The Crooked Path from Vagueness to Four-Dimensionalism

I. Introduction

How do the familiar concrete objects of common-sense –houses, trees, people, cars and the like-- persist through time? According to the position known as *'four-dimensionalism'* or *'the doctrine of temporal parts'*, ordinary concrete objects persist through time by *perduring*, i.e., by having temporal parts at all those times at which they exist, in addition to their ordinary spatial parts.[1] The contrasting position, known as 'three-dimensionalism', holds that ordinary concrete objects lack such an additional temporal dimension; rather, they persist through time by *enduring*, i.e., by being 'wholly present' (whatever exactly that comes to) at each of those times at which they exist.[2,3]

In his excellent recent book, Four-Dimensionalism: An Ontology of Persistence and Time (Sider (2001)), Theodore Sider defends a version of four-dimensionalism which he calls the 'stage-theory': according to this view, ordinary persisting objects are analyzed as being identical to momentary stages; they persist by having temporal counterparts at other times. (The 'stage-theory' contrasts with the more familiar 'worm-theory', according to which ordinary persisting objects are analyzed as extended space-time worms, rather than momentary stages.) Sider's claim on behalf of the stage-theory is that it is the position which, on the whole, provides the best analysis of the persistence of ordinary concrete objects: when compared with competing views, the stage-theory yields the best unified solution to a wide range of classical metaphysical puzzles and has "on

balance, the most important advantages and the least serious drawbacks" (Sider (2001, p.140)).

Despite all of its many significant virtues, however, Sider's case for four-dimensionalism is troubling in certain crucial respects, both philosophically and meta-philosophically. My purpose in this paper will be to show that, when we evaluate Sider's evidence in favor of the stage-theory, a different assessment of the dialectical situation from that endorsed by Sider recommends itself. In the end, as we shall see, everything turns on *'the argument from vagueness'* (Sider (2001, ch.4)), arguably the most important and innovative argument Sider offers in support of four-dimensionalism. My own assessment of Sider's case in favor of the stage-theory can be summarized by means of the following three theses:

(I) If it were not for the argument from vagueness, there would be a relative stand-off between the three-dimensionalist and the four-dimensionalist, given the rest of Sider's evidence.

(II) But the argument from vagueness suffers from an arguably fatal flaw and hence cannot bear the heavy dialectical burden of resolving the relative stand-off between the three-dimensionalist and the four-dimensionalist.

(III) Moreover, the argument from vagueness also carries the main responsibility for those features of Sider's view which are most troubling, philosophically and meta-philosophically.

Given limitations of space, my main focus in what follows will be to provide a detailed defense of Thesis (II), which will be the topic of Section III. My remarks in defense of Theses (I) and (III), in Sections II and IV, respectively, will unfortunately have to be largely programmatic; I hope, however, to convey enough information to give the reader a taste of the motivation behind Theses (I) and (III). My overall conclusion will be that, due to the problematic nature of the argument from vagueness, Sider's case in favor of four-dimensionalism is in the end not successful. Given the philosophically and meta-philosophically troubling consequences of the argument from vagueness, we are in any case much better off with a different ontology and a different conception of what it means to do metaphysics from that endorsed by Sider.

II. The Dialectical Landscape: A Brief Sketch

Sider's case for the stage-theory consists of the following four components: (i) a defense of the B-theory of time over the A-theory (Sider (2001, ch.2)); (ii) an evaluation of traditional arguments in favor of four-dimensionalism, with the addition of several noteworthy arguments of Sider's own creation (ibid., ch.4); (iii) an evaluation of prominent alternative solutions to a series of classical metaphysical puzzles to which the stage-theory is directed (ibid., ch.5); (iv) responses to important objections that have been mounted against the stage-theory (ibid., ch.6). Given considerations of space, I will limit myself to a few brief comments concerning the overall structure of Sider's case for the stage-theory.

Part I of Sider's case, his defense of the B-theory, is strictly speaking detachable from the main purpose of the book (the defense of four-dimensionalism), since the dispute between A-

theorists and B-theorists in the philosophy of time is independent of the dispute between four-dimensionalism and three-dimensionalism over the nature of persistence. Thus, even if four-dimensionalism is perhaps most naturally combined with the B-theory of time, a defense of the latter is not in fact strictly necessary for the purposes of a defense of the former.[4]

Among the many arguments in favor of four-dimensionalism surveyed in the course of Part II of Sider's defense of the stage-theory, he only finds three to have persuasive powers: (i) the *arguments from exotica*; (ii) the *argument from spacetime*; and, finally and most importantly, (iii) the *argument from vagueness*, which will be discussed separately and in detail in Section III below. The arguments from exotica concern such exotic possibilities as the phenomenon of time travel and the possibility of a world without time. Both sorts of scenarios, in Sider's view, are difficult to accommodate for the three-dimensionalist, since they appear to require conceptual resources which only the perdurantist has at his disposal. The argument from spacetime reasons that four-dimensionalism is favored both by a substantivalist conception of spacetime and by a relationalist conception of spacetime.

Both the arguments from exotica and the argument from spacetime, in my view, fail to shift the balance in favor of four-dimensionalism. The argument from spacetime does not lead *directly* from substantivalism or relationalism about spacetime to four-dimensionalism; rather, it does so by way of potentially controversial intermediary steps which need not be endorsed by the endurantist (e.g., the thesis, motivated by assumptions of ontological parsimony, that regions of space ought to be identified with their occupants). The exotic possibilities considered by Sider, on the other hand, seem to me to be at least as embarrassing to the four-dimensionalist as they are to the three-dimensionalist; and since they in any case concern phenomena which involve areas at the outer

reaches of our powers of imagination, they are best left to one side in an attempt to resolve the dispute over the nature of persistence.[5]

Part III of Sider's case for the stage-theory consists of a review of certain classical puzzles in metaphysics and their solutions by prominent competing theories; his overall conclusion is that the stage-theory, on balance, presents the best unified treatment of an impressively wide range of puzzles. And while the seriousness of Sider's challenges to the competing solutions should by no means be underestimated, the overall dialectical impact of Part III of Sider's case for the stage-theory is again not decisive. The possibility of pursuing alternative solutions to the metaphysical puzzles has not been closed off for good by anything Sider has to say in this part of his defense; alternative treatments of the puzzles are still a live possibility, as long as their proponents succeed in laying to rest Sider's formidable challenges.

The fourth and final part of Sider's case consists in his responses to prominent arguments which have been mounted against four-dimensionalism. Among the objections he considers, there are, in my mind, two in particular which continue to create trouble for his view. First, as we shall see in Section IV below, Judith Jarvis Thomson's famous *'ex nihilo'* objection does, in my view, have more force against Sider's account than he acknowledges (Thomson (1983)). The second unresolved objection concerns motion in homogeneous spheres: it is a well-known difficulty for those varieties of four-dimensionalism which also accept Humean Supervenience that they have a difficult time distinguishing worlds which contain nothing but a stationary homogeneous sphere from worlds which contain nothing but a rotating sphere qualitatively indistinguishable from it.[6] The series of momentary 'snapshots' of what goes on in these two worlds looks exactly the same, after all; and, by Humean Supervenience, the distribution of local intrinsic qualities in these worlds

determines the distribution of all other facts. How, then, can the fact that one sphere is rotating and the other stationary be accounted for by the perdurantist who also accepts Humean Supervenience? Despite all the complicated machinery Sider introduces to address this objection, he in the end acknowledges defeat: he reaches the negative conclusion that "[w]hat the present view cannot do is to distinguish states of rotation in cases where there is not enough else going on in the world to give candidate pairs of genidentity and laws a foothold" (Sider (2001, p.233); but these, of course, are precisely the cases that are of most interest. As I shall suggest below in Section IV, Sider's failure to provide a satisfying response to the objection concerning motion in homogeneous spheres raises the worry that the conceptual resources which are available to his particular version of the stage-theory are too impoverished and of the wrong sort to yield an analysis of the persistence of ordinary concrete objects.[7]

Although my remarks in defense of Thesis (I) have been exceedingly brief, I hope that I have nevertheless succeeded in giving the reader a taste for why so much, in Sider's case for the stage-theory, rides on the argument from vagueness. First, the defense of the B-theory of time in Part I is detachable from the defense of four-dimensionalism. Secondly, the two further arguments which Sider presents in favor of the four-dimensionalism (the argument from spacetime and the arguments from exotica), in my view, fail to shift the balance in favor of four-dimensionalism. Thirdly, despite the impressive puzzle-solving capability of Sider's own view, and his formidable challenges to competing solutions, the possibility of offering alternative treatments to these metaphysical puzzles has of course not been closed off by his arguments, once and for all. Finally, we noted that, although Sider is in general quite successful in warding off objections to four-dimensionalism, there are two difficulties which, in my mind, continue to haunt his view: the problem concerning motion in

homogeneous spheres and Thomson's *'ex nihilo'* objection. Thus, the dialectical balance in the dispute between the four-dimensionalist and the three-dimensionalist, at this point, looks to be relatively even-handed; and so it is that we come to the argument from vagueness, which seems to bear the burden of resolving the relative stand-off between the two sides of the dispute over the nature of persistence.

III. The Argument from Vagueness

III.1 The Non-Temporalized Argument from Vagueness

The argument from vagueness concerns the question 'Under what conditions do objects come into and go out of existence?' or 'Which arrangements of matter are suitable for objects to come into (and go out of) existence?'. Its radical answer is: 'Objects come into (and go out of) existence under *all* conditions' and '*All* arrangements of matter are suitable for objects to come into (and go out of) existence'. The fundamental reason Sider gives for this provocative conclusion is that *no principled line* can apparently be drawn between conditions in which objects come into (or go out of) existence, and arrangements of matter that support this circumstance, and those conditions and arrangements of matter in which the same fails to happen. But the radical conclusion (so Sider argues) to which the argument from vagueness leads --that objects are constantly coming into and going out of existence, *no matter how bits of matter are arranged*-- entails four-dimensionalism (at least in its temporalized version).

Sider's argument from vagueness (Sider (2001, ch.4)) is creatively adopted from a very condensed passage in Lewis (1986a, ch.4, pp.211 ff), in which he advances an argument in favor of

unrestricted mereological composition (i.e., the operation which, given a plurality of objects, yields a single object, their fusion or sum). Sider helpfully summarizes Lewis' argument 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 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 the account 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 compose 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 compose something can never receive a vague answer.

Sider now takes on the following two tasks: first, to offer a less condensed statement and justification of Lewis' argument in favor of unrestricted composition; and, secondly, to temporalize this argument in such a way that it then leads (in Sider's view) straight to four-dimensionalism. 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 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, and the like).[8] A *'sharp cut-off'* in a series of cases of composition is 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 places and those in which composition fails to take place may be vague. *'Nihilism'* about mereological composition is the position according to which 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:[9]

(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.

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.[10]

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).[11] 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 the 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 (Sider (2001, 'Introduction'), according to which genuine ontological disagreement is possible between two feuding factions.

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, five 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 a heap or a pile of soil, 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.

III.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 (1986a, p.212); my emphasis)

An argument which concerns the question of whether composition could ever be vague cannot take for granted that the notion of overlap is not vague, since composition can be defined in terms of overlap. Classical systems of mereology (e.g., the Leonard/Goodman Calculus of Individuals; see Leonard & Goodman (1940)) typically take as primitive either the notion of parthood, or that of overlap, or that of discreteness. It is of no great importance which notion is taken as primitive, since the others can be straightforwardly defined in terms of it. The notion of fusion in turn can be defined in terms of any of these three notions. For example, Sider uses the following definition of 'fusion' in terms of parthood (slightly modified):

(F) An object, x, fuses a class of objects, C, if and only if (i) every member of C is part of x, and (ii) every part of x shares a part in common with some member of C.[12]

But since the notion of overlap is just that of sharing a part in common, the notion of fusion can equally well be defined in terms of overlap. Thus, 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 (either overlap, or parthood, or discreteness) is not vague.[13]

Sider attempts to bypass Lewis' illicit assumption in his defense of (P3). The crucial move in Sider's justification of (P3) is his 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 terms and the predicate 'is concrete'. Thus, Lewis' assumption that composition can never be vague can thus be re-formulated 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.[14]

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.

While I am willing to grant to 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 which 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. There is no reason why they should not agree on what '∃' means, but they nevertheless disagree on *what* exists and *how many* things exist: in other words, they disagree on 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 (F). 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 is a fusion of C' 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 is a fusion of C' applies in every situation in which we are dealing with a plurality of objects; no further constraints must be satisfied. They therefore agree on the *meaning* of the term 'fusion', but they disagree on its *range*.

Nothing has been gained by re-formulating 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 assumption (which we have also granted to him), the dispute between the universalist and the defender of the intermediary position therefore looks to be as genuine as any ontological dispute could be. 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 what they disagree on. To settle the truth-value of the numerical sentence at the center of the debate, the ontological dispute itself must be settled, *by other means*.[15]

In the end, it therefore seems that 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 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 re-statement of what is at issue.

III.3. The Temporalized Argument from Vagueness

Sider's next move is to show that four-dimensionalism follows from his intermediary conclusion that composition is unrestricted (assuming the non-vagueness of logic). This next step trades on temporalizing the argument offered above in the following way:

(P1") If not every assignment has a minimal D-fusion, then there must be a pair of cases

connected by a continuous series such that in one, minimal D-fusion occurs, but in the other, minimal D-fusion does not occur.

(P2") In no continuous series is there a sharp cut-off in whether minimal D-fusion occurs.

(P3") In any case of minimal D-fusion, either minimal D-fusion definitely occurs, or minimal D-fusion definitely does not occur.

My treatment of the temporalized version of the argument from vagueness will be brief. If I have been successful above in showing that (P3) has not been persuasively justified, the same weakness will of course also affect the temporalized version of the argument.

The temporalized version of the argument from vagueness involves the use of two new technical notions: that of an *'assignment'* and that of a *'minimal D-fusion'* (short for *'diachronic fusion'*). An *assignment* is a (possibly partial) function which takes times as arguments and assigns to them as values non-empty classes of objects that exist at those times. An object, x, is a *D-fusion* of an assignment, f, just in case for every time, t, in f's domain, x is a fusion-at-t of the class of objects assigned to t by f. (Thus, diachronic fusions are defined in terms of synchronic fusions.) A *minimal* D-fusion of a given assignment, f, is a diachronic fusion which exists *only* at the times in f's domain.

The non-temporalized version of the argument from vagueness gives a certain radical answer to the question 'Under what circumstances do objects come into (or go out of) existence?' or 'Which arrangements are suitable for objects to come into (or go out of) existence?'. In parallel fashion, the temporalized version of the argument from vagueness answers the corresponding temporalized version of the same question in the same radical way: when asked the question, 'Under what

conditions do minimal D-fusions come into (or go out of) existence?' or 'Which arrangements of matter are suitable for minimal D-fusions to come into (or go out of) existence?', we are encouraged to answer 'Minimal D-fusions come into (and go out of) existence under *all* conditions' and '*All* arrangements of matter are suitable for minimal D-fusions to come into (and go out of) existence'. But this, in Sider's view, is tantamount to embracing four-dimensionalism. What, after all, are minimal D-fusions, if not *temporal parts* of persisting objects? Thus, the conclusion, (U), of the temporalized version of the argument from vagueness,

(U) Every assignment has a minimal D-fusion.

according to Sider, entails four-dimensionalism.

I will not comment on the details of the temporalized version of the argument from vagueness, since they are exactly parallel to the untemporalized version. What I want to ask, instead, is whether accepting (U) is really tantamount to embracing four-dimensionalism. It seems to me that it is not, for the following reasons.

Both the four-dimensionalist and the three-dimensionalist have ways of making sense of a temporalized version of mereology, even though their respective commitments require them to do so in different ways. The four-dimensionalist takes as basic an *atemporal* notion of parthood (overlap, discreteness, etc.), and then proceeds to define a temporalized notion of parthood (overlap, discreteness, etc.) in terms of the temporal parts that are parts (in the atemporal sense) of persisting objects at particular times. The three-dimensionalist, on the other hand, takes as basic a *temporalized* notion of parthood (or overlap or discreteness). This, of course, is just a special case

of their general disagreement over whether property-instantiation should be indexed to time in a non-derivative fashion. Given their respective approaches to temporalized mereology, however, they both have ways available to them of making sense both of diachronic fusions and synchronic fusions. (I will not go through the details, but see Thomson (1983) and Simons (1987), for three-dimensionalist versions of a temporalized mereology.)

Now, given that the question of whether a sensible way of temporalizing mereology can be had itself does not distinguish between the three-dimensionalist and the four-dimensionalist (only the question of *how* to do so), it should come as a bit of a surprise to be told that (U) by itself amounts to a statement of four-dimensionalism. After all, (U) is only the temporalized version of a principle of plenitude concerning mereological fusions. But I see no reason why the temporalized principle of plenitude cannot be accepted by a mereologically promiscuous three-dimensionalist as well. Thomson, I think, is an example of such a philosopher, who is happy with the whole plethora of synchronic and diachronic fusions, but who still takes them to be fusions *of* three-dimensional objects (see especially Thomson (1983)). Perhaps, Sider would argue that a three-dimensionalist of this kind is close enough to four-dimensionalism to be considered a friend, rather than an opponent; but this just raises the issue of what the distinction between three-dimensionalism and four-dimensionalism really amounts to, in that case, if it is not supposed to be merely terminological.

Thus, it seems to me that the issue over whether mereological composition is restricted or unrestricted (even in its temporalized version) marks a dispute that is independent of the dispute between the three-dimensionalist and the four-dimensionalist over the nature of persistence. Thus, even if the argument from vagueness were successful, it does not clearly entail four-dimensionalism.

IV. Conceptual Relativity and Other Troubles

I will end with some brief remarks in defense of Thesis (III), which aim to show that the argument from vagueness bears the main responsibility for those features of Sider's view which are most troubling, philosophically and meta-philosophically. I want to suggest that (i) the radical conclusion forced on us by the argument from vagueness leads to a problematic ontology; and (ii) it leads to a problematic conception of what it means to do metaphysics.

To say that objects are coming into (and going out of) existence under *all* conditions and that *any* arrangement of matter whatsoever is suitable for this purpose is of course just another way of saying that it is entirely *irrelevant* to the question of whether objects come into (or go out of) existence how particular bits of matter are arranged at any given time. But this position leads to an exceedingly *deflationary* conception of what it means to be an object. Moreover, when conjoined with certain further assumptions which Sider takes over from David Lewis (in particular, counterpart-theory and Humean Supervenience), the result is not only a problematic ontology but also a conception of the kind of enterprise in which we are engaged as metaphysicians which at least some of us will find disconcerting.

Let's face it, houses, trees, cars and people –the familiar concrete persisting objects of common-sense-- intuitively just do not seem to be fusions. For various reasons, fusions simply do not seem to have the right properties to serve as plausible candidates for an analysis of ordinary persisting objects. Anybody who says that they do, mereologically promiscuous three-dimensionalists and four-dimensionalists alike, has quite a bit of explaining to do.[16] Those who accept a principle of plenitude for fusions tell us that fusions come cheaply, because they are really

quite similar to sets in certain important respects, and therefore inherit the 'cheapness' of sets. For example, just like sets, all it takes for a fusion to exist is for its parts to exist; fusions, so to speak, come into existence 'automatically', just by virtue of the fact that their parts exist. Secondly, the identity of a fusion depends on nothing more than the identity of its parts; the identity of a fusion, so to speak, does not introduce any further constraints that are not already imposed by the identity of the objects that compose the fusion. It is these sorts of features of fusions which have led David Lewis to say, in Lewis (1991), that composition is really a sort of (plural) identity. By accepting the existence of a fusion, according to this view, we are committed to nothing more than what we were already committed to, to begin with, by accepting the existence of the objects that make up the fusion.

But their very 'cheapness' is also what makes fusions, in many ways, so unsuitable to serve as plausible candidates for an analysis of ordinary persisting objects. After all, how the bricks are arranged does appear to matter to the existence and identity of what we would normally think of as a house, but it is entirely irrelevant to the existence and identity of the fusion of the bricks. If the bricks are scattered, the house no longer exists (according to our ordinary use of the term 'house'). If the bricks are re-arranged in a radically different way, there is now a gigantic pizza-oven where there used to be a house. But, in either case, the very same fusion of the bricks still exists, unless some of its parts were destroyed in the process: it is of no importance to the identity and existence of the fusion of bricks whether the bricks are scattered or whether they are first arranged house-wise and then arranged pizza-oven-wise. How, then, could a house *be* a fusion of bricks? (And anyone who takes houses to be fusions really must take the verb 'to be' in this context to denote the relation of numerical identity; otherwise, no story at all has been told about the relation between houses and

the fusions coincident with them.)

At this point, Sider's stage-theory will no doubt remind us of the near magical powers of counterpart-theory. Counterpart-theory, both of the temporal and modal variety, is what gets Sider around assigning to ordinary persisting objects the wrong modal and temporal properties. Thus, we can safely say, according to the stage-theory, that the house is identical to a certain fusion of bricks, because there is still a way of making true the kinds of claims we would ordinarily endorse, such as 'The house could have existed longer than it did', 'The house could have had slightly different parts', 'Houses are not pizza-ovens', and the like. After all, when we say that fusions have their parts essentially, all this means, according to the stage-theory, is that our conceptual household is organized in such a way that we are sometimes led to relate stages at one time, or in one world, to stages at different times, or in different worlds, via a counterpart-relation (the 'same-fusion' relation) which introduces relatively strict standards of similarity.

But now, I think, we can also see why this ontology is committed to a milder version of the Carnapian conceptual relativity Sider wishes to avoid. There is room, in Sider's theory, for *some* genuine ontological disagreements: for example, the universalist, the nihilist and the holder of the intermediary position genuinely disagree over how many and which fusions that exist. But the only genuine ontological disagreements for which there is room, in Sider's world, are ones that concern disagreements over 'bare' fusions, so to speak. What has happened to the houses, trees, people, and cars, the familiar concrete objects of common-sense, whose persistence this account set out to analyze? There are no 'deep' ontological facts as to whether a given fusion should count as a house or not; and two philosophers who are engaged in this sort of disagreement really are involved in a conceptual dispute. In this sense, Sider is guilty of a bit of false advertising: his account is really a

way of saying that, at the end of the day, there is no interesting *ontological* story to be told about the persistence of our familiar concrete objects of common-sense; whatever there is to say about the persistence of houses, trees, people and cars concerns the organization of our conceptual household.

Of course, in the vast majority of cases, there are actual qualitative differences between those fusions which we have reasons to include in the domains of our restricted quantifiers and those which we find entirely uninteresting and tend to ignore. The fusions we typically care to talk about are ones which appear to us more unified than those of the second kind (the kind we commonly ignore), because the stages that compose them stand in certain special qualitative relations to one another; in other words, the relation which unifies the parts of a temporal worm, also known as the *'genidentity'* relation, is simply less gerry-mandered in the case of those worms that interest us than it is in the case of the worms we tend to ignore. But there is no 'deep' ontological difference between these two sorts of worms. Insofar as "the nature of that relation [the genidentity relation] is generally separable from the question of whether temporal parts exist" (Sider (2001), p.225), Sider's theory really has not told us much about the persistence of our familiar concrete objects of common-sense, just that they are somewhere to be found among the plethora of fusions that populate the world; to say exactly where they are to be found no longer lies within the domain of a strictly ontological theory.

This is also precisely why the problem about motion in homogeneous spheres raises what I think is a deep worry about Sider's account. In most cases, there do seem to be straightforward qualitative differences between the worms we care to talk about and those that are too gerry-mandered to matter to us; and Sider can perhaps safely leave the work of specifying the nature of these differences to those who are more interested in the organization of our conceptual household

and less interested in strictly ontological matters than he is. But there appear to be some, admittedly far-fetched, cases, in which our conceptual household seems to tell us that there clearly is a difference between two worms, and yet the difference in question apparently cannot be captured in terms of the vocabulary available to the four-dimensionalist (who also accepts Humean Supervenience). What, after all, could be clearer than the difference between a sphere that is rotating and one that is standing still? If we were observers in this universe, we could just feel this difference. Moreover, the difference between a moving and a stationary object is the sort of characteristic that would matter not only to metaphysicians but also to scientists. But if we line up all the momentary 'snapshots' which the four-dimensionalist has at his disposal to describe these two scenarios, the world which contains nothing but the homogeneous rotating sphere looks exactly like the world which contains nothing but the qualitatively indistinguishable but stationary sphere. The fact that the difference between them seems so clear to us makes one suspect that the vocabulary that is available to the four-dimensionalist perhaps was not of the right kind, in the first place, to capture adequately the means by which our conceptual resources are organized.

But let's grant for the moment that someone, somewhere down the road, will tell an acceptable story about the nature of the genidentity-relation and thus distinguish for us the gerry-mandered worms from the ones we care to talk about. The fact that the gerry-mandered worms exist nonetheless, in the same sturdy sense of 'existence', even though nothing about them is worth paying attention to, bears witness to the very deflationary conception of what it means to be an object in Sider's world. Take, for example, the four-dimensional equivalent of Lewis' 'trout-turkey': this is an object, let's say, which fuses the earlier years of a trout with the later years of a turkey. Now consider the 'middle' portions of this worm: there will be a place somewhere in the middle of this

worm where the last trout-stage borders directly on the first turkey-stage. But why is it that this trout-stage is followed directly by a turkey-stage? In other words, why is this object, which has been spending its time swimming through rivers and lakes, suddenly, in a matter of a single instant, turning into something which walks on land on two feet and can fly? The question I have in mind is not so much why the last trout-stage and the first turkey-stage exist at all, since Sider might explain these facts by importing a causal story from elsewhere (after all, both stages are also parts of more unified worms). The question is: what are the last trout-stage and the first turkey-stage doing together right next to each other in one and the same worm? This fact has no interesting explanation, causal or otherwise, on Sider's account. They exist right next to each other in the same worm because it is exceedingly easy, in Sider's world, to satisfy the constraints placed on what it means to be an object. And, in this sense, Thomson's *'ex nihilo'* objection really does have a point (even though, ironically, much the same worry arises with respect to her own view): miracles of a certain sort do constantly happen in Sider's world, only the worms which seem to involve generation *ex nihilo* are not the ones to which we normally pay attention. If we consider just the trout-turkey worm in isolation, the last trout-stage in no way 'sets the stage' in such a way that, barring supernatural interference and the like, the first turkey-stage cannot help but come into existence. To explain why the existence of the first turkey-stage fails to be a complete miracle, we must refer to other, more unified, worms that have some of the same parts as the trout-turkey. But whether a worm has this sort of 'internal unity' or not, causal or otherwise, makes no difference to its status as an object.

But even the more unified worms to which we normally do pay attention are, I think, more miraculous than Sider lets on. Take the nicely unified worm associated with the normal life of a

trout. There might be a causal story available to explain why, say, the first trout-stage 'sets the stage' in just the right way that, barring supernatural intervention and such, the second trout-stage will come into existence. Thus, the *generation* of stages in unified worms might not be *ex nihilo*.[17] But why does the first trout-stage *cease to exist*? The matter which is arranged trout-wise, after all, continues to exist (in the four-dimensional sense) and continues to be arranged trout-wise. The only explanation for facts involving the 'destruction' of temporal stages that seems to be available to the four-dimensionalist is an uninteresting non-causal one, viz., that 'its time was up'. That is, the first trout-stage only existed for an instant, because stages only last for an instant, and, thus, when the first instant was over, the first stage was over as well. But no interesting story involving the arrangement of bits of matter at these two times is available, since all of these facts support the continuing existence of trout-stages. Thus, the going out of existence of a stage, even in a unified worm, does seem to be miraculous in a way in which its generation does not. The three-dimensionalist, on the other hand, has at least in principle the option of explaining both why objects come into existence and why they go out of existence by means of the very same substantive causal story.

V. Conclusion

The main goal of Sider's book, Four-Dimensionalism: An Ontology of Persistence and Time, is to show why his version of four-dimensionalism, the stage-theory, on balance, should be preferred over its main competitors: it is, in his view, the theory which presents the best unified treatment of a wide range of central metaphysical puzzles; the theory which has, on balance, "the most important advantages and the least serious drawbacks" (Sider (2001, p.140)). I have tried to suggest in this

paper that, when we add up all the evidence for and against the stage-theory, a different assessment of the dialectical situation recommends itself.

As it turns out, everything depends on the *argument from vagueness*, the dialectical fulcrum of Sider's book. If it were not for the argument from vagueness (so I suggested in outline in Section II of this paper), the situation would be relatively even-handed between the three-dimensionalist and the four-dimensionalist. But the argument from vagueness (as I show in more detail in Section III) suffers from a crucial, and arguably fatal, weakness: no independent, non-question-begging justification has been provided for its most controversial premise, the non-vagueness of mereological composition.

That the argument from vagueness suffers from an arguably fatal flaw is really (as I suggest in Section IV) quite fortunate, since it is precisely the radical conclusion forced on us by this argument (when conjoined with certain additional Lewisian assumptions) that is responsible for the features that I find most troubling, philosophically and meta-philosophically, about Sider's position. The argument from vagueness entails that objects are constantly coming into and going out of existence, *regardless of how matter is arranged* at any given time: in other words, the arrangement of matter is entirely *irrelevant* to the existence and identity of objects. Sider is, in effect, committed to an exceedingly deflationary conception of what it means to be an object. In conjunction with his endorsement of counterpart-theory, it turns out, on Sider's account, that many of the questions and disputes which originally seemed to be of a strictly ontological nature now really concern the organization of our conceptual resources (viz., the nature of the different counterpart-relations we invoke in different contexts). It is for this reason that I charge Sider's position with being committed to a milder version of the Carnapian conceptual relativity he seeks to avoid. In particular, Sider's

account has the consequence that there is really not much of interest that a strictly *ontological* theory can say about the persistence and nature of the familiar concrete objects of common sense; but these were of course the very objects whose nature and persistence his account set out to analyze. Thus, the character of the whole enterprise in which we are engaged as metaphysicians has really shifted, as a result of Sider's position, in a way which we should resist, if we want to preserve the genuinely ontological character of certain central metaphysical questions.[18]

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Notes

1. For proponents of the four-dimensionalist position, see for example: Armstrong (1980); Cartwright (1975); Heller (1984), (1990); Jubien (1993); Lewis (1983a), (1986a); Quine (1960), (1963); Russell (1914), (1927); Sider (1996), (1997), (2001). (For a more complete list of references, see Sider (2001, p.3).)

2. For proponents of the three-dimensionalist position, see for example: Baker (1997), (2000); Burke (1992), (1994a), (1994b); Chisholm (1976); Haslanger (1985), (1989a), (1989b), (1994); Johnston (1987), (1992); Lowe (1987), (1989); Oderberg (1993), (1996); Simons (1987); Thomson (1983), (1998); van Inwagen (1990); Wiggins (1968), (1980); Zimmerman (1995). (A more complete list of references, again, is given in Sider (2001, p.3)).

3. The distinction between 'perdurance' and 'endurance' comes from David Lewis (e.g., Lewis (1986, p.202)), who attributes it to Mark Johnston.

4. Sider seems to mean by *'A-theory'* any theory of time which holds that tensed natural language statements are irreducibly tensed (i.e., according to which no reduction of a tensed statement, such as 'It is raining today', in terms of a tenseless statement, such as 'It is raining on June 26, 2002', is possible); a *'B-theory'* of time, correspondingly, is any theory according to which tensed natural language statements can be successfully reduced to tenseless statements. According to this use of the terminology, presentism, the so-called 'moving spotlight' view as well as the 'growing universe' view would all be classified as A-theories of time (see Markosian (forthcoming), for extensive references).

5. I hope to develop my objections to the argument from spacetime and the arguments from exotica in more detail elsewhere. My brief remarks in the present context are only intended to give the

reader an idea of why I believe that the argument from vagueness is the centerpiece of Sider's case for four-dimensionalism.

6. Humean Supervenience is the thesis that "the whole truth about a world like ours supervenes on the spatiotemporal distribution of local qualities" (Lewis (1986b, pp.ix-xvi); see also Lewis (1994)). The example of the homogeneous rotating sphere is due to Saul Kripke (unpublished lectures). For more references concerning the discussion of the rotating sphere case in the literature, see Sider (2001, pp.224 ff).

7. See, however, Teller (2002), for an interesting recent defense of four-dimensionalism against this objection.

8. 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 parts 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.

9. 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.

10. Sider himself turns out to be a 'nihilist' about baldness (see his unpublished manuscript

cauthored with David Braun, "Vague, So Untrue"); 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.

11. 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 (1998), Hudson (2000) and Hudson (2001), especially Chapter 3, for interesting discussion of the status of (P2).

12. Notice that (F) is simply a *definition* of the notion of 'fusion'; it does not say anything about the *existence* of fusions. To that end, classical theories of mereology typically accept a more or less powerful fusion-axiom, which asserts the *existence* of fusions (see Simons (1987) for fusion-axioms of varying degrees of strength). This difference, between a mere definition and something that asserts the existence of a kind of entity, will become important below.

13. Perhaps, Lewis is less troubled by this move than I am because he also holds the position (defended in (Lewis (1991))) that composition is a kind of identity (and, thus, he might take composition to be a logical notion); but since I find the arguments for the Composition-as-Identity thesis given in Lewis (1991) to be equally circular, it does not help, in my view, to appeal to this thesis in defending the assumption that composition is non-vague. Unfortunately, Sider seems to embrace Lewis' arguments in favor of the Composition-as-Identity thesis (Sider (2001, pp.160-161)), although he does not invoke them in his justification of (P3).

14. 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 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 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.

15. 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 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 whether or not an object exists can sometimes be a vague matter. 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 a single strategy, viz., the ontological theory of vagueness.

16. I am calling a position 'mereologically promiscuous' if it embraces unrestricted composition (temporalized or non-temporalized). Since I do not think the issue over whether a sensible restriction to mereological composition can be found decides between four-dimensionalism and three-dimensionalism, there are, to my mind, mereologically promiscuous versions of both sorts of views. The very promiscuity of these views, however, opens them up to some of the same criticisms, since they both share the same deflationary conception of what it means to be an object.

17. There is, I think, a further worry as to what accounts for the *directionality* of causation in the first place, in Sider's eternalist/four-dimensionalist universe. Since time does not have direction, on this account, except in the relatively uninteresting, indexical sense, one may wonder where the genuine directionality comes from which seems inherent in the causal relation between the earlier stages and the later stages of a unified worm.

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