. It is not the case that a commitment to one argument entails a commitment to the other, for I grant that one can have disanalagous views about times and worlds. But the point is that in order to endorse one argument and reject the other one will have to admit that, by parity of reasoning, the ways in which the one argument is rejected offers parallel ways in which the other can be rejected. In this way, the compelling-ness of the argument for temporal parts stands or falls with the compelling-ness of the argument for modal parts. The best option, then, would be for someone to either reject both or accept both, but not to stand divided between the two.

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