Borderline Simple or Extremely Simple[1]

In his *Material Beings*, Peter van Inwagen distinguishes two questions about parthood. What are the conditions necessary and sufficient for some things jointly to compose a whole? What are the conditions necessary and sufficient for a thing to have proper parts? The first of these, the Special Composition Question (SCQ), has been widely discussed, and David Lewis has argued that an important constraint on any answer to the SCQ is that it should not permit borderline cases of composition. This is a far-reaching claim, since many plausible-seeming accounts of composition do permit borderline cases. Ned Markosian has recently directed our attention to the second, the neglected Inverse Special Composition Question (ISCQ). I will argue that those who accept Lewis's constraint on answers to the SCQ should accept an analogous constraint on answers to the ISCQ, and I will discuss the effects of such a constraint.[2]

I Accounts of Composition and of Simplicity

What are the conditions necessary and sufficient for some objects jointly to compose something? There are two extreme answers to this Special Composition Question: any conditions are sufficient; no conditions are sufficient. Universalists believe that there are no restrictions on composition: take any plurality of objects whatsoever, no matter how scattered or diverse, there is something those objects compose. Nihilists believe that composition never occurs: no matter how integrated some objects are, there is nothing they compose (except perhaps that each object composes itself).[3]

These extreme answers are straightforward, but they do not match our untutored beliefs about what there is: universalists claim that there are far more material things than we had ever dreamed of, while nihilists do not believe in the objects of everyday life, of chemistry or even of atomic physics. Extremists must provide a story about why the rest of us appear to believe in either more or fewer objects than there really are: perhaps ordinary talk about baseballs does not really conflict with the metaphysician's denial that baseballs exist, or perhaps we ordinarily but fallaciously infer the non-existence of scattered objects from their insignificance.[4]

Extremist measures are supposed to be necessary because more moderate answers to the SCQ, according to which some but not all pluralities have a sum, are alleged to have a fatal flaw. The argument is roughly this: if any moderate account of composition were true, then borderline cases of composition would be possible. But this would mean that borderline cases of existence were possible, and they are not. So no moderate account of composition is true.

I will discuss the details of this argument below, but first I will outline an analogous argument from borderline cases against moderate accounts of simplicity. The Inverse Special Composition Question asks for conditions necessary and sufficient for a material object to have proper parts. Equivalently, the Simple Question asks for necessary and sufficient conditions for a material object to lack proper parts, to be a simple. There are two extreme answers to this Simple Question: any conditions are

sufficient for simplicity; no conditions are sufficient for simplicity. According to the first of these, there can be no composite objects: either there is a single World Object, or else there is just a plurality of non-composing atoms. According to the second answer, nothing can be simple, and the world must be made of 'atomless gunk'.

These claims about how things must be are strange. Fortunately, there are also moderate answers to the Simple Question, according to which some but not all possible objects are simple and it is for physicists to discover which, if any, actual objects satisfy the conditions for simplicity. But are such moderate accounts of simplicity tenable? Drawing upon an analogy with composition, we can construct the following argument: if any moderate account of simplicity were true, then borderline cases of simplicity would be possible. But this would mean that borderline cases of existence were possible, and they are not. So no moderate account of simplicity is true.

Is this argument any good? I will take up a slightly easier question: must those who are committed to the soundness of the analogous argument for extremism about composition also accept this argument for extremism about simplicity? I will argue that the two arguments stand and fall together. If there is such a connection between extremism about composition and extremism about simplicity, this should be of some interest, since the former position is more popular than the latter. But is my argument even necessary? Aren't extremists about composition inevitably committed to extremism about simplicity, regardless of borderline cases? Not inevitably. Nihilism about composition entails that everything is simple; and, if the world is gunky there must be composition if anything exists (Lewis 1991, p. 70; Sider 1993; Markosian 1998b, n. 26). But universalism about composition is *prima facie* compatible with a range of extreme and moderate views about simplicity.

II Vagueness and Composition

In this section, I take up some details of the argument for extremism about composition, with an eye to assessing the analogous argument for extremism about simplicity. Recall the shape of the argument: if any moderate account of composition were true, then borderline cases of composition would be possible. But this would mean that borderline cases of existence were possible, and they are not. So no moderate account of composition is true.

Why think that if any moderate account of composition were true, then borderline cases of composition would be possible? Two complementary strategies are available: first, show that existing moderate accounts of composition permit borderline cases; second, argue more generally that any plausible moderate account will permit borderline cases.

One well-discussed moderate account of composition is van Inwagen's, according to which objects compose something when and only when their joint activity constitutes a life (van Inwagen 1990). (I will use 'perform a life' to mean 'are such that their joint

activity constitutes a life'.) There are three sorts of situation in which it seems to be a vague matter whether some objects perform a life. First, there are pluralities which we would ordinarily describe as 'composing a virus'. Yet it is a vague matter whether viruses are living or non-living, and so it is a vague matter whether those pluralities perform lives. Second, living things seem to have fuzzy spatial boundaries: you have 'borderline parts'. So there is a plurality of objects such that it is vague whether the plurality performs a life (it's vague whether those things perform your life, and there is no other life in the vicinity). Third, lives often begin and end fuzzily: if it is a vague matter whether a hamster is still alive, then it is a vague matter whether the particles in the hamster-vicinity are still performing a life. So van Inwagen's moderate account of composition permits cases in which it is vague whether composition occurs.[5]

Should we expect all moderate accounts of composition to permit borderline cases of composition? Lewis argues that any moderate account which does not permit borderline cases "cannot fit the intuitive desiderata" (1986, p. 213). Moderate accounts gain plausibility by tracking our intuitions about when composition does and doesn't occur. But we seem reluctant to draw sharp boundaries regarding composition in everyday life. Moreover, whatever folk theory of composition we have seems to involve ideas about causal, functional or spatial integration, and about contrast with the environment: all of these features permit of degree and thus, especially in vaguely-specified combination, are prone to borderline cases. Our intuitions about composition are vague, so any account of composition which attempts to capture these is liable also to be vague.

It seems plausible that, if we try to specify an acceptable moderate account of when composition occurs, then what we say will permit borderline cases. But why try to specify? Markosian argues that composition is 'brute', which is to say that there is no true, non-trivial and finitely-statable answer to the Special Composition Question (Markosian 1998b). Sider responds that brute facts about composition violate our intuition that relevantly small differences in the microscopic arrangement of things cannot make all the difference to the existence of a macroscopic thing (Sider 2001, p. 124).

My task in this paper is not to assess the argument for extremism about composition, but merely to compare it with an argument for extremism about simplicity. So let's suppose that accounts of composition should be informative, and that plausible, moderate, informative accounts of composition inevitably permit borderline cases. Why is this thought to count against them? A borderline case of composition is one in which it is a vague matter whether a given plurality of objects has a sum. There are three competing accounts of the nature of vagueness - ontic, semantic and epistemic accounts - and, it is alleged, none of these can accommodate vagueness in composition.

Both ontic and semantic vagueness in composition are rejected because of their connections with vagueness in existence. We must tread carefully, however, since not every borderline case of composition gives rise to problematic vague existence.

Recall the three ways in which vague composition might occur, according to van Inwagen's criterion. First, it is a vague matter whether the virus exists. Here, vague composition clearly entails vague existence. Second, although your spatial fuzziness means that it is a vague matter which plurality composes you, it is perfectly determinate that you exist. There is no vagueness of existence here, no indeterminacy in the number of objects involved in the story: there's you, there are all the simple things, and there are your living cells. Doesn't the sum of plurality P vaguely exist, where it is vague whether P composes you? No: we cannot infer from its being vague whether P composes anything to P's composing something which vaguely exists. In a (metaphorical) sense, P is poised between composing you and composing nothing at all; whatever this means, it doesn't entail that P composes a greyish thing a bit like you.

So vagueness of composition like that in the virus case gives rise to vagueness in existence, while vagueness of composition like that regarding your spatial parts does not. The third type of case involves temporal fuzziness; whether this gives rise to vagueness in existence depends upon issues about the nature of time and persistence which lie beyond the scope of this paper.

Lewis (1986) argues directly against vagueness in composition; Sider (2001) assumes that vague composition automatically gives rise to vague existence, and aims his fire at the latter. Sider's strategy is legitimate only if any plausible, moderate, informative account of composition which permits vague composition permits the type which entails vague existence. Van Inwagen's account does have this feature: is this inevitable? Sider's strategy would falter given an account which specified a sharp threshold of, say, spatio-causal integration, beneath which composition did not occur, yet claimed that above the threshold only the best candidate plurality in a vicinity composes anything, where it can be vague which is the best candidate. The sharp threshold rules out virus-type vagueness and thus vague existence, while the vagueness of the best-candidate condition permits a determinately-existing object to have vague boundaries. But it is hard to see how such a view could be motivated, except by the desire to avoid vague existence.

Let's accept for the sake of argument that all plausible, moderate, informative accounts of composition permit the type of vagueness in composition which entails vagueness in existence. This is thought to count decisively against such accounts, given either an ontic or a semantic account of vagueness.

According to ontic accounts of vagueness, if it is vague whether some objects jointly compose something, this is because there is a relation (or complex of relations) which is instantiated by all and only pluralities which jointly compose something, and the world simply fails to determine whether this plurality instantiates that relation. In virus-type cases, it is indeterminate whether the plurality instantiate *jointly compose something*, and as a result it is indeterminate whether there is any composite object in the vicinity. Ontic accounts of vagueness in general are unpopular, but ontic vagueness in existence can seem particularly unappealing. The thought may be that ontic vagueness in existence would involve objects with a kind of shadowy half-

status on the verges of existence, or untenable commitment to there *being* something which only vaguely *is*. I am persuaded by van Inwagen's argument that this thought is mistaken (van Inwagen 1990, section 19; Hawley 2002). Nevertheless, if ontic vagueness in existence is rejected in the context of arguing for extremism about composition, then it must also be rejected when considering extremism about simplicity, so I need not examine this point further here.

According to the semantic or linguistic view of vagueness, all vagueness is due to the failure of some word to latch onto a unique property or particular. In fuzzy-boundary cases, a composite object stands in slightly different relations to different pluralities of candidate parts. Vagueness here can be explained by our failure to select any unique relation as the semantic value of 'has as parts'. Although advocates of the semantic view of vagueness typically overlook this option, it seems perfectly coherent.[6] Virus cases are more problematic. It is a vague matter whether the candidate parts satisfy 'performing a life'; this may be explained by our failure to select any unique semantic value for this predicate. But we cannot so easily put down vagueness in whether the virus exists to semantic indecision. There do not seem to be a range of candidate semantic values for the predicate 'exists'; even if there were, we cannot picture the virus as possessing some of those properties and not others, for this is already to picture the virus as existing. If an account of composition permits the kind of vague composition which entails vagueness in existence, then if we adopt a semantic view of vagueness, we should reject that account of composition (for a more detailed argument, see (Sider 2001, section 4.9)).

So both ontic and semantic accounts of borderline composition are rejected because of the supposed impossibility of ontic or semantic vagueness in existence. There is a third view of vagueness, the epistemic account, according to which borderline cases arise because of our ignorance. If there is a borderline case of composition, then either our predicate 'jointly compose something' latches onto some significant physical relation whose precise extension we cannot determine, or it picks out one of many very similar relations, and we are ignorant of which of these it picks out. Sider argues against the first of these in the same way that he argues against the claim that composition is brute: how could two extremely similar pluralities differ in whether they compose anything? The second suggestion falls to the arguments against semantic indecision in the term 'exists'. (Sider 2001, pp. 130-32) So there cannot be epistemic borderline cases of composition.

Extremists argue against moderate accounts of composition by linking them to supposedly-unacceptable vagueness in existence, or else to supposedly-unacceptable bruteness of composition. I have suggested that the argument has some weak spots, but it has nevertheless proved compelling to many of those who have thought about composition. Should the analogous argument for extremism about simplicity be equally compelling?

III Vagueness and Simplicity

There are several points at which we might try to accept the argument to extremism about composition, whilst rejecting the analogous argument to extremism about simplicity. Details of the various competing accounts of vagueness are common to both arguments, as is the rejection of either ontic or semantic indeterminacy in existence. But key claims might seem compelling with respect to composition, yet resistible with respect to simplicity. Here are some questions about the analogy:

- If we accept that either semantic or ontic vagueness in composition would give rise to a problematic kind of vagueness in existence, must we also accept that either semantic or ontic vagueness in simplicity would give rise to a problematic kind of vagueness in existence?

- If we accept that any moderate account of composition must be informative (that composition is not 'brute'), must we also accept that any moderate account of simplicity must be informative? Relatedly, if we reject epistemic accounts of borderline composition, must we reject epistemic accounts of borderline simplicity?

- If we accept that any plausible, informative, moderate account of composition will permit borderline cases of composition, must we accept that any plausible, informative, moderate account of simplicity will permit borderline cases of simplicity?

I will argue that the answer to each of these questions is 'yes'. If I am right, then there is a good analogy between the argument for extremism about composition and the argument about simplicity. Extremists about composition who base their view on the argument from vagueness should choose between the claim that everything has proper parts and the claim that nothing has proper parts. But even if my argument fails, it will be instructive to see how and why it fails: what disanalogies are there between composition and simplicity?

I will take up the questions about the analogy in turn. First, if we accept that either semantic or ontic vagueness in composition gives rise to a problematic kind of vagueness in existence, must we also accept that either semantic or ontic vagueness in simplicity gives rise to a problematic kind of vagueness in existence? I distinguished two different ways in which a borderline case of composition might arise. In virus-type cases, it is indeterminate whether a composite object in that region exists at all: such a case involves vagueness in existence, however that is to be understood. In cases like that of your fuzzy boundaries, it is determinate that there is a composite object in the vicinity, but it is indeterminate which of several pluralities compose it. This more innocuous type of case involves vagueness in parthood, but need not involve vagueness in existence.

There are also two distinct ways in which an object O could be a borderline case of having proper parts. First, it could be indeterminate whether the candidate parts exist. Second, it could be determinate that the candidate parts exist, but indeterminate whether they are parts of O. For example, imagine an account

according to which an object has proper parts if and only if it has sufficient internal structure, where this can be a vague matter. If, without absorbing material from the environment, an unstructured object develops sufficient internal structure, then some new objects - its proper parts - begin to exist. At some intermediate stage in this process, the object may be a borderline case of having proper parts. This is a borderline case of the first type, involving vague existence of the parts. Contrast this with a case where a simple object acquires a part from the environment: at some intermediate stage in this process the object may be a borderline case of having proper parts, but there is no vagueness in what exists.

But the second type of borderline simplicity is more problematic than the corresponding type of borderline composition (where a determinately-existing object has fuzzy boundaries). Even without considerations of vagueness, it is difficult to understand how an object can be simple at one time, or at one possible world, and have proper parts at another time or world; this difficulty infects any attempt to describe an object which is borderline between being simple and having proper parts. The difficulty arises because standard accounts of modal or temporal change in parts do not apply smoothly to the limit case of change between being simple and having proper parts.

What are the standard accounts of change in parts? Suppose that Alfie grows an extra toe (Heller 1990, chapter 1). Call the new toe 'Toe', and let 'Toe-Complement' be a name for the person-shaped thing to which Toe is attached. How are we to describe this change? One option is to claim that Alfie and Toe-Complement begin as one and the same thing, but become distinct when Alfie expands to include Toe. A second option is to deny that either Toe or Toe-Complement exist after the change, claiming only that Alfie has grown by incorporating more particles. A third option is to claim that Alfie is first constituted by Toe-Complement, then later constituted by the sum of Toe and Toe-Complement, yet is identical to neither. A fourth option is to claim that no Alfie-shaped object survives the change, either because nothing is wholly present at more than one time, or because objects cannot survive mereological change.[7] Each option has its advantages and disadvantages, but the natural choice for anyone with a moderate account of composition is the second.

Now consider the limit case of an object which apparently grows from being simple to having two proper parts, by acquiring a part from the environment. For example, imagine an ionised hydrogen atom (a proton) which acquires an electron from the environment to become a neutral hydrogen atom (pretend that the proton, like the electron, is simple). The first option is to identify the atom with the proton temporarily. The second option is now not available, since we are committed to the existence of both proton and electron. The third option is to distinguish the atom from the proton, even when they coincide. And the fourth option is to claim that the atom ceases to exist during this change, and is replaced by a new atom.

What if the transition is vague? Then we must choose between vague (temporary) identity, vagueness in constitution without vagueness in parthood, and vague

existence (the first, third and fourth options respectively). Vague identity is acceptable if given a semantic analysis (in terms of indeterminacy of reference), but is notoriously problematic if ontic (Evans 1978). Analysing such a transition as a change in constitution rather than a change in parthood undermines the initial claim that the object in question is borderline simple, and thus undermines the moderate account of simplicity under discussion. And vague existence, as we have seen, is unpopular.

There is a distinction between cases of vague composition which give rise to vague existence, and those more innocuous ones which do not. An analogous distinction can be made amongst cases of vague simplicity, but even when there is no vagueness in the existence of the candidate parts, there may be other unwelcome commitments. The only way out is to claim that we have not fixed whether we are talking about a simple or the sum of two objects, giving a semantic account of a vague identity. In what follows, I will focus on borderline cases of vague simplicity which straightforwardly give rise to vague existence: this will avoid some complications, and will bring out the analogy with problematic vagueness in composition.

I turn to the second question(s) about the analogy: if we accept that any moderate account of composition must be informative (that composition is not 'brute'), must we also accept that any moderate account of simplicity must be informative?[8] Relatedly, if we reject epistemic vagueness in composition, must we also reject epistemic vagueness in simplicity? Markosian argues that, given the unacceptable vagueness of plausible, informative, moderate accounts of composition and the unpalatability of extreme accounts, we should claim that there can be no informative account of composition. Defending extremism, Sider responds that it is at least implausible to suppose that two pluralities can be almost exactly alike in their arrangement and qualities yet differ absolutely in whether they compose anything. Does a commitment to Sider's argument against brute composition compel a parallel rejection of brute simplicity?

If simplicity is brute, then there could be two extremely similar objects which differed in whether or not they had proper parts. If this seems objectionable, then, as in the case of composition, it is perhaps because it makes existence seem unbearably fragile: if this object had been ever so slightly different then its proper parts just would not have existed, and if this plurality had been ever so slightly different, then its sum just would not have existed (other things being equal, that is). *Prima facie*, this fragility concern seems to apply symmetrically to brute composition and brute simplicity.

I can think of two reasons why one might be impressed by Sider's argument against brute composition, yet reject the analogous argument against brute simplicity. One might think it necessary that one of composition and simplicity be brute, and so take Sider's argument to show by elimination that simplicity must be brute. Or one might claim directly that while Sider's argument against brute composition succeeds, the analogous argument against brute simplicity fails.

Why think that at least one of composition and simplicity must be brute? This raises large and interesting questions: here, following Markosian (1998b), I will take it that the task is to provide a condition that is necessarily coextensive with "there is an object composed of the xs", which holds for any xs, and which is not synonymous with that phrase, and ditto for "x is a simple". Suppose that we succeed in the former task: must we then fail in the latter? We might find that we must use the notion of a simple in providing the condition for composition, and must use the notion of composition in providing the condition for simplicity (although this doesn't seem inevitable). But while this could involve us in some circularity, the circularity need not be vicious, and the circle would have to be very small indeed if it forced us to break the 'no-synonymy' rule.

What about the claim that the fragility objection to brute simplicity is just less compelling than the fragility objection to brute composition? Perhaps the existence of a sum is closely dependent upon the arrangement of its parts, but the existence of a part is not likewise dependent upon being a part. Even granted a relationship between being ontologically dependent and being related in non-brute fashion, this claim rests on a dubious asymmetrical view of the relationship between parts and wholes.[9]

So, if the fragility objection gives us reason to reject the claim that composition is brute, then we have a similar reason to reject the claim that simplicity is brute. And *vice versa*: the fragility objections stand and fall together. It might nevertheless be reasonable to adopt brutalism in one area but not in the other, because of differences in the dialectical situation. Markosian's argument that composition is brute is based on his rejection of non-brute accounts of composition, but he is more optimistic about the prospects for non-brute accounts of simplicity: this position is coherent. Conversely, we might be happy with some informative account of composition, but reject all informative accounts of simplicity one by one, and therefore turn to brute simplicity: again, this position is coherent. But these matters can only be judged by considering each debate as a whole; for now, my point is that the fragility objection should carry the same weight against brute simplicity as it does against brute composition.

For similar reasons, if we reject an epistemic account of borderline composition, we should also reject an epistemic account of borderline simplicity. Suppose we cannot tell whether something is simple, despite knowing all the other salient facts upon which this could turn. Then either we are ignorant of where we happen to limit the extension of 'is simple', which suggests many candidate extensions for 'exists', or else we are ignorant of some brute fact about simplicity. Neither option is attractive to those persuaded by the argument from borderline cases to extremism about composition.

I turn now to the third question about the analogy between the argument for extremism about composition and the argument for extremism about simplicity: If we accept that any plausible, informative, moderate account of composition will leave

space for borderline cases of composition, must we accept that any plausible, informative, moderate account of simplicity will leave space for borderline cases of simplicity?

Plausible, informative, moderate accounts of simplicity typically involve topological constraints upon the actual or possible region occupied by an object (for example, perhaps all and only simples occupy regions which include only one point, or regions which are continuous). I will assume that there can be no vagueness in whether a given region is continuous, or more generally in whether one region is a sub-region of another. If there could be such vagueness, this would only strengthen my argument that moderate accounts of simplicity permit borderline cases.

Instead of looking for vagueness in the topological features of regions, I will claim that it could be vague whether there is matter at some particular point (compare Heller 1990, pp. 7-10). What justifies this claim? Such vagueness might arise if there was vagueness in where some matter was located. And it might arise if there was vagueness in whether what was at a point counted as 'matter'. Vagueness in where matter is located is understood most naturally as ontic vagueness, whereas vagueness in what counts as matter is understood most naturally as resulting from semantic indecision. We should allow that both are possible.

Quantum theory suggests that it is sometimes indeterminate where matter is located. Such ontic indeterminacy is not obviously connected with vagueness, but it is nevertheless relevant here, since objections to ontic vagueness in existence seem to apply quite generally to any kind of ontic indeterminacy in existence. 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. That is, if you reject vague existence, then you should not accept an account of simplicity which avoids vague existence only on the supposition that quantum indeterminacy will be explained away somehow.

Whether there is vagueness in what counts as 'matter' seems also to depend upon what candidates science comes up with. Would mental stuff or ectoplasm count as matter? What about energy, or field density? We can imagine a situation in which we are in full possession of the other salient facts yet in doubt as to whether what permeates a given region counts as 'matter'. Whether a term like 'matter' suffers semantic indecision in part depends upon what worldly properties are available to be the semantic value of that term. Again, I am not making the positive claim that 'matter' suffers semantic indecision (although this seems likely to me); rather, I claim that if you reject vague existence, then you should not adopt an account of simplicity which avoids vague existence only if there is no vagueness in 'matter'.

I will take it, then, that there can be vagueness of some kind in whether or not a given point is matter-occupied. What consequences does this have for the moderate accounts of simplicity discussed by Markosian (1998a)?

1. Indivisibility Criteria of Simplicity

If we take indivisibility as a necessary and sufficient condition for simplicity, we may, as usual, distinguish two types of vagueness in simplicity. First, if it were vague whether some object O were composed of just one of a determinately-existing range of indivisible objects, or of a divisible sum of them, then it would be vague whether O was divisible. But this type of vague simplicity would not give rise to vagueness in existence. A case of vague existence would be one in which it was vague whether some object O were divisible, but not because of its vague relations to some determinately-existing objects. How feasible is this?

There are different senses of 'divisible' corresponding to different modalities: we might think of legal divisibility, epistemic divisibility, and practical divisibility, but as Markosian notes, physical and metaphysical divisibility are the obvious candidates here. These multiple senses of 'divisibility' create ambiguity rather than vagueness in 'divisible': any indivisibility criterion of simplicity must specify which modality is intended, but this seem unproblematic.

Could it be problematically vague whether a certain object was divisible, even given a particular modality? I will take it that an actual object is divisible if and only if there is an accessible possible world at which it is divided. And I will take it that for an object to be divided at a world is for it to occupy a spatially discontinuous region there. If we opt for physical divisibility, there seems to be scope for vagueness in which possible worlds are accessible. Which worlds count as ones in which physics is the same as it is in the actual world? Can the constants differ a little? What if there's a bit less stuff in the universe? What about slightly different initial conditions?

Perhaps there is no equivalent vagueness in which worlds are metaphysically possible, but in either modality there is scope for vagueness in whether, given an actual object and a possible world, that world is one in which that object is divided. This vagueness could arise from vagueness in whether a given possible object is the actual object, or from vagueness in whether the relevant possible object is divided. Vagueness in 'trans-world identity' is easily understood on a counterpart-theoretic analysis of modality: it could be vague which counterpart relation is in question, or else vague whether the counterpart relation in question holds between the two objects. Other theorists may be more reluctant to grant that there could be vagueness in genuine trans-world identity.

But even if it is determinate that a given possible object 'is' O in that world, and that the world is relevantly accessible, there could be vagueness in whether the possible object is divided, arising from vagueness (discussed above) in whether or not a given point is matter-occupied. Imagine a cheese-sandwich-shaped object, where the slices of bread correspond to regions determinately filled with matter, and the cheese corresponds to a region only indeterminately filled with matter. The sandwich-shaped region is continuous, but the bread-shaped region is discontinuous. Now, imagine an object which exactly occupies the sandwich-shaped region if that region is matter-filled, and exactly occupies the discontinuous sum of

the two bread-slice-shaped regions otherwise. If it is vague whether the cheese-shaped region contains matter, then it is vague whether the object in question is divided. So it is vague whether such a possible object can make it true that some actual object is divisible. If other worlds do not determine whether the actual object is divisible, then we have a borderline case for the divisibility account of simplicity, even if we dismiss all the other possible sources of vagueness.

2. MaxCon
According to Markosian's MaxCon, necessarily, x is simple iff x is a spatially continuous object and there is no continuous region of space, R, such that (i) the region occupied by x is a proper subset of R, and (ii) every point in R falls within some object or other. MaxCon includes two necessary conditions on simplicity: a spatial continuity requirement, and a complex negative condition on the region occupied by an object. In fact, the second of these functions as a necessary condition for existence applying to any object, simple or composite. If a region S is a proper subset of a continuous region R, and every point in R falls within some object or other, then, according to MaxCon, the largest such region of which S is a subset is occupied by a simple, so nothing exactly occupies S.

Does MaxCon permit borderline cases of simplicity? I have assumed that there can be no vagueness in whether a given spatial region is continuous, nor in whether one region is a proper subset of another. If there is problematic vagueness in MaxCon, then there is vagueness in whether some particular point falls within any object at all, arising from vagueness in whether there is matter at a given point.[10] Vagueness in whether a matter-occupied point lies within one object rather than another will not give rise to vague existence; and MaxCon is not threatened by vagueness arising out of fuzzy boundaries, so long as it is determinate what the underlying distribution of matter is. Suppose that, for whatever reason, it is vague whether a given region is matter-filled. What consequences would this have for MaxCon? Let *a* be the largest region which determinately contains matter belonging to O, and let *b* be the largest region such that it is indeterminate whether it contains matter belonging to O.[11]
What are the significant possibilities?

First, suppose both *a* and *aUb* to be continuous. Then O has vague boundaries, but there are no considerations of vague identity or existence (if anything exactly occupies *aUb*, then it is O and nothing exactly occupies *a*). Second, suppose *a* is continuous and no subregion of *b* is continuous with *a*. Then it is determinate that an object exactly occupies *a*, but at best indeterminate whether an object occupies *b*, and so indeterminate whether O is identical to the object occupying *a*, and thus simple, or to an object occupying *aUb* and thus composite. There is thus vagueness in whether an object exactly occupying *b* exists, and not because some determinately-existing object is such that it is vague whether it exactly occupies *b*. This is vague existence of the allegedly problematic kind. MaxCon permits this because it rules that if a region like *b* is matter-filled, then it exactly contains an object (we can't think of *b* as part of the fuzzy-boundary-region without thinking of it as a candidate for exactly containing an object). Most accounts of what it is for a region to contain an object will also have this consequence.

Third, suppose *a* is discontinuous, but *aUb* continuous: think of the sandwich, where the bread-region is discontinuous, but the bread-plus-cheese region is continuous. Then it is a vague matter whether O has parts (if it occupies *a* alone) or is simple (if it occupies *aUb*). Moreover, it is indeterminate whether objects exist in each of the separate continuous subregions of *a*. This clear case of vague existence arises because MaxCon rules that *a* contains an object iff *b* is not matter-filled (other things being equal). Unlike the previous case, this vague existence is a consequence of a distinctive feature of MaxCon.

Those who reject vague existence should therefore either reject MaxCon, or else commit themselves to the impossibility of ontic indeterminacy in whether there is matter at a point, and to the existence of a unique semantic value for 'matter'.[12]

3. The Pointy View of Simplicity
According to the Pointy view, necessarily, x is simple iff exactly one point lies within x. Could there be a borderline case for the Pointy view? Again, I take it that there can be no vagueness in whether a region contains only a single point, so any vagueness here would have to arise from vagueness in whether more than one point lay within some object. One can imagine vagueness in whether a particular object was identical to some point-like thing, provided we give a semantic account of this vagueness. But this would not produce any vagueness in existence.

What about vagueness in whether there is matter at some particular point, as discussed above? This would entail vagueness, for each such point, as to whether an object exactly occupies it: in the absence of any determinately-existing object indeterminately located at that point, this would be vague existence of the problematic kind. The indeterminacy here does not arise from the claim that every point-sized object must be simple, but from the claim that only point-sized objects are simple, and thus, given that that any matter-filled point must lie within an object, that each matter-filled point is exactly occupied by an object.

IV Prospects for Moderate Views of Simplicity

I have argued that if we reject moderate accounts of composition which permit borderline cases, then we should reject moderate accounts of simplicity which permit borderline cases. And I have argued that if we prefer an informative account of composition, we should likewise prefer an informative account of simplicity. So those who are fond of the argument from borderline cases to extremism about composition, yet want to resist extremism about simplicity, must adopt a moderate view of simplicity which does not permit borderline cases.

But I have argued that the possibility of vagueness in whether there is matter at a point entails that three plausible moderate accounts of simplicity do permit borderline cases. We could try holding out against the possibility of vagueness in whether there is matter at a point: it can seem far-fetched to suppose that there could be borderline cases of matter-filled points, that matter itself may have an indeterminate

location, or that it may be indeterminate exactly what counts as 'matter'. But answers to the Simple Question are supposed to be metaphysically necessary truths, true in far-fetched worlds as well as what we take to be the actual world.

How about a moderate account of simplicity which does not turn on whether there is matter at certain points? What could determine whether an object has proper parts, other than where its matter is located, actually or possibly? If we add clauses about the causal features of things, then we only increase the vulnerability to borderline cases. Once we move away from the logical vocabulary in which extreme accounts are couched - 'all', 'none' - we no longer have a guarantee that what we say is precise. Those who accept the possibility of ontic vagueness are familiar with the idea that what we say may not always have a determinate truth value, no matter how careful we are. But those who insist that all vagueness is due to semantic indecision should also recognise that they are hostage to the way the world is, and the extent to which the extra-linguistic world co-operates with us in providing semantic values for our terms.

The demand for guaranteed precision forces a retreat to terms which cannot suffer from vagueness. One response to this is extremism, the view that either necessarily everything has proper parts or else necessarily nothing has proper parts. But another response is to give up the idea that every point which lies within an object is a point at which there is matter. We could try claiming that every spatial region exactly contains an object, whether or not the region is matter-filled.[13] Such a view reduces both the Special Composition Question and the Simple Question to questions about relations among regions, entails universalism about composition, entails that all and only simples exactly occupy points, and, as far as I can tell, is not prone to borderline cases. Parthood relations among objects turn out to be determined by the structure of space (including whether space is gunky).

But there is a price to be paid for the precision this account produces: vacuums which contain no matter but are full of objects; spatially-extended objects not made of matter, but not exactly immaterial either; the temptation to identify objects and regions. Insisting on the rejection of vague existence forces us to choose between immaterial spatial objects, necessary gunk or necessary monism: I suggest that we look more kindly upon vagueness in existence.

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[2] See van Inwagen (1990, sections 2 and 4), Lewis (1986, pp. 212-3) and Markosian (1998a). Lewis's argument has been clarified and extended by Sider (2001, section 4.9). Like these authors, I will restrict my discussion to physical, spatially-located objects.

[3] Universalists include Lewis (1986), Heller (1990), Jubien (1993, pp. 14-17), and Sider (2001). Nihilists are thinner on the ground, but see Rosen and Dorr (2002) for discussion.

[4] For the former strategy see van Inwagen (1990) and Merricks (2001); although neither is a nihilist, each denies the existence of artefacts like baseballs. For the latter strategy, see Lewis (1986).

[5] Not all openness or indeterminacy is due to vagueness, but these examples do seem allied with the standard phenomena of vagueness: we can formulate principles of tolerance and construct Sorites series based on these conditions for composition.

[6] It is overlooked, I think, because we assume that we can't specify which composite object is in question without thereby specifying what parts it has. But this is just to assume that vagueness in composition is impossible.

[7] There is a similar puzzle about Alfie's having different parts in different possible worlds. Options there include accepting contingent identity, denying the existence of arbitrary undetached parts, distinguishing constitution from identity, or adopting either counterpart theory or mereological essentialism.

[8] Kris McDaniel (2003, p. 267) raises the possibility that simplicity is brute.

[9] See Harte (2002) for a very interesting discussion of this issue in Plato.

[10] I assume that every point at which there is matter lies within some object, a consequence of Markosian's 'Against Matter Without Objects' principle (1998a, n. 23): any weaker assumption is more likely to permit borderline cases of MaxCon. At the end of the paper I will consider whether there is matter at every point which lies within some object.

[11] I will neglect higher-order vagueness; such vagueness would only makes matters worse for MaxCon.

[12] Markosian elsewhere denies the possibility of vagueness in existence (1998b).

[13] A more natural version of this thesis would deal with space-time regions. But I will continue the policy of this paper, and deal only with parthood at a time.