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Sider, Hawley, Sider and the Vagueness Argument

ABSTRACT: The Vagueness Argument for universalism only works if you think there is a good reason not to endorse nihilism. Sider's argument from the possibility of gunk is one of the more popular reasons. Further, Hawley has given an argument for the necessity of everything being either gunky or composed of mereological simples. I argue that Hawley's argument rests on the same premise as Sider's argument for the possibility of gunk. Further, I argue that that premise can be used to demonstrate the possibility of simples. Once you stick it all together, you get an absurd consequence. I then survey the possible lessons we could draw from this, arguing that whichever one you take yields an interesting result.

1. Introduction

Universalism is the thesis that necessarily for any ys those ys compose a further object (henceforth I will simply say 'compose' rather than 'compose a further object'). One argument for it is 'the vagueness argument' (VA) [Lewis 1986: 212-3; Sider 2001: 120-39; van Cleve 2008: 326-31], although technically it is an argument for either universalism *or* nihilism (the thesis that, necessarily, for any ys the ys never compose). Sider's version of VA is the most popular so I present that version below (§2). Relying on a further argument from Hawley, I demonstrate (§3) that, given VA, universalism is committed to the impossibility of simples (objects with no proper parts). I then present Sider's argument that nihilism is false on the grounds that (i) gunk is possible and (ii) nihilism is committed to the impossibility of gunk (objects which are such that every part has a proper part) (§4). With this exposition completed, I explain how similar reasoning demonstrates that simples are possible, and thus that any theory committed to their impossibility is false i.e. universalism is false (§5). Thus if we put these three arguments together, we have a contradiction. I argue that there are three choices, either give up on VA (my preferred option), deny a certain principle both Hawley and Sider rely on concerning possibility (§6) or accept that composition is contingent (§7). In any case, whatever conclusion one accepts, it is an interesting one.

2. The Vagueness Argument

Define a ‘case’ as a possible situation where some objects have certain properties and are arranged somehow. Intuitively there are cases where composition takes place and cases where it doesn’t. 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). There would also be a ‘continuous series of cases’ connecting the two, each case corresponding to some way the teddy bear atoms are arranged at the instants during the period that it is fed through the wood chipper. With that intuitive scenario in mind, assume the following for *reductio*:

Restricted Composition: There could be (i) a case, C_1 , where composition occurs; (ii) a case, C_n , where composition does not occur; (iii) a continuous series of cases connecting C_1 and C_n .

Add this premise:

No Cut Offs: There can never be two exceedingly similar cases such that composition definitely occurs in one case but definitely does not occur in the other.

I will not recap Sider’s argument for **No Cut Offs** here, so charitably accept it for the purpose of argument. The final premise of VA is:

No Existential Vagueness: The number of concreta that exist can never be a vague matter.

If there were n objects and it was vague whether they composed, it would be vague whether there were n or $n+1$ objects. Given **No Existential Vagueness** that is impossible, so by *modus tollens*:

No Compositional Vagueness: For any case, it is not vague whether composition takes place or not.

VA proceeds thus: given **No Cut Offs**, there's no sharp cut-off point in the continuous series **Restricted Composition** commits us to (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). **No Existential Vagueness** entails **No Compositional Vagueness**, and given **No Compositional Vagueness** every case does or does not definitely compose. 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). Thus we get a contradiction and, by *reductio*, **Restricted Composition** is false. As the teddy bear example shows, given the first two conjuncts of **Restricted Composition** the third conjunct follows, so we must deny one of the first two conjuncts. The only way to do that is to say that either composition takes place in *every* case (so universalism is true) or in *no* case (so nihilism is true). Sider has an argument against nihilism (see §4), and so endorses universalism.

3. Hawley's Argument

Universalism and nihilism are responses to the Special Composition Question: what are the jointly necessary and sufficient conditions for the y s to compose. Hawley has argued that, given VA, we get analogous answers to the Simple Question: what are the jointly necessary and sufficient conditions for x to be a simple? To demonstrate this, Hawley begins by introducing:

Topological Dependence: Whether x is a simple or not depends upon the topological properties of the region that x exactly occupies. [2004: 397]

All extant *restricted* responses to the Simple Question are committed to **Topological Dependence**. Consider two answers from Markosian [1998b]: that an object is a simple

iff it exactly occupies a point sized region, or that an object is a simple iff it exactly occupies a maximally continuous region. Both answers obviously entail **Topological Dependence** [Hawley 2004: 399-401]. A third answer is that an object is simple iff x is indivisible. Hawley argues that we should define an object as being indivisible iff it does not occupy discontinuous regions in any possible world. Thus, simplicity does depend upon what regions an object occupies (albeit regions at other possible worlds) and **Topological Dependence** is true [Hawley 2004: 398-9].

A fourth answer is McDaniel's Brute View: it is a matter of brute fact whether or not an object is a simple [McDaniel 2007]. Whilst Hawley argues that the Brute View undermines VA [2004: 394-7], she does not argue that it entails **Topological Dependence**. However, I can demonstrate that it does. Markosian argues for Brutal Composition (that it is a matter of brute fact whether some y s compose or not), and as part of this enterprise argues that mereological properties supervene on natural non-mereological properties. For instance, an intrinsic duplicate of me with regard to all non-mereological properties will also duplicate my mereological properties. Given Markosian's (convincing) defense of this supervenience thesis [1998: 215-6], and McDaniel's claim that the Brute View follows Markosian's lead, I take it McDaniel will accept the supervenience thesis also. So imagine two objects, one a simple and the other a composite, which are duplicates with regards to all (natural) non-mereological and non-locational properties. Given the supervenience thesis, their mereological differences must be the result of which regions they are located at. Thus, if such a situation is possible then, given the Brute View, **Topological Dependence** is true. I believe that such a situation is possible. For instance, imagine a world where the only natural properties and relations were charge, location and parthood (with properties such as size and shape supervening on the location of the object [Skow 2007]). It is easy to imagine two objects that have the same charge, except one occupies a point sized region and the other a scattered region. Intuitively the former is a simple, whereas the latter (in occupying a scattered region) is composite and *ex hypothesi* the only (natural) property that can explain this mereological difference is the difference in what regions they are located at. As the Brute View is intended to respect such intuitions about simplicity (just as Brutal Composition is

intended to respect our folk intuitions about composition) this intuitively possible scenario should be accepted by the proponent of the Brute View as metaphysically possible. Thus (given the Brute View) it is possible that there are simples and composites that vary with regards to their mereological properties due only to their locational properties, and given the supervenience thesis this entails **Topological Dependence**. So even if simplicity is a matter of brute fact, we should accept **Topological Dependence** nonetheless. To my knowledge, this exhausts the currently available (restricted) answers to the Simple Question. Thus **Topological Dependence** is eminently plausible, at least if a restricted answer to the Simple Question was true.

Next, Hawley defends:

Vague Location: For any two regions, it could be vague which of those regions an object is exactly located at.

Hawley's defense of **Vague Location** is:

Quantum theory suggests that it is sometimes indeterminate whether matter is located. [...] Quantum theory may be superseded, or its apparent indeterminacy explained away; nevertheless, it seems to be an open question whether there can be indeterminacy in the location of matter, a question which an account of simplicity should not close. [2004: 397]

Interpret this as endorsing:

Possibility: If some plausible interpretation of a scientific theory says that P, then we should assume *ceteris paribus* that P is metaphysically possible.

Then, as some theories of quantum physics receive a plausible interpretation where 'exact location' is vague, we should think it is metaphysically possible that exact location is vague (i.e. **Vague Location** is true).

Given **Vague Location**, it can be vague whether an object exactly occupied a region R (such that anything exactly occupying R would be simple) or a superregion of R (such that anything exactly occupying that superregion would be composite). Consequently, simplicity can be vague. But this rallies against **No Existential Vagueness**. If the object was a simple, we would have one concrete object. If it were composite, we would have at least three objects (the composite, plus its minimum two proper parts). If it were *vague* as to whether it were composite or simple, it'd be *vague* (pace **No Existential Vagueness**) as to whether or not there was one object or at least three. So **No Existential Vagueness**, **Topological Dependence** and **Vague Location** are inconsistent. Hawley argues that we can drop **Topological Dependence** for it is only in accepting a *restricted* answer to the Simple Question that we become committed to **Topological Dependence**. In which case we should unrestrict simplicity: either *everything* is a simple (call that 'everyism') or *nothing* is (call that 'gunkism').

Combined with the conclusion of VA from above, we are left with four combinations of positions. Given some (innocent) assumptions about what objects there could be, two are obviously inconsistent: nihilism-gunkism (*Proof*: Assume there is a world at which at least one object exists.¹ It is either composite and has proper parts, or not. If it was composite, nihilism would be false. If it wasn't composite it would be mereologically simple and gunkism would be false. QED) and universalism-everyism (*Proof*: Assume there is a world at which there are at least two objects.² Given universalism they compose and thus compose an object with two proper parts. Given everyism that object is a simple and must not have any proper parts. QED). That leaves universalism-gunkism and nihilism-everyism. For nihilists, this result is not shocking – they've *always* said that

¹ This assumption is uncontroversial. Only *ontological* nihilists [O'Leary-Hawthorne and Cortens 1995] will dissent, but they are a rare breed. Moreover, they would have little interest in VA in any case, for it would be odd to worry about the vague existence of things, and how it bears on when those things compose, given that no things exist.

² Also an uncontroversial assumption. Only ontological nihilists and those who endorse the necessity of existential monism (that the universe is just one big mereological simple [Schaffer 2007]) will deny it. Again, monists are a rare breed. And, again, they will have little interest in vague existence (for by necessity there is only ever *definitely* one thing) and the answer to the special composition question (as monism is compatible with any answer to that question, including universalism or whatever you care to mention [see Schaffer 2007: 178n11]).

everything was simple. For universalism it proves more shocking, for whilst universalists often concede the metaphysical possibility of gunk they don't concede its metaphysical necessity, nor the metaphysical impossibility of simples [*cf* Hawley 2004: 387].

4. Sider's Anti-Nihilism Argument

And with good reason, for the metaphysical contingency of gunk existing and simples existing seems reasonable [*cf* Sider 2001: 180]. Indeed, it is this alleged fact that Sider uses to deny nihilism and make his move at the end of VA from a denial of **Restricted Composition** to universalism being true.

Sider says:

Scientists discovered that hydrogen 'atoms' have proper parts. Then they discovered that protons have proper parts. At one point, at least, it was a legitimate scientific hypothesis that this process could go on forever [...] Philosophical reflections on the nature of composition should not lead us to claim that a legitimate scientific hypothesis is metaphysically impossible. So we ought to accept the possibility of material objects made of gunk. [1993: 287]

So Sider is endorsing **Possibility** (indeed, he appears to drop the *ceteris paribus* clause and so endorses a thesis *stronger* than **Possibility**). He then says that, as there have been scientific theories positing gunk, **Possibility** means its existence is metaphysically possible. It follows that nihilism is false (*Proof*: There could be gunk. Gunk has proper parts, and so is composite. Given nihilism, necessarily nothing is composite. So nihilism must be false. QED) and since it is false, the VA is an argument for universalism.

5. The Problem

However, what has remained unnoticed is that **Possibility** has one further result, for there are legitimate scientific theories saying simples can exist [Greene 1999: 141; Scala 2002]. So simples are metaphysically possible. Thus, just as the pairing of nihilism-everyism is

ruled out because of the possibility of gunk, so too the pairing of universalism-gunkism is ruled out as well (*Proof*: As universalism is necessarily true (if true at all), and universalism is necessarily paired with gunkism, gunkism is necessarily true (if true at all). But then if universalism was true, simples would be impossible. But as simples are possible, universalism is false. QED.).

To sum up: given **Possibility** and VA there are only four permissible combinations of answers to the Special Composition Question and the Simple Question. Two were *prima facie* inconsistent. The third, nihilism-everyism, was ruled out by an argument from Sider (again, premised on **Possibility**) and I have given my own argument (again, premised on **Possibility**) that the remaining combination, universalism-gunkism, is likewise ruled out. Thus, given VA and **Possibility** *no* answer to either the Special Composition Question or Simple Question is permitted, which is absurd. So, we must either deny **Possibility** or one of the premises of VA.³

My preference is to give up on VA, either by denying **No Cut Offs** or **No Existential Vagueness**. Once we do that, the doors are opened to restricted composition. Moreover, Sider's vagueness argument for perdurantism [Sider 2001: 134-9] is done for too, as it rides on the back of VA, so this move would benefit endurantism as well. That would be an interesting conclusion, and the one I am inclined to accept.

6. *Living Without Possibility*

The VA being unsound is not the only conclusion we could draw. We might instead drop **Possibility**. There are two problems with doing this. The first is that if we drop **Possibility**, we also lose Sider's reason for thinking that nihilism is false (as do others who think the same [van Cleve 2008: 327]). This is crucial as VA's *reductio* of **Restricted Composition** entails only that one of universalism and nihilism is true. So if we needn't give up on nihilism, VA no longer guarantees universalism. Therefore, whilst

³ Unless you endorse ontological nihilism (see *n1*). So you might take this argument just to indicate that there can't be anything whatsoever, although that would be a radical conclusion.

this is not an option I'm inclined to, even in that case we would still have an interesting conclusion.

The second problem is that the intuitions driving Sider and Hawley towards **Possibility** are very plausible. There does seem to be *something* wrong with saying that (*ceteris paribus*) philosophical discussion can rule out legitimate scientific theories from being true. So even if **Possibility** is not true, some principle a lot like it will be. That principle will likely remedy some of the shortcomings **Possibility** seems to have. First (example) shortcoming: it still remains to be explained exactly when all things aren't equal, and when it is that philosophical argument alone does give us a reason to think certain scientific theories are impossible. Second shortcoming: what makes a theory count as legitimate (such that we must take what it says to be possible) rather than a theory just being some random musings (such that we needn't think such a thing). There may be yet more shortcomings, and **Possibility** will need to be tweaked in light of such concerns. But whatever tweaks are made, it doesn't look like likely that they will effect what has been said so far. The scientific theories relied upon above (such that that there could be gunk; could be vague location; and could be simples) are not the ramblings of internet cranks, and are legitimate scientific theories that should (*ceteris paribus*) be thought of as being possible. So however we remedy the first shortcoming it is unlikely to make any difference. Further, whatever the details of the *ceteris paribus* clause I do not see any reason to think that all things are not equal in the cases described above, so any remedy to the second shortcoming is unlikely to make any difference either.

So presumably however we might tweak **Possibility** we still end up with the problems from above. One revision to **Possibility** does deserve some extra attention. We might try to replace **Possibility** with a similar principle that does guarantee that armchair philosophy doesn't overstretch itself, but which also ensures the possibility of gunk without guaranteeing that particles can be vaguely located. For every physical theory that might have been true, there are various ways to interpret that theory when it comes to the metaphysics. **Possibility** holds that if *any* (plausible) such interpretation entails P, then P is (*ceteris paribus*) metaphysically possible. But it is reasonable to think that every

scientific theory has a single *correct* interpretation, and so instead of **Possibility** we might insist that it is only when the correct interpretation of a possible theory says that P, that P is *ceteris paribus* possible. Thus we get, instead of **Possibility**:

Possibility*: If the correct interpretation of a physical theory says that P, then we should assume *ceteris paribus* that P is metaphysically possible.

Possibility* is, like **Possibility**, a principle linking scientific postulations with claims about metaphysical possibility, but **Possibility*** might be able to escape the problems from above. Whilst it will be true that on *some* (plausible) metaphysical interpretation of a theory from quantum physics that particles can be vaguely located at regions, it might not be true that the *correct* interpretation of that theory is that particles can be so located. If the correct interpretation wasn't such that objects were vaguely located, then, unlike **Possibility**, **Possibility*** wouldn't guarantee the metaphysical possibility of vaguely located objects. Thus we would no longer have a reason to believe **Vague Location**, *a fortiori* we would no longer be forced to accept either everyism or gunkism (and universalism could now be true, alongside some, restricted, answer to the Simple Question).

Of course, this would be a problem for Hawley's argument as much as mine. But I think there are some things to be said against this move in any case. As above, I find Hawley's original reasoning for thinking **Possibility** is true to be quite convincing, so see little reason to accept **Possibility*** instead. But there are more problems than my mere inclination concerning the truth of **Possibility**.

Firstly, accepting **Possibility*** doesn't mean that **Vague Location** definitely isn't true, it just leaves it an open question to be answered once we figure out the correct interpretations of the various theories of quantum physics (indeed, you might treat Hawley as arguing that **Possibility*** is true and that the correct interpretation of some plausible quantum theory *is* that exact location is vague, in which case **Vague Location** is restored). If even one of those theories is such that the correct metaphysical

interpretation is that particles can be vaguely located at certain regions, then **Vague Location** will be true, and **Possibility*** will cause the same problems that **Possibility** does. The scads of literature concerning what the correct metaphysical interpretation of quantum physics is, demonstrates that it is a non-trivial question what the correct interpretations will turn out to be, so it is an open question whether **Vague Location** will be true or not.

Secondly, and more seriously, accepting **Possibility*** rather than **Possibility** puts the possibility of gunk back into jeopardy. If, when we assume **Possibility*** rather than **Possibility**, we can say to Hawley that a theory that *seems* to indicate that exact location is vague does not in fact do so (hence, it needn't be possible), we might be able to say the same to Sider such that the physical theories that *seem* to imply the existence of gunk do not in fact do so (hence gunk needn't be possible). Indeed, Williams [2006] has given an explanation of how a theory might *seem* to include gunk without actually requiring gunk. So not only do we now need a substantial argument against some theory which *prima facie* requires vague exact location really requiring it, but we need a substantial argument for the conclusion that some theory that *prima facie* commits us to gunk really does commit us to gunk. This isn't to say that it *can't* be done, but it at least makes clear the challenge that lies ahead for someone trying to endorse the VA in combination with Sider's argument against nihilism. Once again, that would be an interesting conclusion.

7. *Contingent Composition*

Finally, rather than denying **Possibility** or denying that VA works, we might modify our definitions of universalism and nihilism. Whilst the standard definitions are that *necessarily* everything does or does not compose, we might think that universalism and nihilism are contingent theories. So composition would be contingent, and whilst universalism might be true at one world, nihilism is true at another. Given this, we could accept the possibility of gunk whilst still accepting that nihilism was (contingently) true. Just as long as there is no gunk at the actual world, there won't be any problem [*cf* Williams 2006: 495-502]. Similarly for universalism. We can accept that simples are

possible, whilst accepting that universalism is actually true, just as long as there are no simples at the actual world.

One problem with this is that there is a general distaste towards accepting that composition is contingent, and so many universalists will want to avoid this option. However, contingent composition has been defended [Cameron 2007] so we should not discount it out of hand. But the specifics of the defence quickly become pertinent. For instance, the extant defences of contingent composition are not for the conclusion that only two principles of composition are contingent (e.g. universalism and nihilism), but that a whole range of principles are contingent (e.g. that universalism, nihilism and the gamut of principles of restricted composition are each true at some world). But the only way that someone who believes VA could accept that conclusion would be to think that one of **No Cut Offs** or **No Existential Vagueness** is itself contingent, and then the doors are again opened to the possibility of restricted composition. Further, in defending contingent composition, Cameron takes it that he has to *dispense* with VA in order to secure the contingency of composition [2007: 114-7]. So whilst the possibility of contingent composition has been defended, that extant defence undermines VA anyhow, and some new defence of contingent composition will be called for. In any case, even if you are not moved by these worries, thinking that the considerations of this paper lead us to endorsing contingent composition is, of course, an interesting conclusion.

8. Conclusion

The vagueness argument must be supplemented by an argument against nihilism in order to guarantee universalism. The main (although, admittedly, not the only) argument to achieve this is Sider's argument for the possibility of gunk. But that argument relies on a principle about metaphysical possibility (i.e. **Possibility**) that is used by Hawley to argue for the necessity of either everyism or gunkism. I have argued that the pairings of everyism and gunkism with universalism or nihilism are all inconsistent, and suggested that we should instead give up on VA. Whilst there are alternatives (giving up on **Possibility**, ergo giving up on Sider's argument for the possibility of gunk; replacing

Possibility with **Possibility*** and getting stuck into a debate about the correct metaphysical interpretations of various physical theories; or accepting a weird form of contingent composition whereby only universalism and nihilism are contingent) any of those alternatives are equally interesting. So some interesting conclusion is the case.

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