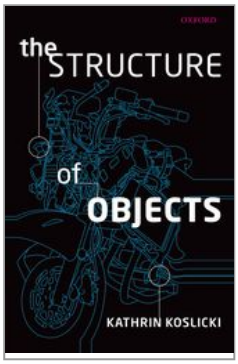

The Structure of Objects
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Ordinary Objects as Mereological Sums

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Abstract and Keywords

The thesis that ordinary material objects are mereological sums in the standard sense has been remarkably popular among three-dimensionalists and four-dimensionalists alike. This chapter considers two prominent representatives: Judith Jarvis Thomson, for the three-dimensionalist camp; and David Lewis, for the four-dimensionalist camp. The question of why Thomson's temporalized and modalized version of standard mereology still does not adequately capture the characteristics of ordinary material objects is postponed until Chapter 4. The remainder of the chapter considers Lewis' argument in favor of Unrestricted Composition, in particular in the recently expanded version offered in Theodore Sider's, *Four-Dimensionalism: An Ontology of Persistence and Time*; as well as Lewis' defence of the Composition-as-Identity Thesis in his *Parts of Classes*. It is argued that the three-dimensionalist need not be swayed by either component of Lewis' view, since they are ultimately founded on question-begging reasoning.

Keywords: three-dimensionalism, four-dimensionalism, Judith Jarvis Thomson, David Lewis, Unrestricted Composition, Uniqueness of Composition, composition as identity, Theodore Sider

§II.1 Introductory Remarks

The last chapter has been devoted mainly to an exposition of the main concepts and principles of standard mereology. By “standard mereology”, I mean the system referred to in Simons (1987) as “Classical Extensional Mereology” or CEM, originally developed by Leśniewski and introduced to the English-speaking world primarily in the guise of Leonard and Goodman's “Calculus of Individuals” (Leonard and Goodman 1940). Despite CEM's considerable merits as a formal theory, it remains to be seen whether it is of any use to the

metaphysician in characterizing our ordinary mereological concepts, as they apply to our scientifically informed, common-sense ontology. One of my main theses in what follows is that CEM is the wrong theory for this purpose. However, since this view goes against a powerful trend within contemporary metaphysics, we would do well to examine first what motivates the position that ordinary material objects are mereological sums in the standard sense. To this task, we will turn next.

§II.2 Thomson's Three-Dimensionalist Approach

From a three-dimensionalist perspective, a prominent defense of the view just outlined can be found in Judith Jarvis Thomson's classic paper, “Parthood and Identity Across Time” (Thomson 1983). In this essay, Thomson proposes that ordinary material objects, such as Tinkertoy houses, ought to be regarded as mereological sums according to the standard conception, though she finds that in order for the application of standard mereology to the case of ordinary material objects to have any plausibility at all, the standard conception must be extended and weakened in certain respects. Let's examine Thomson's support for this position.

Her argument begins with the following two observations, which she takes to be intuitively compelling:

> A Tinkertoy house is made of Tinkertoys. And surely a Tinkertoy house is made only of Tinkertoys: surely it has no additional ingredients, over and above the Tinkertoys it is made of. (Perhaps there is such an entity as ‘house-shape’. Even if there is, it certainly is not literally part of any Tinkertoy house.)
>
> **(p.24)**
> It is an attractive idea that the logic of parthood is the Leonard–Goodman Calculus of Individuals, . . .
>
> (Thomson 1983, p. 201)

The two ideas Thomson finds to be intuitively compelling are, first, that a Tinkertoy house is made of Tinkertoys and *only* of Tinkertoys; and, secondly, that the logic of parthood is correctly captured by CEM. The second assumption is not taken by Thomson as set in stone and is modified in crucial respects in the remainder of her essay, though I suspect she would not want to give up the first one under any but the most dire circumstances. (To anticipate, my own view in what follows will be that both assumptions must be rejected.) Thomson doesn't at this point say why we should think of CEM as the correct theory of parthood; but, in addition to the considerations she provides to this effect in the remainder of the essay, she also may have in mind that CEM, in the guise of the Leonard–Goodman Calculus of Individuals, arguably was at the time at which her essay was written, and possibly still is, the most widely known and well-worked-out theory of parthood available.

Once we accept the two assumptions just stated, (i) that the parts of the Tinkertoy house are all and only the Tinkertoys, and (ii) that CEM correctly characterizes the logic of parthood, then we get the following result. If the Tinkertoy house exists and is composed only of Tinkertoys, then (by the Principle of Unrestricted Composition) it follows that there is such a thing as the unique fusion of the Tinkertoys which compose the house. And once we are committed to the fusion of Tinkertoys, it would of course be natural to suggest that the Tinkertoy house be identified with the fusion, since we are otherwise committed to the result that the single region of space-time in question is occupied by both the Tinkertoy house and the numerically distinct Tinkertoy fusion.

However, this simple view, which preserves both the spirit and the letter of (i) and (ii), faces an immediate obstacle, viz. the problem of *change over time*: intuitively, Tinkertoy houses can change their parts over time, but CEM-style mereological sums cannot, since numerical identity according to CEM requires sameness of parts and no allowances are made within CEM for sensitivity to time. Thus, it seems that the simple view must be abandoned and Tinkertoy houses cannot be fusions in exactly the sense of CEM.

One way out of this quandary is to endorse the doctrine of temporal parts, a four-dimensionalist metaphysic. The four-dimensionalist may continue to view ordinary material objects as mereological sums in the standard sense *and* account for the problem of change over time in the following way. The spatio-temporally extended Tinkertoy house persists over time, according to this approach, by having, in addition to its ordinary spatial parts, numerically distinct temporal parts at each of the different times at which the Tinkertoy house exists. (We are to understand the temporal parts of the Tinkertoy house roughly on analogy with its spatial parts: just like the Tinkertoy house has a left half and a right **(p.25)** half, so we are to think of it as also having an “earlier half” and a “later half”; see Thomson 1983 and Sider 2001 for a more detailed exposition of the four-dimensionalist outlook.) Now, for the Tinkertoy house to change its parts over time, on this view, just means for its earlier temporal parts to have different (spatial) parts from those of its later temporal parts; but since the earlier temporal parts and the later temporal parts are numerically distinct objects, no violation of Leibniz's Law is thereby incurred.

This would be a fine way of preserving assumptions (i) and (ii), if only the doctrine of temporal parts were an acceptable metaphysical theory concerning the nature of ordinary material objects (as opposed to, say, that of events like football games). But Thomson famously objects that the doctrine of temporal parts is “a crazy metaphysic—obviously false” (Thomson 1983, p. 210), since it entails that material objects are constantly being generated *ex nihilo* (or, at least, the stuff of which they are composed is). I won't comment here on Thomson's classic *ex nihilo* objection (but see Koslicki 2003a and 2003b for further discussion), since our main concern presently is Thomson's own positive

proposal as to how the three-dimensionalist can best preserve assumptions (i) and (ii) in the face of the problem of change over time.

In response, Thomson offers a *temporalized* version of the Calculus of Individuals, which she calls the "Cross-Temporal Calculus of Individuals". Since, as she observes, it really is intuitively obvious that ordinary material objects can change their parts over time, parthood (for the three-dimensionalist) must be a *three-place* relation between pairs of objects and times, not the timeless *two-place* relation at work in the original Calculus of Individuals. In this way, the logic of parthood cannot be *quite* that of the original Calculus of Individuals, but it can nevertheless be something reasonably close to it, something which preserves the spirit of the original Calculus of Individuals while allowing for the phenomenon of change over time.

The new Cross-Temporal Calculus of Individuals now defines "fusion" as relativized to times in terms of its primitive notion, temporalized disjointness, in the following way:

> Fusion at a Time: $xFuS@t \equiv_{def} xE@t \ \& \ (\forall y)\ [(y\wr x@t) \leftrightarrow (\forall z)((z \in S \ \& \ zE@t) \rightarrow (y\wr z@t))]$

In other words, a mereological sum, x, fuses a set, S, at a time, t, just in case x exists at t and anything that is at t disjoint from x is also disjoint at t from every member of S, and vice versa. In place of the old fusion-axiom, Thomson suggests indefinitely many axioms of the following form:

> Cross-Temporal Fusions: $[t_1 \neq t_2 \ \& \ (\exists x)(x \in S_1 \ \& \ xE@t_1) \ \& \ (\exists y)(y \in S_2 \ \& \ yE@t_2)] \rightarrow (\exists z)(zFuS_1@t_1 \ \& \ zFuS_2@t_2)$

Each new fusion-axiom of this form states that for any two non-empty sets whose members exist at two distinct times, there is a mereological sum which fuses the **(p. 26)** members of the one set at the one time and the members of the other set at the other time. In place of the old Uniqueness Axiom, Thomson proposes the following temporalized version:

> Temporalized Uniqueness: $(x = y) \leftrightarrow (\forall t)[((xE@t) \vee (yE@t)) \rightarrow ((x \leq y@t) \vee (y \leq x@t)]$

In other words, objects x and y are numerically identical just in case they are parts of each other at every time at which they exist. (See also Simons 1987, for another version of a temporalized three-dimensionalist mereology.) With the temporalized version of CEM in hand, the three-dimensionalist now has the option of viewing the Tinkertoy house as a *cross-temporal* fusion of Tinkertoys, which may, without contradiction, fuse different sets of Tinkertoys at different times.[1]

This is not quite the end of the story, though. For, in analogy with the temporal problem, the three-dimensionalist who takes Thomson's position also faces the problem that the *modal* properties of the Tinkertoy house are intuitively different from those of a cross-temporal fusion of Tinkertoys. For suppose that an object and the parts that compose it happen to have exactly the same spatio-temporal

extent; that is, they go out of existence and come into existence at exactly the same times. (It helps to think of ice-sculptures in this context; see also Gibbard 1975 for a well-known illustration of a scenario of this kind.) It now follows from Thomson's Cross-Temporal Calculus of Individuals that the objects in question are numerically identical, since they have the same parts *at all times* at which they exist. But this looks to be intuitively the wrong result, since we might ordinarily agree, for example, that the very same ice *might have* never composed an ice-sculpture at all, that it *might have* composed a different ice-sculpture, that the very same ice-sculpture *might have* been made of slightly different ice, and so on (though Thomson doesn't seem to think our intuitions are crystal-clear in this respect). (A modal objection of this sort is raised against the four-dimensionalist in van Inwagen 1990b.)

Those who accept the intuition that ice-sculptures and the ice that composes them have divergent modal properties, it seems, must now extend the Cross-Temporal Calculus of Individuals in some fashion to make room for modal notions, i.e., they must adopt a “Modal Cross-Temporal Calculus of Individuals”. **(p.27)** Thomson ends her paper by suggesting that such a modalized version of CEM should endorse a new, further weakening of the Uniqueness Axiom, according to which objects are numerically identical just in case they *necessarily* have the same parts at all times at which they exist:

> Modalized Uniqueness: $(x = y) \leftrightarrow \Box(\forall t)[((xE@t) \vee (yE@t)) \rightarrow ((x \leq y@t) \vee (y \leq x@t)]$

This further modification would get us around the modal problem just raised, since it would allow, for example, that the ice and the ice-sculpture are numerically distinct even though their actual spatio-temporal extent happens to be exactly the same.[2] Given our exposition of Thomson's views, we can now state her support for the thesis that ordinary material objects are best analyzed as mereological sums, in a suitably weakened and extended sense, as follows. The idea that the parts of a Tinkertoy house are all and only the Tinkertoys that compose it is intuitively attractive. Arguably the most widely known and well-worked-out theory of parthood is CEM, in the guise of the Leonard–Goodman Calculus of Individuals. CEM appears to run into trouble with the problem of change over time. A popular fix for this difficulty, the doctrine of temporal parts, has unacceptable consequences of its own. But a temporalized version of CEM, which is still reasonably close to the spirit of the original theory, can get around the problem of change over time. The temporalized version of CEM now runs into a modal analogue of the problem of change over time; but this difficulty can be addressed in parallel fashion by modalizing CEM. The thesis that ordinary material objects are mereological sums in the (extended) standard sense thus seems to have survived the major temporal and modal hurdles intact.[3] The only remaining matter is to lay to rest the worries of those who believe that CEM isn't the ontologically innocent theory it is often made out to be. To this end, Thomson

tries at various places in her essay to address the concerns of those who are troubled by CEM's commitment to arbitrary sums by pointing out that her argument could run equally well with a more restricted commitment to **(p.28)** sums. Thomson herself, however, does not mind CEM's full-blown Unrestricted Composition Principle one bit and remarks that “one only has to live with fusions for a while to come to love them” (Thomson 1983, p. 217).

We thus find in Thomson (1983) a three-dimensionalist defense of the thesis that ordinary material objects are temporalized and modalized mereological sums. And although Thomson's version of standard mereology modifies the original formulation of CEM developed in Leonard and Goodman (1940) in certain important respects, it is not too far-fetched to continue to regard such a Modal Cross-Temporal Calculus of Individuals as a working out of what I have been calling the standard conception of mereology. A modalized version of CEM of course does more violence to the intentions of its original founders than does a temporalized version; but we have already noted that extreme nominalism was associated with mereology purely by historical accident and thus comes as an independent theoretical commitment of this particular group of philosophers. Thomson's Calculus still makes provisions for the existence and uniqueness of mereological sums, two of the most characteristic features of CEM, even if her Uniqueness Principle is weakened to allow for temporary or contingent coincidence and full-blown commitment to arbitrary sums is not required by anything she says in her essay (though Thomson herself is happy to accept Unrestricted Composition). Most importantly, though, the original analogy between the identity- and existence-conditions of mereological sums and those of sets is preserved in crucial respects by Thomson's modified version of CEM: just as the existence and identity of a set depends on nothing more than the existence and identity of its members, so the existence and identity of a mereological sum depends on nothing more than that of its parts. Correspondingly, since ordinary material objects on Thomson's view just are temporalized and modalized sums, their existence and identity too depends on nothing more than the existence and identity of their parts at a time and in a world. I take the preservation of this characteristic analogy between sets and sums to be sufficient grounds for regarding Thomson's Calculus as a manifestation of standard mereology.[4]

Despite the merits of Thomson's Calculus, we shall find in what follows that a three-dimensionalist analysis of ordinary material objects in terms of CEM, even in this suitably extended and weakened form, cannot be sustained. First, however, I turn to Lewis’ four-dimensionalist approach, which will also give us occasion to consider in more detail how standard mereologists might try to convince those who are skeptical that their theory is in fact as ontologically innocent as it is advertised to be, even when it embraces the full-blown commitment to arbitrary sums.

(p.29) §II.3 Lewis’ Four-Dimensionalist Approach

David Lewis has been among the most visible four-dimensionalist defenders of the thesis that ordinary material objects are mereological sums in the standard sense. Lewis’ defense of this approach has several detachable components: (i) his defense of *four-dimensionalism* over three-dimensionalism as the most promising theory of persistence (see especially Lewis 1983a and 1986b); (ii) his defense of the principle of *unrestricted mereological composition* (see especially Lewis 1986b); (iii) his defense of the *Uniqueness of Composition* primarily against Armstrong's alternative conception in the realm of properties (see especially Lewis 1991 and 1986a); and, finally, (iv) his *Composition-as-Identity* thesis which is intended to establish that standard mereology is ontologically innocent (see especially Lewis 1991).[5]

In the present chapter, our main concern is with components (ii) and (iv) of Lewis’ view. Since I am not currently engaged directly in the dispute between three-dimensionalists and four-dimensionalists, I will not take up component (i), i.e., the so-called “problem of temporary intrinsics” of Lewis (1986b) or the condensed argument in favor of temporal parts in the Postscript to Lewis (1983a). We can also leave aside, for present purposes, component (iii) of Lewis’ defense of four-dimensionalism: since four-dimensionalism is precisely designed to avoid commitment to numerically distinct spatio-temporal coinciding objects, violations of Uniqueness of Composition do not arise for Lewis in the realm of material objects; he only has to worry about them in the context of his preference for a nominalist conception of properties as classes of possible and actual concrete particulars, over Armstrong's alternative conception of properties as Aristotelian universals. Assuming then that (i) has been dealt with sufficiently in another setting and by other writers, and that a discussion of (iii) has been deferred to another occasion, let's turn to components (ii) and (iv) of Lewis’ approach.

§II.3.1 Support for Unrestricted Composition

Along with everyone other than the Nihilist, Lewis accepts the intuitive datum that ordinary material objects are *wholes* composed of parts. Component (i) of Lewis’ analysis leads to a certain conception of what sorts of things ordinary material objects are and what sorts of things they number among their parts: in **(p.30)** addition to their more familiar spatial parts, they also have less familiar temporal parts at each time at which they exist. But their four-dimensional nature in itself doesn't settle the question of *how* ordinary material objects are composed of these temporal and spatial parts, i.e., what the notion of mereological composition is that is operative in this context. We have already quoted Lewis earlier, at the end of Chapter I, as being of the firm opinion that there is only a single genuine kind of mereological composition, namely that captured by the axiom system of CEM. In Lewis’ formulation, the three axioms of CEM are (i) Unrestricted Composition, (ii) the Uniqueness of Composition and (iii) the transitivity of parthood. Among these axioms, we follow Lewis in taking

the third to be unassailable, despite the fact that even this axiom has not gone completely unchallenged in the literature. Thus, if Lewis wants us to follow him in taking composition, as it applies to ordinary material objects, to be the notion described by CEM, he must convince us that there is no way around accepting the first two axioms of standard mereology along with the third. Given Lewis' four-dimensionalism, the Uniqueness of Composition is inert in the context of ordinary material objects. For all the usual non-Gibbard-style cases of putative coincidence (e.g., cases of constitutionally related objects with different spatio-temporal extents) present us with mere temporary overlap, while Gibbard-style cases are dealt with by invoking counterpart theory. (See Sider 2001, ch. 5 for a more detailed exposition of the four-dimensionalist response to the puzzles of coincidence.) Either way, ordinary material objects, according to the four-dimensionalist picture, don't threaten to violate the Uniqueness of Composition. Thus, if Lewis wants to convince us that ordinary material objects are four-dimensional mereological sums in the standard sense, the most important item on his agenda is a defense of the first axiom, the principle of unrestricted mereological composition, according to which any plurality of objects whatsoever, no matter how disparate and gerrymandered, composes a further object, their sum.[6]

§II.3.1.1 *The Lewis/Sider Argument from Vagueness*

Lewis' argument to this effect can be found in a very condensed passage in Lewis (1986b, ch. 4, pp. 211 ff), which is helpfully summarized by Sider as follows:

> If not every class has a fusion then there must be a restriction on composition. Moreover, the only plausible restrictions on composition would be vague ones. But there can be no vague restrictions on composition, because that would mean that whether composition occurs is sometimes vague. Therefore, every class has a fusion.
>
> (Sider 2001, p. 121)

Very briefly, Lewis' reason for thinking that any plausible restriction on mereological composition would have to be vague is as follows. We are intuitively **(p.31)** more comfortable with certain fusions than with others: the fusion of all the molecules that are currently part of my body, for example, seems acceptable using such intuitively plausible principles as physical contact, adjacency, unified action, contrast with the environment, and the like; Lewis' legendary "trout-turkey" (an object which fuses the upper half of a trout with the lower half of a turkey), on the other hand, makes us queasy. But there is no principled line to be drawn between fusions that make us queasy and those that do not; any plausible candidate for a restriction on mereological composition would therefore need to reflect this fuzziness in our intuitions.

Lewis' reason for thinking that it can never be indeterminate whether composition takes place is this. The only acceptable account of vagueness is one which locates the source of vagueness in language and thought: vagueness is a matter of semantic indecision. But the question of whether a given plurality of objects composes something can be formulated in a part of language which does not contain any vague vocabulary. Therefore, the question of whether a given plurality of objects composes something can never receive a vague answer.

Many of us find that Lewis' argument goes by a bit fast. In only a little over two pages, he reaches the (to some of us) startling conclusion that composition *always* occurs, whenever there is a plurality of objects. It is thus helpful to examine a less condensed statement and justification of Lewis' argument, as proposed in Sider (2001, ch. 4). Sider refers to this argument as the "argument from vagueness". The role of this argument in Sider's defense of four-dimensionalism cannot be overestimated, since, as I have argued in Koslicki (2003a), a creatively adopted, temporalized version of it in effect becomes Sider's main strategy of breaking the dialectical stand-off between endurantists and perdurantists. Sider's (non-temporalized) version of Lewis' argument goes as follows:

> (P1) If not every class has a fusion, then there must be a pair of cases connected by a continuous series such that in one, composition occurs, but in the other, composition does not occur.
> (P2) In no continuous series is there a sharp cut-off in whether composition occurs.
> (P3) In any case of composition, either composition definitely occurs, or composition definitely does not occur.

This argument uses several technical notions: that of a "case of composition", that of a "continuous series" of cases of composition, and that of a "sharp cut-off" point between cases of composition. A "case of composition" is simply a possible situation involving a class of objects which have certain properties and stand in certain relations; one can ask with respect to various such possible situations whether or not the objects in question compose anything. (Somewhat confusingly, something can be a case of composition, even though composition does not take place in it.) A "continuous series" is taken to be a finite series of cases of composition connecting a case, C_1, with a case, C_2, such that **(p.32)** each case in the series is extremely similar to the case immediately adjacent to it in all relevant respects (e.g., qualitative homogeneity, spatial proximity, unity of action, comprehensiveness of causal relations).[7] A "sharp cut-off" in a series of cases of composition is a pair of adjacent cases, such that in one composition definitely occurs and in the other composition definitely fails to occur. The first premise of Sider's argument states that, if composition were to be restricted, there would be at least one continuous series of cases, which connects a case of composition with a case of non-composition. Premise (P2) says that the shift from composition to non-composition in such a series does not happen suddenly. Premise (P3) rules out that any such shift could happen

gradually. But if the shift can neither happen suddenly nor gradually, then it cannot happen at all. Thus, the requirements which would need to be met in order for composition to be restricted cannot be met; hence, composition is unrestricted.

(In what follows, let's call the subscriber to the Lewis/Sider line, according to which mereological composition is unrestricted and takes place under all circumstances, a “Universalist” about mereological composition. I will refer to the position of their main opponent as “the intermediary position”, according to which composition takes place under certain circumstances but not under others; the boundary between circumstances in which composition takes place and those in which composition fails to take place may, but needn't, be vague. As mentioned earlier, “Nihilism” about mereological composition is the position that composition never takes place; there are only mereological simples.)

One of Sider's biggest challenges is to show why his argument should not in fact be likened to the following strikingly bad argument:[8]

(P1′) If baldness is restricted, then there must be a pair of cases connected by a continuous series such that in one baldness occurs and in the other baldness does not occur.
(P2′) In no continuous series is there a sharp cut-off in whether baldness occurs.
(P3′) In any case of baldness, either baldness definitely occurs or baldness definitely does not occur.

(p.33) Here, of course, the most intuitively plausible view is precisely that “baldness is restricted”, so to speak; both “Universalism” and “Nihilism” about baldness are extremely counterintuitive, to say the least. Thus, the most reasonable position concerning baldness seems to be precisely the kind of intermediate position which is supposed to be untenable in the case of composition. The existence of a continuous series of cases involving baldness should also not be in doubt, since in typical cases of baldness one and the same man goes bald slowly over time, which at the same time gives plausibility to (P2′)’s assumption that this process takes place gradually. What we would of course balk at is (P3′), the assumption that there can be no indeterminacy in whether or not baldness occurs; “is bald” is, after all, everyone's favorite example of a vague predicate.[9]
Sider's main work, in my view, therefore lies in defending the plausibility of (P3) in the case of composition. In what follows, I will simply grant to him the truth of (P1) and (P2).[10] I will also grant to him two “local” presuppositions he uses in his argument: (i) that the only plausible account of vagueness is the linguistic one (according to which vagueness is always a matter of semantic indecision); and (ii) that logic can never be a source of vagueness (though we will have to be careful about what exactly granting this assumption comes to in this context). We will furthermore not dispute two more “global” presuppositions Sider makes throughout his book: (i) Lewis’ “best-candidate” theory of meaning, according to

which meaning supervenes on use and intrinsic eligibility (see, for example, Lewis 1983b); and (ii) the anti-Carnapian assumption defended in the introduction of Sider (2001), according to which genuine ontological disagreement is possible between two feuding factions.[11]

Why, then, should we not think that there is a region somewhere between the definite case of composition, C_1, and the definite case of non-composition, C_2, in which it is indeterminate whether composition occurs? Perhaps, some years after I have been buried, the molecules that were part of my body just before I died are still fairly close together but not so close that they clearly compose the remains of a human body, for example; some may have been carried off by winds or rains. If the Lewis/Sider line concerning mereological composition is correct, it seems that one would in fact *expect* there to be such an indeterminate region in a series connecting a case of composition with a case of non-composition, since any restricted account of composition must match the indeterminacy present in our intuitions concerning composition.

(p.34) §II.3.1.2 The Controversial Premise (P3)

Let's see, then, what Sider has to say in defense of (P3). We have of course already heard Lewis' justification: the question of whether composition occurs can never have a vague answer, since it can be stated in a part of language which contains no vague vocabulary. But Lewis' justification contains a step which looks to be blatantly circular:

> Vagueness is semantic indecision. But not all of language is vague. The truth-functional connectives aren't, for instance. Nor are the words for identity and difference, *and for the partial identity of overlap*. Nor are the idioms of quantification, so long as they are unrestricted. How could any of these be vague? What would be the alternatives between which we haven't chosen?
>
> (Lewis 1986b, p. 212; my emphasis)

As we saw in Chapter I, composition can be defined either in terms of overlap or in terms of one of the other basic mereological vocabulary items (which in turn can be used to define the notion of overlap). Thus, it would seem that in a context in which the question at issue is whether the mereological notion of composition can ever be vague, it cannot legitimately be taken for granted that the mereological notion in terms of which it is defined (overlap or parthood or disjointness) is not vague.[12]

Sider attempts to bypass Lewis' illicit assumption in his defense of (P3). The crucial move in Sider's justification of (P3) is to attempt to show that Lewis' assumption (that composition can never be vague) can be restated in a part of language which only contains *logical* vocabulary (and no longer any objectionable *mereological* vocabulary). Given Sider's presupposition that logic can never be a source of vagueness, the truth of (P3) would then follow.

Let's now consider Sider's proposed circumvention of Lewis' illicit assumption. If it ever were a vague matter whether composition takes place (so Sider argues), then it would also be a vague matter how many concrete objects exist. For consider a collection, C, of objects; if the world contains the fusion of C, in addition to the objects in C, then the world would contain one more object. But if it is indeterminate whether C has a fusion, then it is also indeterminate whether the world contains this additional object, the fusion of C, over and above the objects in C. That is, there would be some numerical sentence of the form "There are *n* concrete objects" (for some finite value of "*n*"), whose truth-value is indeterminate. But a numerical sentence of the form "There are *n* concrete objects", according to Sider, contains no mereological vocabulary, only logical **(p.35)** terms and the predicate "is concrete". Thus, Lewis' assumption that composition can never be vague can thus be reformulated in non-mereological terms, since (C) can be justified by way of (N):

(C) Composition is never vague.
(N) No numerical sentence of the form "There are *n* concrete objects" (for some finite value of "*n*") is ever indeterminate in truth-value.

Conversely, instead of focusing our attention on (~C), the claim endorsed by this version of the intermediary position, we can instead debate the truth of (~N):

(~C) Composition is sometimes vague.
(~N) Numerical sentences of the form "There are *n* concrete objects" (for some finite value of "*n*") are sometimes indeterminate in truth-value.

Now, if Sider's claim is correct and (N) contains no mereological vocabulary, then the assumption that logic is non-vague, in conjunction with the claim that no vagueness can result from the concreteness-predicate, should buy him his conclusion, that (N) is true.[13]

Suppose now that there is a particular numerical sentence (X) of the form "There are *n* concrete objects" (for some finite value of "*n*"), whose truth-value is in dispute between the Universalist and the holder of the intermediary position. The Universalist (let's suppose) says that (X) is definitely true (because he thinks that the questionable fusion at issue definitely exists), while the holder of the intermediary position believes (X) is indeterminate in truth-value. What could the two of them possibly be disagreeing over? (X), so Sider would argue, contains nothing but logical vocabulary (ignoring the concreteness predicate): the existential quantifier, logical connectives and the identity relation; but none of these (in Sider's view) is a plausible candidate for a term which has different possible precisifications. Thus, anyone who grants that logic is non-vague must also agree that (X) has a determinate truth- value.

(p.36) While I am willing to grant Sider that logic is non-vague, we must consider carefully what granting this assumption really comes to, in this context. Let's put aside, again, the notions that are not central to this dispute: the identity relation and the logical connectives; what is central to this dispute is

surely the existential quantifier. So how do the participants in this dispute stand with respect to the existential quantifier?

The Universalist and the holder of the intermediary position can, I think, agree on the *meaning* of the existential quantifier, in the sense that they can agree on which logical operation is denoted by the symbol "∃". They can also agree that the existential quantifier is non-vague, in the sense that it can be precisely specified which logical operation it denotes. But settling on the meaning of the existential quantifier by itself does not settle what its *range* is: two philosophers can perfectly well agree on what the symbol "∃" means, while still carrying on a thoroughly sensible dispute over the *size and the nature of the domain of quantification* (while both of them are talking about *unrestricted* quantification). This is exactly the kind of situation in which the Universalist and the holder of the intermediary position find themselves. They are not merely equivocating on the meaning of "∃"; rather, they are engaged in a genuine ontological dispute over *what* exists and *how many* things exist: in other words, they disagree over what it means to be an *object*.

The same situation obtains with respect to the notion of a fusion. The Universalist and the holder of the intermediary position can, again, agree on what the term "fusion" means, e.g., that it denotes the operation defined in the first chapter. But this does not mean that they agree on *which* fusions exist: here, the holder of the intermediary position will insist that the relation "x fuses a class, α" only applies in conditions in which a certain *further* constraint is met (i.e., the restriction on composition must be satisfied). The Universalist, on the other hand, believes that the relation "x fuses a class, α" applies in every situation in which we are dealing with a plurality of objects; no further constraints need be satisfied. They therefore agree on the *meaning* of the term "fusion", but they disagree on its *range*.

Nothing has been gained by reformulating the dispute between the Universalist and the holder of the intermediary position in terms of (N), instead of (C). For the truth-value of a numerical sentence like (X) cannot be settled in the absence of taking a position on the question of whether composition is restricted or unrestricted. Whichever way we put it, the two philosophers disagree on which objects exist and on what it means to be an object. Given Sider's anti-Carnapian outlook, the dispute between the Universalist and the defender of the intermediary position therefore looks to be as genuine as any ontological dispute. But the numerical sentence in question only serves to *mark* the dispute between the Universalist and the defender of the intermediary position; it is just another way of formulating the point on which they disagree. To settle the truth-value of the numerical sentence at the **(p.37)** center of the debate, the ontological dispute itself must be settled, *by other means*.

In the end, it therefore seems as though Sider ends up with a more elaborate version of what has already bothered us about Lewis' illicit move. In the context of a discussion over whether composition could ever be vague, one cannot take for granted that mereological vocabulary is never vague. But, in the same context, one also cannot take for granted that no numerical sentence of the form "There are *n* concrete objects" (for some finite value of "*n*") is ever indeterminate in truth-value, since that is merely a restatement of what is at issue.[14]

§II.3.1.3 The Matter of Vague Existence

When presented with these arguments in Koslicki (2003a), Sider responds in his paper "Against Vague Existence" as follows (see Sider 2003). According to Sider, the proponent of the intermediary position faces, first, a break-down of the existing paradigm under which the linguistic theory of vagueness is conceptualized as *requiring precisifications*; secondly, he faces a conflict with an independently plausible picture of existence as a *natural kind*. I think that the first of these considerations poses a fair challenge to the holder of the intermediary position and to supporters of the linguistic theory of vagueness, to spell out exactly how a sentence like "There are *n* concrete objects" (for some finite **(p.38)** value of "*n*") can be indeterminate in truth-value. I am less moved by Sider's second consideration, however, which to my mind utilizes a bizarre conception of natural kinds.

As Sider points out, there is an interesting asymmetry between the purported indeterminacy of the "bare" numerical sentence (X) and the more familiar indeterminacy of, say, a sentence like (Y):

(Y) There are exactly three bald men in the room.

In the case of (Y), those who believe that vagueness is a matter of semantic indecision can express what the various available candidate-meanings of the predicate "is bald" are in a "relatively precise *background-language*" (Sider 2003, p. 138), without using the predicate itself. For various numerical values, *n*, there is the set containing men with *n* hairs on their head; and although it is a precise matter for each of these sets whether the men in the room are members of it, none of these sets has an overwhelming claim to being considered *the* one and only legitimate precisification of the meaning of "is bald". Thus, the indeterminacy of a sentence like (Y) can be traced to the role played in the sentence by one or more of its constituents; and it can be described in a way which doesn't itself make use of the constituent in question.
In the case of a "bare" numerical sentence like (X), on the other hand, this attractive model which traces the source of indeterminacy to multiple precisifications of one or more of its constituents seems to break down. For once a sentence like "There are *n* concrete objects" (for some finite value of "*n*") is translated into logical notation, it contains nothing but logical vocabulary (ignoring the concreteness-predicate): the existential quantifier, variables,

identity and logical connectives. For example, if the value of "*n*" in question is three, then (X) would become something along the lines of (X′):

(X′) (∃x) (∃y)(∃z)((x ≠ y & x ≠ z & y ≠ z) & (∀w)(w = x v w = y v w = z))

If a "bare" numerical sentence of this kind turned out to be indeterminate in truth-value, it is difficult to see how the source of its indeterminacy could be traced to a single one of its constituents and, moreover, how this indeterminacy could be expressed by means of multiple precisifications which don't themselves use the constituent in question; for it seems that any adequate paraphrase of a sentence like (X) or (X′) would itself have to contain the same logical vocabulary, viz., the existential quantifier, variables, identity and logical connectives. What, then, is the "relatively precise background language" in which the multiple candidate-meanings for the constituent responsible for the indeterminacy in question could be expressed? I take this to be, in essence, Sider's first challenge for the intermediary position.

Sider's point against the intermediary position is certainly justified. However, it is also not surprising to find that there are interesting asymmetries between the sort of indeterminacy which manifests itself in more familiar cases of vagueness **(p.39)** and the purported indeterminacy present in the kind of "bare" ontological disagreement we are considering. If I was forced to point to a single constituent to which the indeterminacy of the English sentence (X) could be traced, my response would be that the culprit is the term "object". But, of course, when (X) is translated into logical notation, as illustrated in (X′), there is no explicit occurrence of a predicate like "is an object"; rather, this notion is already built into our conception of the domain over which the existential quantifier, the variables and the identity relation are defined. As became clear in the last section, the situation we face here is indeed significantly different from that posed by the more familiar cases of indeterminacy, in that the Universalist and the holder of the intermediary position *agree* on the (precise) meaning of the logical vocabulary in question; their disagreement is over its range. If we compare this to an analogous dispute over (Y), on the other hand, between, say, someone who takes (Y) to be determinately true and someone who takes the same sentence to be indeterminate in truth-value, the disputants would in effect be quarreling over the *meaning* of the predicate "is bald", e.g., over whether a man with 100 hairs is sufficiently hairless to be counted as bald.

What Sider's first objection shows, then, is that the linguistic theory of vagueness must in some fashion be made to accommodate certain special cases of "bare" ontological disagreements in which the source of the indeterminacy cannot be straightforwardly located in a single constituent that is explicitly represented in the logical form of the disputed statements and whose indeterminacy may be exorcized by means of multiple precisifications stated in a "relatively precise background language" in which the term in question need not occur. Rather, in such cases, the indeterminacy resides not in the meaning but in the application of notions that are implicitly at work in specifying the domain over which the explicit constituents range. I acknowledge that this objection

presents an interesting challenge for the linguistic theory of vagueness, but I leave the details for a context which is more directly concerned with the phenomenon of vagueness than our present discussion (but see note 14 for a brief suggestion on how the indeterminacy at issue might be handled).

Sider's second argument can, I think, be dealt with more briefly. Using the Lewisian picture of meaning as “intrinsic eligibility plus use” (see Lewis 1983b and 1984), Sider argues that it is implausible to think of the term “existence” (as well as the term “object”, I assume) as having multiple precisifications, as required by the linguistic theory of vagueness, due to the fact that existence, in his view, is a *natural kind*. This, he remarks, fits nicely into his anti-Carnapian picture of the world as consisting of a ready-made domain of objects, along with their natural properties and relations (Sider 2003, p. 144).

However, at least according to extant notions of natural kind, *existence* would not be classified as such; rather, paradigmatic examples of natural kinds are typically taken by those that play some prominent role for the purposes of explanation and prediction, e.g., biological, chemical or physical kinds, such **(p. 40)** as *tiger* or *water*. According to the classical treatment of the semantics of natural kind terms in Putnam (1975b) and Kripke (1980), for example, these expressions are said to be similar in their semantic properties to proper names, in that both are considered to be *directly referential rigid designators*. Natural kind terms like “water” or “tiger”, on this view, denote entities whose members are empirically discovered to share certain theoretically interesting properties or “hidden essences”, with the consequence that theoretical identity statements like “Water is H_2O” or “Tigers are animals with genetic code C” acquire the status of *necessary a posteriori* truths.

Regardless of the details of the Kripke/Putnam account, it is difficult to see how any substantive conception of natural kinds could be extended to include the notion of existence. Like self-identity, existence applies to everything there is (ignoring, for the moment, unrelated complications concerning allegedly non-existent objects). How, then, could such a property mark a natural kind, at least if the conception of natural kinds operative in this context is to have any *bite*? What could be the scientifically discoverable, theoretically interesting properties that the members of this alleged natural kind have in common? Perhaps Sider has a different conception of natural kinds in mind, in which case we would need to be told what it is; in the absence of a viable alternative notion, however, it is difficult to make sense of his suggestion that existence be regarded as a natural kind.[15]

§II.3.1.4 The Composition-as-Identity Thesis

To complete our discussion of Lewis’ four-dimensionalist approach to ordinary material objects, it remains for us to examine component (iv) of his program, the so-called “Composition-as-Identity Thesis”, whose primary defense is mounted in

Lewis (1991, Sect. 3.6). The dialectical role of this component is to make the commitment to Unrestricted Composition, which was supposed to follow from component (ii) of Lewis' analysis, more palatable to those who are skeptical of CEM's supposed ontological innocence. For if, contrary to my remarks in the last two sections, Lewis' defense of Unrestricted Composition were successful, then it would follow that the material world is far more densely populated than we ordinarily assume it to be, with all manner of gerrymandered and intuitively bizarre mereological sums (such as the notorious "trout-turkey", whose parts are the, still undetached, upper half of a trout along with the, still undetached, lower half of a turkey). Most of these counterintuitive sums of course never turn out to be of any interest to us, outside of philosophical disputes over ontology, and thus, as Lewis allows, they never make it into the ordinarily restricted (and frequently fuzzy) range of our everyday quantifiers. But, whether talked **(p.41)** about or not, they exist nonetheless. The aim of the Composition-as-Identity Thesis now is to convince those who are not yet on board that the commitment to arbitrary sums is thoroughly harmless from an ontological point of view.

Lewis' defense of the Composition-as-Identity Thesis in Lewis (1991) has already been subjected to detailed discussion and criticism, for example in Oliver (1994) and van Inwagen (1994) (see also Harte 2002 for a more condensed discussion which reaches the same conclusion). Since I agree with much of what these philosophers have said, my treatment of Lewis' thesis will be brief. Lewis' Composition-as-Identity Thesis is that commitment to arbitrary sums ought to be viewed as ontologically harmless because composition is either, as he sometimes puts it, a *kind* of numerical identity, or it is at any rate *analogous*, in a sufficiently interesting sense, to numerical identity. Somewhat confusingly, he slides back and forth between these two designations. Either way, however, as Lewis repeatedly points out, commitment to sums is "not a *further* commitment", since sums are "nothing over and above" the objects that compose them.

In support of his Composition-as-Identity Thesis, Lewis invokes work by Donald Baxter and David Armstrong (Baxter 1988a and 1988b; Armstrong 1978), both of whom, for different reasons, allow that there is a sense or kind of identity, according to which *many* objects can be identical to *one* object. In Baxter's case, the reason for this extended notion of identity is that, like Bishop Butler and Roderick Chisholm, he recognizes, in addition to the familiar "identity in the strict and philosophical sense", also a kind of "identity in the loose and popular sense"; it is in this latter sense that many objects can turn out to be identical to one object. Armstrong, on the other hand, emphasizes that strict identity and strict distinctness are merely the endpoints of a spectrum of cases, whose middle-portions are occupied by objects which overlap more or less extensively; in this sense, a sum and its parts are not completely distinct, since they are not disjoint.

Neither of these considerations, however, is going to move those who are skeptical of CEM's purported ontological innocence. For when they claim that one object can never be identical to many objects, they have in mind Baxter's first “sense” of identity, viz., “identity in the strict and philosophical sense”; and this, they will maintain, is the *only* genuine kind of numerical identity there is, our ordinary talk involving “sameness” notwithstanding. Moreover, when they deny that many things can be identical to one, according to their understanding of “identity” and “distinctness”, they have in mind, not the mereological concepts of “overlap” or “disjointness”, which everyone agrees to be notions of degree, but rather “numerical identity” and “numerical distinctness”, which the philosophers in question will take to be absolute notions. Thus, rhetoric aside, no one—not even Lewis, Baxter or Armstrong themselves—would disavow the claim that mereological sums are *not identical* to their parts, when this claim is properly **(p.42)** disambiguated to involve “identity” in the strict and numerical sense; in this sense, then, a commitment to sums clearly *is* a further commitment “over and above” the commitment to the objects that are said to compose the sums in question.

To illustrate, consider a world which, by hypothesis, contains two (and only two) mereological atoms, a and b. Those who accept the principle of unrestricted mereological composition, would hold that the world in question also contains a *third* object, c, which is the sum of a and b. All parties agree that the sum, c, is “in the strict and philosophical sense” numerically distinct from a and b, despite the fact that c is of course not disjoint from a and b. Thus, when “≠” is interpreted in the usual way to denote strict numerical distinctness, then it is true to say that a ≠ c and b ≠ c. Moreover, if identity is understood in the same strict numerical fashion, then the claim that a and b “taken together” just are c can only be interpreted to be the uncontroversial claim that *the sum* of a and b is identical to c, i.e., that c is self-identical. To the extent, then, to which the world in question is said by the supporters of Unrestricted Composition to contain an additional, *third* object numerically distinct from the two atoms, whose existence the detractors of Unrestricted Composition may well wish to deny, commitment to sums does indeed carry a *further* ontological commitment “over and above” the commitment to the two atoms. We may of course still believe that such a commitment is harmless from an ontological point of view, or worth its price, but this shouldn't detract from the fact that commitment to sums *is* a further commitment “over and above” commitment to the objects that are said to be its parts.

In addition to his reference to the work of Baxter and Armstrong, Lewis cites as further support for his thesis that composition is a *kind of*, or *analogous to*, strict numerical identity the following five considerations (Lewis 1991, pp. 85 ff; my italics). (i) First, the purported *ontological innocence* of CEM: “. . . just as it is *redundant* to say that Possum exists and something identical to him exists as well, so likewise it is *redundant* to say that Possum and Magpie both exist and

their fusion exists as well". (ii) Secondly, the "automatic" existence of sums which follows from an acceptance of *Unrestricted Composition*: "If Possum exists, then *automatically* something identical to Possum exists; likewise if Possum and Magpie exist then *automatically* their fusion exists". (iii) Thirdly, the *extensional* nature of CEM, which follows from the *Uniqueness* of Composition: "Just as there cannot be *two different* things both identical to Possum, likewise there cannot be *two different* fusions of Magpie and Possum". (iv) Fourthly, the *ease of describing* fusions: "*Describe* Possum *fully*, and thereby you *fully describe* whatever is identical to Possum. *Describe* Magpie and Possum *fully*—the character of each, and also their interrelation—and thereby you *fully describe* their fusion". (v) And, finally, the *multiple location* of fusions in exactly the places in which its parts are located: " . . . if it turns out that Mary and her lamb are identical, then there is no mystery at all about their **(p.43)** *inseparability*. Likewise if it turns out that the lamb is part of Mary, and if Mary is wholly present wherever she goes, then again the *inseparability* is automatic, and in no way mysterious."

Clearly, only the last two of these considerations are dialectically appropriate, as addressed to a philosopher who doubts the ontological innocence of CEM. For the Composition-as-Identity Thesis is precisely meant to convince such a philosopher that he can put aside his qualms and accept Unrestricted Composition (consideration (ii)) as well as the Uniqueness of Composition (consideration (iii)) because commitment to fusions is ontologically harmless (consideration (i)). Thus, considerations (i), (ii) and (iii) simply beg the question against the kind of philosopher to whom this discussion is addressed.

This leaves considerations (iv) and (v). Consideration (iv) seems to make use of a kind of supervenience thesis, according to which the characteristics of sums supervene on the characteristics of their parts; consideration (v), on the other hand, can be understood to pose a kind of challenge to those who deny the Composition-as-Identity Thesis: if sums, according to their view, are not in some sense identical to their parts, then the inseparability of sums and their parts seems to become mysterious. But neither of these considerations would change the mind of someone who does not believe that many objects can ever, in any interesting sense, be identical to one object. For it could nevertheless be the case that the characteristics of the one object supervene on those of the many, or that the one object is located wherever the many objects are located, even though the relation between the one and the many is nothing like that of numerical identity (to illustrate, witness the example of sets and their members or that between mental states and physical states). Thus, while considerations (iv) and (v) do not share the obviously question-begging character of (i), (ii) and (iii), they do not by themselves turn the tide in any way in favor of Lewis' view.

§II.4 Concluding Remarks

This concludes our discussion of Lewis' four-dimensional approach to the metaphysics of material objects. We have, in this chapter, encountered two prominent defenders of the thesis that ordinary material objects are best viewed as mereological sums in the standard sense. Thomson's three-dimensionalist version of this thesis was found to modify the standard conception of mereology in the sense of CEM in certain crucial respects, to account for the temporal and modal properties of ordinary material objects. In Chapter IV, we will see why this suitably extended and modified version of CEM nevertheless does not yield an adequate analysis of ordinary material objects. The considerations provided in this chapter, however, should, if successful, have established that Lewis' four-dimensionalist case for a CEM-style analysis of ordinary material objects can be resisted on the grounds that both his argument in favor of Unrestricted **(p.44)** Composition as well as his arguments in favor of the Composition-as-Identity Thesis are ultimately question-begging. We did not, in the present context, address the two remaining aspects of Lewis' four-dimensionalist picture, viz., the argument in favor of perdurance over endurance or the argument in favor of the Uniqueness of Composition, both of which lie outside the scope of the present study.

Notes:

(1) Thomson's Cross-Temporal Calculus of Individuals still carries a commitment to coinciding objects, i.e., numerically distinct objects which occupy exactly the same region of space-time. For if it is the case that the parts that currently compose the Tinkertoy house needn't always compose the Tinkertoy house, then the current parts are fused into lots of distinct cross-temporal fusions whose careers at other times diverge from that of the Tinkertoy house itself. These cross-temporal fusions are numerically distinct from one another, but coincide spatio-temporally during certain periods of time. One might think that their coincidence is made somewhat more bearable by the fact that they are mutual parts of each other during the times at which they coincide; alternatively, one might also find it even more puzzling how objects can be parts of each other during certain periods of time and yet not be numerically identical.

(2) It does so of course only at the price of further commitment to coincident objects. For, just as in the temporal case, a single this-worldly fusion of parts may be associated with many different other-worldly fusions of parts; the resulting objects are all strictly speaking numerically distinct even though they share exactly the same this-worldly spatio-temporal extent. Depending on one's outlook, their coincidence is again either mitigated or made even more puzzling by the fact that they are this-worldly parts of each other. The nature of some of these numerically distinct coinciding objects is investigated further in Thomson (1998).

(3) Of course, Thomson's proposal is not the only option available to the three-dimensionalist. For example, another possibility would be to argue that modal and temporal arguments for distinctness using Leibniz's Law, such as those considered by Thomson, can be defeated in another way. Views of this kind will be taken up for discussion and rejected below (see also Koslicki 2005a for arguments to this effect). Assuming that arguments from Leibniz's Law really do establish numerical distinctness, though, Thomson is right to think that parthood for the three-dimensionalist must be temporalized and modalized.

(4) If anything, mereological sums according to the standard conception are even *less* structured than sets, since standard mereology makes no room for a distinction analogous to that between subset and membership; in order to avoid the set-theoretic paradoxes and to satisfy the nominalist commitments of the standard mereology's original founders, all the entities quantified over within standard mereology were taken to be of the same ontological type, viz., individuals.

(5) Components (i) and (ii) are the main focus in Sider (2001); see also Koslicki (2003a) and (2003b) for discussion. A less condensed version of the argument in Lewis (1983a) can be found in Hawthorne, Scala and Wasserman (2004). Unrestricted Composition is opposed in van Inwagen (1990). For interesting discussion of component (iv), see, for example, Baxter (1988a) and (1988b); Harte (2002); Oliver (1994); and van Inwagen (1994). Contribution to the lively debate over universals include Armstrong (1978, 1980a, 1986, 1988, 1989, 1991, 1997); Bigelow (1986); Devitt (1980); Forrest (1986a) and (1986b); Quine (1980); and Williams (1953).

(6) My remarks in the following section against the Lewis/Sider argument in favor of unrestricted mereological composition are drawn from Koslicki (2003a).

(7) As a possible example for such a continuous series, take C_1 to be a case involving the molecules that are now part of my body and C_2 to be a case involving those same molecules long after I have died, when they are scattered into different regions of the Milky Way; it is likely that supporters of restricted composition would agree that the first is a case of composition, while the second is a case of non-composition, and that the two cases can be connected by some continuous series. If this example is not to the liking of those supporting restricted composition, they are invited to pick their own example: all Sider requires is that there is *at least one* such case which can be connected by a continuous series.

(8) In analogy with the definition of “a case of composition”, I understand the phrase “case of baldness” in such a way that it leaves open whether baldness occurs in it or not; thus, a “case of baldness” is simply a possible situation

involving the “ingredients” for baldness or non-baldness, i.e., people and their hair, or lack thereof.

(9) Sider himself turns out to be a “Nihilist” about baldness (see Sider and Braun 2007); however, his position on this issue does not affect the present discussion, since we are not currently debating the plausibility of any particular theory of vagueness.

(10) This is not to say, however, that the question of whether the truth of (P2) should be granted to Sider does not also raise questions which are worth pursuing; see, for example, Markosian (1998a) and Hudson (2000) and (2001), especially Chapter Three, for interesting discussion of the status of (P2).

(11) The nature of ontological disagreement is pursued further in Koslicki (2005b).

(12) Perhaps, Lewis is less troubled by this move than I am because he also sometimes sounds as though he takes mereological notions themselves to be logical. This goes along with his Composition-as-Identity Thesis, which will be examined in the next section. Unfortunately, Sider seems to embrace Lewis’ arguments in favor of the Composition-as-Identity Thesis (Sider 2001, pp. 160–1), though he does not invoke them in the context of his justification of (P3).

(13) In my view, Sider's use of the concreteness-predicate in this context is in fact illegitimate; however, since my objection to his use of the concreteness-predicate is really just another version of the objection to (P3) I am about to raise, I will not elaborate in detail my reasons for taking his use of this predicate to be illegitimate. Most importantly, it seems to me that the concreteness-predicate is implicitly mereological and that a stipulative definition of “is concrete” in terms of “is abstract” of the kind Sider attempts to give is hopeless. However, Sider's main purpose in adding the concreteness-predicate to the numerical sentences in question is merely to assure the existence of *finite* instances of such sentences (i.e., to keep out all the sets and other abstract objects, which would make all finite instances of “bare” numerical sentences false). The question of whether there is a way of making finite instances of the numerical sentences at issue true is independent of the dispute between the Universalist and the proponent of the intermediary position. To see this, assume, for instance, that both participants in the dispute are radical nominalists: they might agree that there are no infinite hierarchies of abstract objects and still disagree over whether composition is non-vague.

(14) One might think that my rendition of the Lewis/Sider argument above does not present the argument in its most charitable light. The argument might appear less question-begging than it does in my rendition of it, if we take its goal to be to establish that Universalism about composition must be embraced because the intermediary position can be found to lead to *ontological* vagueness,

i.e., the thesis that there is vagueness in the world. This would be an unwelcome consequence for the holder of the intermediary position, since all participants in the dispute have agreed to sign on to the linguistic theory of vagueness, for the time being. I am equally unpersuaded by this version of the Lewis/Sider argument, however. For notice that the thesis endorsed by the holder of the intermediary position—that a sentence like (X) can sometimes be indeterminate in truth-value—does not by itself commit its proponent to ontological vagueness any more than does the parallel claim about bald men: to agree that a sentence of the form "There are *n* bald men" can sometimes be indeterminate in truth-value, by itself, is not yet to endorse a particular theory of vagueness, such as the theory that there is vagueness in the world. Similarly, there is no reason to think that the apparent indeterminacy in numerical sentences of the form "There are *n* concrete objects" (for some value of "*n*") could only be resolved by means of a single strategy, viz., the ontological theory of vagueness. For example, take the dispute between the Universalist and the holder of the intermediary position to be of the kind imagined in Putnam (1987, pp. 18–19): in this scenario, we are to consider a world, w, which contains three atoms, a, b and c; the question under dispute is, "How many *objects* does w contain?". The Universalist unhesitatingly answers "seven"; the holder of the intermediary position, on the other hand, may view it as a determinate matter that w contains at least six objects, but wavers over whether w also contains a seventh object, viz., the sum of a, b and c. It's important to be clear that this dispute need not be construed as committing the holder of the intermediary position to ontological vagueness for the following reason: what this philosopher may view as indeterminate is whether w's domain is correctly described as one containing six objects or as one containing seven objects; i.e., what he regards as indeterminate is the question of which of two domains, both of which contain a determinate number of objects (either six or seven), is correctly described as the domain of objects existing in w. This sort of situation is very different, however, from being committed to w's containing a vague seventh object.

(15) I am equally mystified by the recent suggestion in Dorr (2005) to the effect that *parthood* be considered a natural kind.