Vague parts and vague identity
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Might the world really *be* vague, as opposed to merely being vaguely represented? Arguments that it cannot be are in no short supply, but a notable feature of many such arguments is that they rely on assumptions that the defender of metaphysical vagueness either tacitly or explicitly rejects.

We propose that not all such arguments are on a par. The first section of the paper distinguishes dialectically effective from dialectically ineffective arguments against metaphysical vagueness. The second section constructs an argument against metaphysical vagueness – specifically, an argument against objects that are indeterminate in what *parts* they have[1] – which promises to be dialectically effective. The remaining sections examine whether this argument succeeds.

We conclude by drawing a general moral from the argument we examine: principles often taken to be hostile to metaphysical vagueness (classical logic, classical mereology, denial of de re vague identities, etc) are not obviously so. The thrust of this is two-fold – opponents of metaphysical vagueness are too quick to assume that such principles (which we agree are plausible) rule out metaphysical vagueness, and proponents of metaphysical vagueness are too quick to reject such principles (often needlessly) in order to defend their view. The discussion in the following sections is illustrative of why both such moves are misguided.

1. Arguing against metaphysical indeterminacy

Arguments against metaphysical indeterminacy aren't hard to find, but many rest on premises that one who believes in metaphysical indeterminacy already explicitly rejects. An example is Russell (1923), arguing that there cannot be any metaphysical vagueness because all vagueness is essentially representational. It is, obviously, one of the hallmark components of a thesis of metaphysical vagueness that *not* all vagueness is essentially representational. The trend continues (though in less explicit forms) in more recent literature. Horgan (1994) and Heller (1996) both deny the possibility of metaphysical vagueness because it cannot accommodate the inherent context sensitivity of vagueness. But the defender of metaphysical vagueness can be expected to maintain that not all cases of vagueness[2] are as robustly context sensitive as Horgan and Heller maintain. Eklund (forthcoming) argues that, assuming there is semantic vagueness, there cannot be metaphysical vagueness because vagueness must be a uniform phenomenon. But the defender of metaphysical vagueness (again, assuming she also believes in semantic vagueness), would deny that we should think

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[1] And thus "vague objects" in our sense of the term. One might characterize vague objects as ones with vague boundaries, or which are indeterminately identical to other objects, rather than this mereological characterization. Some think that the notion of vague object has great foundational significance. If so, then the following discussion investigates the tenability of *one articulation* of that foundational concept.

[2] Or perhaps more accurately: indeterminacy. We'll be using the term 'metaphysical vagueness' for the remainder of the paper, though we are inclined to think that 'metaphysical indeterminacy' denotes the more inclusive and philosophically interesting concept. See Williams (forthcoming) for a review of the vexed issue of terminology in this area.

that vagueness is uniform.[3] And many philosophers, without much in the way of further explanation, dismiss ontic vagueness as unintelligible or obviously vacuous.[4] But those are hardly claims that the friend of ontic vagueness is going to be sympathetic to.

Arguments starting from premises one's opponent rejects may still be dialectically effective. What is important is to have independent grounds supporting the starting point.[5] If one's opponent can only retain consistency by rejecting well-grounded assumptions, then so much the worse for that opponent. You cannot please everyone all of the time – especially not in philosophy.

The argument to be considered here will start from assumptions about logic and the principles governing parthood that the believer in metaphysical indeterminacy may well wish to reject. We assume classical tautologies---in particular, the law of excluded middle---hold good. We shall help ourselves also to principles drawn from classical extensional mereology.[6]

Defending the claim that these are reasonable starting points would be a major enterprise---it is simply assumed here. But we think these should immediately strike one as *better* candidates for a successful argument against ontic indeterminacy than those in play in the arguments of Russell, Heller, Eklund and Lewis. One does not have to take a stance on issues of vagueness to be impressed by a case for classical logic on grounds of theoretical conservativeness; and extensional mereologies are well-understood and widely deployed in contemporary metaphysics. By contrast, the assumptions in play in the arguments of Russell, Heller, Eklund and Lewis rely on specific claims about the nature of vagueness: to that extent it is tempting to see the contested propositions as "spoils to the victor" rather than giving independent traction on the debate.

Admittedly, many friends of metaphysical indeterminacy develop their theories in the context of revisionary theories of logic or mereology. From a neutral perspective, however, giving up well-entrenched principles of logic or a simple powerful mereology counts as a major cost to a theory. This cost would be appreciable *independent* of the particular topic at hand.

However, it is not clear, pre-theoretically, that claiming that it is at times indeterminate whether one thing is part of another should commit one to such revisionism. All parties, therefore, should be interested in the argument below which purports to establish that vague objects are impossible if we presuppose strong principles governing logic and mereology.

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[3] On certain understandings of what we mean by 'uniform' phenomenon. Again see Williams (op cit) on "imperialist" vs. "non-imperialist" positions on the nature of indefiniteness.

[4] See for example: Horgan (1994), Dummett (1975), Lewis (1986) and (1993), and Hudson (2005)

[5] Indeed, in some circumstances, we may be entitled to assume something *without* having any positive grounds for thinking it true. Lewis thinks that the assumption that there are no true contradictions has this status (see especially (2004)). Weatherson (2003) raises the prospect of a ban on ontic vagueness having a similar status. Of course, it's rather *disappointing* if this is the most we could say.

[6] See Simons (1987) for presentation of several mereological systems, including classical extensional mereology. As we understand it, this theory commits itself to certain formal properties of the (improper) parthood relation (reflexivity and transitivity), to the existence and uniqueness of arbitrary mereological sums of entities, and to the so-called "strong supplementation principle".

2. The argument against vague parts

2.1. The argument

In his (2003) discussion of the problem of the many, Brian Weatherson offers a reductio of the claim that there are vague objects, in the sense of objects x and y, such that it is indeterminate whether x is a part of y. Weatherson's argument forms the starting point for our discussion.

The background to Weatherson's argument is the classical setup of Unger's problem of the many (1980), here in a form taken from McGee and McLaughlin (1994). Focus on the material world in the vicinity of Kilimanjaro, and say Sparky is an electron right on the borderline for being part of the mountain. Define: "Kilimanjaro(+) to be the body of land constituted … by the atoms that make up Kilimanjaro together with Sparky [and] Kilimanjaro(-) [to] be the body of land constituted … by the atoms that make up Kilimanjaro other than Sparky." (McGee and McLaughlin, 1994). The argument generalizes to any putative instance of metaphysically indeterminate parthood. In any case where, putatively, it is indeterminate whether some s is a part of K, we can substitute K for Kilimanjaro; substitute the fusion of K and s (call it K+), for Kilimanjaro(+); and substitute the fusion of parts of K that do not overlap with s (call it K-), for Kilimanjaro(-). Classical extensional mereology assures us that K+ and K- exist.

The Weathersonian argument assumes the following. First we have the existence of Kilimanjaro(-) (which definitely lacks Sparky) and Kilimanjaro(+) (which definitely contains Sparky). The second element is the premise that if two things coincide *setting aside Sparky*, then they coincide if they either both contain Sparky, or neither contains Sparky. The third element is classical logic, and in particular: the law of excluded middle. The fourth element that is the principle that things that share all their parts (coincide) must be identical. For simplicity, let us take this in its strongest form: if A and B have exactly the same parts, then they are identical.[7] The premises will all be endorsed by the package of classical logic and classical extensional mereology. Though the assumptions are disputable, they all strike us as *reasonable starting points* in the sense outlined earlier. None of them concern the nature of vagueness specifically, and so may be reasonably held prior to any debate as to the possibility of metaphysical vagueness.

Weatherson, in addition, assumes that the vague object Kilimanjaro must be distinct from each of Kilimanjaro(+) and Kilimanjaro(-).[8] Given this, his argument can be

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[7] Notice here that we are using an unrelativized notion of parthood. This fits best with a perdurantist or stage theoretic conception of the persistence of material things. Weatherson sketches extensions of his argument to alternative settings (and so, perhaps, compatible with an endurantist conception of persistence), in each case strengthening certain mereological principles to get the result to go through. The points we wish to make are not affected, so we stick with the simple setting in this paper.

[8] Compare Noonan (2004, p.131):

> Everyone knows that Evans's argument against vague identity in-the-world doesn't show that there aren't vague objects. Even if the argument succeeds all it proves is that every vague object is determinately distinct from every precise object and every other vague object.

What we will argue below is that in the sense of "vague object" relevant here (which may not be Noonan's), the existence of vague objects requires them to not be (determinately) distinct from things

summarized as follows. Kilimanjaro, Kilimanjaro(+) and Kilimanjaro(-) all meet the condition in the antecedent of the third principle. So if Kilimanjaro *does* contain Sparky, then Kilimanjaro and Kilimanjaro(+) would coincide. And if Kilimanjaro *doesn't* contain Sparky, then Kilimanjaro and Kilimanjaro(-) would coincide. By the fourth assumption, either Kilimanjaro has Sparky as a part or it doesn't. Either way, Weatherson claims, we have *distinct*, coinciding objects, which is inconsistent with the second assumption.

Weatherson's assumption that the vague object Kilimanjaro is distinct from Kilimanjaro(+) and Kilimanjaro(-) is not of the same character as of his other assumptions: it is not something on which we have traction independently of the putative nature of vague objects. The argument to follow draws on Weatherson's, but drops this assumption. Plausibly, what it shows is that classical logic and mereology commits the believer in vague objects to the disjunction: the vague object K is identical to K+ or identical to K-. But consistently with this, one might say there is no fact of the matter about which one it is identical to. The disjunction is determinate: but neither disjunct determinately holds. What we get is not a straightforward contradiction, but an argument from vague parts to vague identity.

The disjunctive identity is derivable from the declared assumptions. Proof:

1. Either Sparky is part of K, or it isn't.   (Law of excluded middle)
2. If Sparky is part of K, K coincides with K+   (Assumption 2)
3. If K coincides with K+, then K=K+   (Assumption 3)
4. If Sparky is part of K, then K=K+   (2,3 logic).
5. If Sparky is not part of K, K coincides with K-   (Assumption 2)
6. If K coincides with K-, then K=K-   (Assumption 3)
7. If Sparky is not part of K, K= K-   (5,6, logic).
9. Either K= K- or K= K-   (1,4,7, logic).

Given (9), vague identity seems inescapable. For determinate distinctness from both K+ and K- is now untenable, and determinate identity with either is ruled out by the setup. So indeterminate identity is the only option standing.

First observation: Classical logic and mereology commits the friend of vague objects to vague identities.

<u>2. An argument against vague parts cannot be completed simply by appeal to the Evans-Salmon argument</u>

While vague parthood seemed *prima facie* innocent, vague identity is something that we have specific reason to be dubious about, due to the famous Evans-Salmon argument which we have explicitly accepted.[9] The moral of the Weathersonian argument is this: vague parts give rise to vague identity.[10]

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such as Kilimanjaro(+).

[9] Evans (1978), Salmon (1982).

[10] Compare Barnes (2005), who argues that vague instantiation gives rise to vague existence, granted a suitably Realist property ontology, and Hawley (2002), who implicitly argues that vague existence gives rise to vague identity.

If it were merely a matter of *semantic indecision* whether the referent of "Kilimanjaro" was a fusion containing Sparky, or one that fails to contain Sparky, then presumably we need not be worried by any of this. For then the vague identity statement we arrive at would be vague in virtue of semantic indecision: on some precisifications, "Kilimanjaro" and "Kilimanjaro(+)" would corefer, on the others "Kilimanjaro" and "Kilimanjaro(-)" would do so. It is widely accepted that such semantically vague identity is not the target of the Evans-Salmon argument.[11]

However, our argument was targeted at the thesis that Kilimanjaro was a vague object: that it was *metaphysically* vague whether Kilimanjaro had Sparky as a part. From this starting point, it is tempting to think that we have derived exactly the kind of *metaphysically* vague identity targeted by the Evans-Salmon argument. And we earlier said that the success of this argument is a legitimate assumption for the opponent of vague objects to make. So---it may seem---one can now appeal to those to close the loophole in the argument and complete the reductio of metaphysically vague parts.

Now, we can admit that the vague identity statement "K=K+" is vague *in virtue of worldly indeterminacy*. But it would be fallacious to thereby assume that we can run the Evans-Salmon argument on it. For that argument requires that from the fact that it is (metaphysically) vague whether K and K+, we derive that there is an object K+ such that it is indeterminate whether it is identical to K (one then argues that K+ lacks this property, so the two must be distinct). Deriving this *de re* claim from the *de dicto* one relies crucially on the premise that the terms involved are *not referentially indeterminate*.

Crucially, we have no right as yet to the assumption that there is no *referential* indeterminacy involved. It might seem at first that diagnosing referential indeterminacy is to switch the subject matter from metaphysical to semantic indeterminacy. But this is not so. Suppose it were metaphysically unsettled where an object, Table, was located. Suppose that is either located between you and Wardrobe, or is in another room entirely: but there is no fact of the matter which one of these regions it is in. Now introduce the name "Front" to refer to whichever individual is directly in front of you. "Front" will be referentially indeterminate between Table and Wardrobe, and "Table=Front" will be vague. But the source of this referential indeterminacy is not any lack of semantic conventions on your part, but rather the metaphysical indeterminacy in the location of Table. You laid down precisely the conditions a thing had to meet to be dubbed "Front": and it was metaphysically indeterminate which object met those conditions. The crucial observation here is that the reference relation has two ends: the language-user and the world: indeterminacy in either may give rise to referential indeterminacy. No matter what the source of the referential indeterminacy, it will block the Evans-Salmon argument in the familiar way. Slogan: the Evans-Salmon argument targets only *de re* indeterminate identity, not all metaphysically vague identities.[12]

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[11] Lewis (1988).

[12] Here we draw on the treatment of metaphysically vague identities put forward by Williams (2008). The literature on Evans' argument is too large to survey here. References may be found in the article cited.

What we need to show is that something similar might arise in the case at hand. Here is one ontology of vague objects that makes "K+" referentially indeterminate. There are two vague objects, *K*, and *dual*-K. For each x aside from Sparky, it is determinate that x is a part of K iff it is a part of dual-K. And further, Sparky is such that, determinately, it is part of K iff it is not part of dual-K. There are no objects which determinately have exactly the parts of K apart from s, and there are no objects which determinately have exactly the parts of K together with s.

Recall the way that "K+" was introduced: to pick out that thing which was the sum of K and s. Granted the ontology just sketched, it will be determinate that something meets that description: it will be either K or dual-K, but which one it is turns on which contains s, and that is an indeterminate matter. Hence *it will be indeterminate which vague object "K+" refers to*. Similarly for "K-". The ontic indeterminacy in what parts objects have generates referential indeterminacy in the names "K+" and "K-"; and in the familiar way this blocks the abstraction step of the Evans argument. One cannot convert the de dicto metaphysically vague identity argued for at the end of the last section to an objectionable de re vague identity.

No matter whether this is a *plausible* material ontology, it is *consistent* one. And it provides a way of believing in vague objects consistently with classical logic and mereology.

Second observation: the argument cannot be patched simply by appeal to the Evans-Salmon argument.

3. Hunting the missing premise

Can we find some other reasonable assumption to lay down that will complete a reductio of vague objects (i.e., objects with metaphysically indeterminate parts)? One might think that some other aspect of classical extensional mereology will supply the missing premise. But this is not the case. For a minimal illustration of this, take a world with three simples, A B and C. Now suppose there is some object which is determinately the sum of A+B, and another that is determinately the sum of B+C. Now suppose that we have two further objects, X and Y, such that each determinately contains A+B, and which with respect to C are "dual" in the way that Kilimanjaro and dual-Kilimanjaro were supposed to be: it is indeterminate, of each, whether it contains C, but determinate that one contains C iff the other doesn't. This world determinately satisfies the axioms of a classical extensional mereology,[13] including what one might call *de dicto* determinate Universal Fusion:

> *Determinately*, whenever there are some objects, they have a sum.

What would suffice, to complete the current argument against metaphysically indeterminate parts, is the following principle which we might call *de re* determinate Universal Fusion:

> Whenever there are some objects, there is an object which is *determinately* their sum.

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[13] See Simons (1987) for presentation of several mereological systems, including classical extensional mereology.

This, finally, closes the loopholes. For simplicity, suppose that s is the *only* object such that it is vague whether it is part of K. Then K+ will be a fusion of a determinate set of objects. And by *de re* determinate fusion, there exists an object determinately meeting that description. So "K+" can safely be assumed to be referentially determinate. Ex hypothesi, "K" was referentially determinate too: it determinately refers to the putative vague object. So now, when we derive the vague identity through the Weathersonian argument, we will have proved that vague parts lead to *de re* vague identity: and we may then deploy the Evans-Salmon argument for a final reductio.

De re determinate Universal Fusion is a substantive ontological principle. What the overall argument shows, is not that vague objects are impossible, but that---under Weatherson's original assumptions, and assuming that *de re* vague identity is impossible---we cannot have a vague object *together with* a plenitude of precise objects. We suggest that here we reach stand-off: one who believes in a plenitude of precise objects has the resources to argue against the existence of a vague object "floating on top". But equally, one who believes in a plenitude of vague objects has the resources to argue against the existence of a precise object "floating underneath". Nothing we have as yet seen tells us whether the axe should fall on the vague objects, or on the precise objects. It is striking that we can argue (on independently reasonable assumptions) that the believer in vague objects must deny *de re* determinate fusion. But we see nothing to suggest that treating that denial as a reductio is itself independently reasonable.

Final moral: precise ontology constrains vague ontology, and vice versa. But absent independent argument for a plenitudinous precise ontology, we have no reductio of vague objects.

Conclusion
Even when working with a fully classical logic and mereology, vague parts do not lead to the kind of metaphysically vague identity that is susceptible to the Evans-Salmon reductio. This illustrates an important general point: indeterminate identity claims *including those that are indeterminate in virtue of worldly indeterminacy* cannot be dismissed, even if we accept the principles underlying the Evans-Salmon reasoning.[14]

More broadly, we have an illustration of the general moral that classical logic, even in combination with strong metaphysical assumptions such as classical extensional mereology, does not have the dialectical force against metaphysical vagueness which it is often taken to have. Striking and fully consistent vague ontologies can be developed in line with these assumptions: assumptions that friends of metaphysical vagueness are too quick to deny.

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[14] What *can* be dismissed, however, is the notion that vague parts can be combined with a plentitudinous precise ontology. This local result is itself significant, as it casts doubt on whether vague objects can serve as a solution to the problem of the many. (So we'd still get an argument against objects having vague parts if the problem of the many were the *only* reason we could have for positing vague parts: but we see no need to grant that assumption).

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