

This is a preprint of an article whose final and definitive form will be published in *The Australasian Journal of Philosophy* 2008/9; *The Australasian Journal of Philosophy* is available online at: <http://journalsonline.tandf.co.uk/>

Universalism, Vagueness and Supersubstantivalism

Abstract: Sider has a favourable view of Supersubstantivalism (the thesis that all material objects are identical to the regions of spacetime that they occupy). This paper argues that given Supersubstantivalism, Sider's argument from vagueness for (mereological) universalism fails. I present Sider's vagueness argument (§2-3), and explain why - given Supersubstantivalism - some but not all regions must be concrete in order for the argument to work (§4). Given this restriction on what regions can be concrete, I give a *reductio* of Sider's argument (§5). I conclude with some brief comments on why this is not simply an *ad hominem* against Sider, and why this incompatibility of Supersubstantivalism with the argument from vagueness is of broader interest (§6).

1. Introduction

Universalism is the thesis that for any for any material objects, those objects compose a further object. Sider offers the Vagueness Argument for universalism [Sider 2001: 120-132]. But Sider also believes another thesis: that all material objects are identical to the spacetime regions that they occupy [Sider 2001: 110; although it should be noted that Sider believes it is conditional on substantivalism being true). Call this second thesis supersubstantivalism, or SS for short. After giving an exposition of the Vagueness Argument (§2 and §3) I am going to demonstrate that, given SS, the Vagueness Argument doesn't work (§4 and §5) and so, given SS, you needn't accept Universalism. I'm going to end with a brief discussion of the plausibility of SS, showing that it isn't an unreasonable thesis for perdurantists to accept (§6).

2. The Vagueness Argument

The Vagueness Argument begins with this premise:

- (1) If restricted composition is true then there is (i) a case, C_1 , where composition occurs, and (ii) a case, C_n , where composition does not occur, and (iii) there is a continuous series of cases connecting C_1 and C_n .

where we define a case of composition (or 'case' for short) as a possible situation where some objects have certain properties and are arranged some way. For any given case we can ask whether or not composition occurs (so the term is somewhat misleading as in any given case of composition, composition need not actually take place, but Sider coined it and so I'll

stick with it). Clearly if composition is restricted then at one world, ω_1 , there is a case, C_1 , where composition does take place and another possible world, ω_n , at which there is a case, C_n , where composition does not take place. For example, a possible situation where some atoms compose a teddy bear would be a case where composition does take place (C_1), whilst a possible situation where the teddy bear has been fed through a wood chipper is intuitively a situation where the atoms do not compose an object (C_n). These cases exist at the (possibly identical) worlds ω_1 and ω_n but there are also worlds, ω_2 to ω_{n-1} , such that for every world ω_m , at that world there is a case, C_m , such that C_m is *exceedingly* similar to an *adjacent* case C_{m-1} (that exists at ω_{m-1}). Call these cases, $C_2 \dots C_{n-1}$, 'a continuous series of cases connecting C_1 and C_n '. So we've got a case where the atoms compose a fully formed teddy, C_1 , a case where the atoms compose nothing, C_n , and then in between we have cases C_2 to C_{n-1} , where each of these cases corresponds to some way the teddy bear atoms could be arranged at the various instants during the period of its being fed through a wood chipper. All of this can be true if restricted composition is true, which amounts to an endorsement of (1).

Next Sider argues that the following is true:

- (2) In no continuous series can there be a sharp cut-off point in whether composition occurs or not i.e. there can never be two exceedingly similar cases such that composition definitely occurs in one case but definitely does not occur in the other.

Consider again the teddy bear example. Given any two exceedingly similar cases of that continuous series, the atoms of the bear that are fed through the wood chipper will vary only in how close they are to one another, and between any two exceedingly similar cases the change will be minute. It's difficult to see how one atom moving, say, a tenth of a nanometre in one direction could cause an object to go from definitely composing to definitely not composing. So (2) looks plausible enough.

Finally Sider says

- (3) In any case, it is not vague whether composition takes place or not i.e. composition definitely occurs, or composition definitely does not occur.

We will leave Sider's defence of (3) until §3 below.

Given (1) - (3) it is easy to see how we get to Universalism. If restricted composition is true then, given (1), there's a case where composition occurs, a case where it doesn't and a continuous series of cases in between. Given (2) there is no sharp cut-off point in that continuous series (i.e. there are no two adjacent cases, C_m and C_{m-1} , such that C_m definitely

composes and C_{m-1} definitely does not). But given (3) every case either definitely composes or definitely does not, so since the cases go from definitely composing to definitely not composing *there must be a sharp cut-off point in the series* (i.e. there are two adjacent cases, C_m and C_{m-1} , such that C_m definitely composes and C_{m-1} definitely does not). One *reductio* later, we reject restricted composition and conclude that Universalism is true.¹

Given what has been said, it is obvious that we should grant Sider (1). Let us also grant him (2) for the time being, and instead concentrate on his defence of (3): the claim that composition is never a vague matter.

3. Vagueness and Composition

This is how Sider defends (3). Define a *numerical sentence* as any sentence that asserts the number of *concrete* objects that exist (for example 'There are seven concrete objects' is a numerical sentence). Sider says

- (4) All numerical sentences can be expressed solely in terms of logical operators, logical connectives and the predicate 'concrete'.
- (5) The predicate 'concrete' is not vague and admits of no borderline cases.
- (6) Logical operators and logical connectives are not vague.

So

- (7) Numerical sentences are never vague. (from (4), (5) and (6))

Sider then adds in the following, final, premise

- (8) If composition were ever vague it would be vague as to how many concrete objects existed.

(8) sounds sensible enough for if we have two objects and they don't compose, we have two concreta; if they do compose, we have three concreta; if it's vague as to whether or not they compose, then it's vague as to whether or not we have two or three concreta. Obviously (7) and (8) together entail that composition is never vague, and therefore that (3) is true.

¹ Actually, this isn't quite true. For instance, Lewis says that given genuine modal realism objects in different worlds compose [1983: 39]. Sider's argument cannot capture *that* conclusion, for there are no cases where some *ys at different worlds compose* for every case must be at a world, and no world contains further worlds. Whilst this omission may be forgivable, it is worth noting that Lewis (universalism's arch-advocate!) would not be able to accept the argument in this form. (With thanks to Joseph Melia for pointing this out).

4. The Restriction of Concreteness

So the Vagueness Argument is a valid *reductio* given (1), (2) and (3). Sider's defence of (3) requires (7) and (8) to be true, and (7) in turn requires (4), (5) and (6). In §4 and §5 I will demonstrate that one of (1) to (8) must be false if SS is true, and so, given SS, the Vagueness Argument is unsound. This will be achieved through the use of two arguments. The first argument will demonstrate that - given SS and a desire to motivate the Vagueness Argument - some, but not all, regions must be concrete (presented here in §4). The second argument apes the Vagueness Argument to conclude that this is in fact impossible (presented in §5). Hence, you can't believe SS and accept the Vagueness Argument.

The first argument goes like this, given SS a question arises - which regions are concrete and which are not? This may sound like a strange question, for most philosophers think regions (as in *all* regions) are concrete or that regions (as in *all* regions) are abstract. It has never been suggested that some regions can be concrete and some abstract. So received wisdom says that the answer is that either all regions are concrete or none of them are. But if you accept the Vagueness argument, as well as SS, either of these options murder the dialectic. If *no* region is concrete then no region is a material object, but then given SS there would be no material objects! So that's out. If *all* regions are concrete then, as there are an infinite number of regions, there would be an infinite number of concrete things. But then if there were two material objects, and it were vague as to whether they composed or not, it'd never be vague as to how many concrete things there were - whether they composed or not, there'd still *definitely* be an infinite number of concreta! So, if *every* region is concrete, (8) is false. Compare with the defence of (8) from above: if two material objects don't compose, there's an infinite number of concreta; if they do compose there's an infinite number of concreta; so if it was vague whether they composed there'll still *definitely* be an infinite number of concrete things. The vagueness of composition *wouldn't* result in a concurrent vagueness in numerical sentences.² So (8) would be false, and that would be the end of the Vagueness Argument.

So, to keep safe the Vagueness Argument, not all regions can be concrete but some must be. If you feel squeamish at this thought, this is all the worse for Sider, so for the sake of charity let us accept that some regions can be concrete and others not. But the claim 'not all regions are concrete, (but some are)' is similar to the claim that 'not all objects compose a further object (but some do)'. Just as the Vagueness Argument is a *reductio* of that claim, we

² Or, to put it another way, if it was vague as to how many objects there were, it must be vaguely one number and vaguely another, but the *only* candidate number is 'infinity'.

can ape the Vagueness Argument to present a *reductio* of the hypothesis that some but not all regions are concrete (which commits us to saying that either no region or every region is concrete, *a fortiori* scuppering the Vagueness Argument).

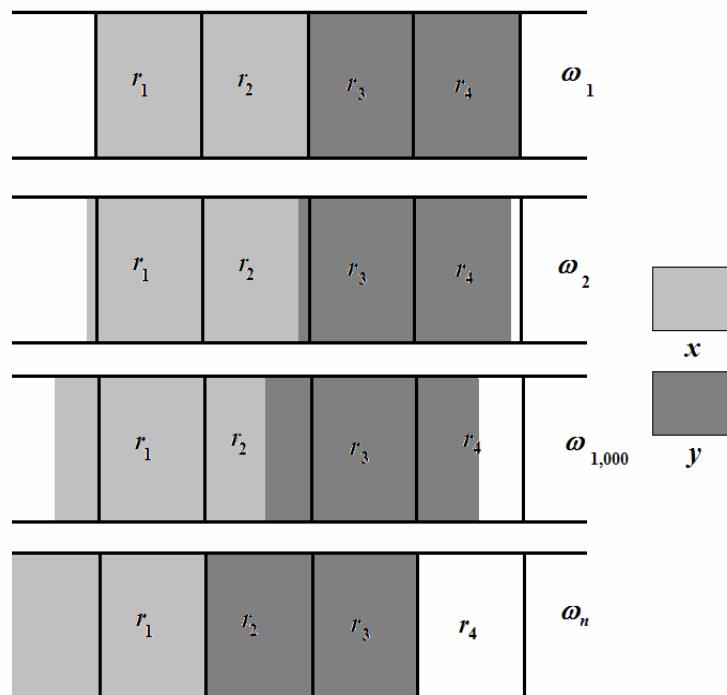
5. Aping the Vagueness Argument

But before we begin the aping, a brief lemma is in order. Given that not every region is concrete, but some are, we can add in a further commitment: if some regions are concrete, their union need not be. In other words if we have some concrete regions, say some material objects, the union of those regions need not be concrete. Now this isn't *obviously* true, but we can prove it (given that we're trying to motivate the Vagueness Argument). Assume that what I say is false, committing us to:

- (9) Given any concrete regions, the *rs*, the union of the *rs* is concrete.

We now end up in a similar quandary as we do if all regions are concrete. Consider a scenario wherein it is vague whether some material objects, the *ys*, compose. The *ys* nevertheless have a union, and since the *ys* are material objects (thus concrete) their union must (given (9)) also be concrete. But this union is concrete no matter whether the *ys* compose or not. So whether or not the *ys* compose is irrelevant as to how many concrete things exist, thus (8) is false (and, again, that would signal the end of the Vagueness

Diagram One: Cases of Concreteness across Possible Worlds



Argument). So to keep motivating the Vagueness Argument we must deny (9). We have our lemma: there are situations where the union of some concrete regions is not itself concrete.

With this lemma in place we can now ape the Vagueness Argument. Define a *case of concreteness* as a possible situation consisting of a region and the properties it instantiates. In any given case of concreteness, the given region may or may not be concrete (just as cases of composition are situations where some objects may or may not compose). Call cases of concreteness ‘cases’ for short (context should prevent confusing cases of concreteness with cases of composition). Now look at the diagram. Stipulate the following: x is a material object that, at ω_1 , is identical to the union of r_1 and r_2 ; y is, at ω_1 , identical to the union of r_3 and r_4 ; x has two parts, one that is r_1 and the other is r_2 ; y is likewise composed of two parts, one that is r_3 and the other is r_4 ; R is the union of r_2 and r_3 . We can assume restricted composition is true (unless you want to beg the question of the Vagueness Argument) and stipulate that the parts of x and y that are r_2 and r_3 fail to compose (so R isn't occupied by a material object). Finally, given the above lemma, and as this is a stipulated example, we can stipulate that this is one of those occasions that even though r_2 and r_3 are concrete (as they're material objects) their union, R , is not concrete.

Next imagine a series of possible worlds. At each possible world x and y exist, but rather than occupying³ the regions they do at ω_1 they occupy a region that is exceedingly similar to the region they occupy at the previous world; where one region is exceedingly similar to another iff the two regions have almost exactly the same sub-regions.^{4,5} So at ω_2 , x and y occupy exceedingly similar regions to the ones they occupy at ω_1 (see the diagram). Further through the series, at $\omega_{1,000}$, they occupy quite different regions, but the regions x and y occupy at $\omega_{1,000}$ are nonetheless exceedingly similar to the regions they occupy at ω_{999} . Further still we arrive at ω_n . At ω_n it is the case that y is identical to R (for at ω_n , y occupies the union of r_2 and r_3 , which is R). Since y is a material object and thus concrete, at ω_n R is also concrete. So we have two cases where in one case (the case at ω_1) R is *not* concrete and another case (the case at ω_n) R is concrete, and they are linked by a continuous series of cases, each exceedingly similar to the last. Thus we get

³ Note that, given SS, occupation is identity. So if the object occupies a region, it is identical to it.

⁴ If you accept the necessity of identity then we do have a problem. Given that y is identical to the fusion of r_3 and r_4 at ω_1 it would be identical to that fusion at all worlds i.e. could never be identical to R at ω_n . This is not a problem for me, for if you accept SS you must reject the necessity of identity (which most perdurantists do anyhow as they accept counterpart theory to solve lump/statue and person/body problems to which this situation is analogous [Sider 2001: 205-6; Lewis 1983: 47-54]). This is why: given SS an object is identical to a region iff the object occupies that region; given the necessity of identity an object is necessarily identical to the region it is actually identical to; so it follows that all objects necessarily occupy the region they actually occupy. This conclusion is reprehensible, so those who accept SS should give up on the necessity of identity.

⁵ It should also be noted that, if you wish, the slight change from world to world can be infinitesimally small (unlike my diagram, where the shift is clearly discrete) so we end up with an infinite series of cases connecting the two cases.

(10) If not all regions are concrete (but some of them are) then there is (i) a case, C_1 , where a region is concrete, and (ii) a case C_n , where the region isn't concrete, and (iii) there is a continuous series of cases connecting C_1 and C_n .

Now add in the following. I will leave a defence until later:

(11) In no continuous series can there be a sharp cut-off point in whether a region is concrete or not.

And then, if (5) is true, the following must also be true:

(12) For any case, it is not vague whether the region is concrete or not i.e. a region is either definitely concrete or definitely not concrete.

(By all means deny (12), but then one must accept that 'concrete' is a vague predicate, which is just to deny (5) *a fortiori* the Vagueness Argument fails.)

(10), (11) and (12) are, of course, analogous to (1), (2) and (3), and it's easy to see how to get a *reductio* of the antecedent of (10). By hypothesis not all regions are concrete, but some of them are, so given (10) there is a continuous series of cases linking a case where R is not concrete, and a case where it is. Given (11) there can be no sharp cut-off point in the series. Given (12) there must be for it is never vague whether something is concrete, thus by *reductio* our hypothesis is false. Thus either all regions are concrete or none of them are (and given the argument from §4 this means that the Vagueness Argument fails).

Are (10), (11) and (12) all true? (10) I take myself to have proven, (12) follows straight from (5) and is necessary for the Vagueness Argument, so the only way that my conclusion can be avoided is to deny (11). But it is difficult to see what could possibly give rise to sharp cut off points between a region being concrete or not in the above scenario, *without the stipulated difference giving us good cause for thinking there could be sharp cut-off points in some continuous series of cases of composition* (i.e. that (2) is false). This is because the *only* thing that changes at the different worlds are what natural properties the various point sized sub-regions of R instantiate. But if such changes can give rise to sharp cut-off points in whether a region is concrete or not, we are well within our rights to ask why the same cannot be said of composition. If a spacetime point instantiating F rather than G can make all the difference as to whether a region is definitely concrete or not (giving us sharp cut off points in a continuous series of cases of concreteness),⁶ then there's no reason why a point particle

⁶ You might note that in the diagram I present the difference between any two exceedingly similar cases as consisting in more than a single point, but as a single line of points (hence *infinitely* many points). This was solely for the ease of presentation. If

instantiating F rather than G can't make all the difference as to whether or not some objects definitely *compose* or not (giving us sharp cut off points in a continuous series of composition cases). I find it difficult to see what the disparity is for banning such changes in a series of composition, but allowing them in a series of concreteness. So if you deny (11) it looks like you must deny (2), *a fortiori* deny the Vagueness Argument. At the very least some argument for the disparity is called for, and none is obviously forthcoming.

Thus you can either accept (10), (11) and (12) are all true, accept the *reductio* and then deny (8); or deny (11) and thence deny (2); or deny (12) and thence deny (5). In all cases, at least one of the premises of the Vagueness Argument is false, and thus the argument fails.

6. Conclusion

I have demonstrated that, given SS, one shouldn't think the Vagueness Argument sound. Sider argues that SS is true (at least, that SS is true given substantivalism) so this is certainly a problem for him. But this is not just intended as an *ad hominem*. That SS undermines the Vagueness Argument is a get-out clause for all perdurantists,⁷ for whilst SS is contentious, it is not unreasonable. Sider is not alone in accepting SS, it is also accepted by Quine [1995: 259], Field [1984: 75n2] and well regarded by both Lewis [1986: 76n55 and 1998: 186] and Hawthorne [2006: 117]. Moreover, SS has support from physicists (see Sklar [1974: 221-4] where he details Wheeler's geometrodynamics; see also Castelvechi [2006], which discusses the physicists such as Smolin who have more recently endorsed SS). Given, then, that we have five heavy weight metaphysicists all taking SS seriously, and some scientists thinking likewise, it doesn't seem unreasonable for the perdurantist who disdains Universalism to follow suit and thus avoid the Vagueness Argument. Conclusion: perdurantists need not accept the Vagueness Argument and if you are in the business of avoiding Universalism, SS may well provide the answer you are looking for.⁸

this does unduly concern you, then imagine instead the world line of a point sized material object as opposed to an extended object as depicted in my diagram. That will make the difference between any two cases a difference in a single point (as opposed to a line of infinite points).

⁷ The endurantists will have to fend for themselves for I am convinced by Sider's arguments that SS entails perdurantism. Also note that Sider was relying on the vagueness argument for universalism mainly so he could mount his vagueness argument for perdurantism. Given SS he will no longer need this latter argument, so Sider may well rest easy with the conclusion of this paper.

⁸ I would like to thank Joseph Melia for his invaluable help, as well as Neil Clarke, Chris Gifford, Sean Power, Jon Robson, Gina Tsang, the interviewing panel of the University of Manchester (particularly David Liggins) and the referees of the AJP.

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*Nikk Effingham
University of Glasgow
67-69 Oakfield Place
Glasgow
G12 8QQ
E-mail: nikk.effingham@gmail.com*