

## Temporal Parts and Timeless Parthood

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**abstract:** What is a temporal part? Most accounts explain it in terms of timeless parthood: a thing's having a part without temporal qualification. Some find this hard to understand, and thus find the view that persisting things have temporal parts--four-dimensionalism--unintelligible. T. Sider offers to help by defining temporal parthood in terms of a thing's having a part at a time. I argue that no such account can capture the notion of a temporal part that figures in orthodox four-dimensionalism: temporal parts must be timeless parts. This enables us to state four-dimensionalism more clearly.

### I.

“Four-dimensionalists” say that things persist by having temporal parts spread out across time. A thing exists at a time, they say, by having a temporal part located just at that time. So I exist in 1975 by having a temporal part that exists throughout that year and only then; I exist now by having another temporal part that exists only now. “Three-dimensionalists,” by contrast, say that at least some things persist without having temporal parts. The event that is the history of a person or a dog might have temporal parts, but people and dogs themselves have none. Better, three-dimensionalism says that some persisting things lack proper temporal parts: maybe anything that exists at some time is a temporal part of itself, just as anything whatever a part of itself. Three- and four-dimensionalists disagree about whether persisting things have temporal parts other than themselves.

But what is a temporal part? It is hard to find a good answer to this question. There

is no generally accepted definition of the term, and those on offer tend to be obscure.

The best account of temporal parthood I know of is this: a temporal part of an object is a part of it that incorporates “all of that object” for as long as the part exists (Heller 1984: 27, Sider 2001: 60). It is a part of an object that overlaps all of the object’s parts that exist when that part exists—where overlapping means sharing a part. If  $\underline{x}$  is a temporal part of  $\underline{y}$ , then any part of  $\underline{y}$  that doesn’t overlap  $\underline{x}$  will exist only when  $\underline{x}$  doesn’t exist. So:

$\underline{x}$  is a temporal part of  $\underline{y}$  =df  $\underline{x}$  is a part of  $\underline{y}$ , and  $\underline{x}$  exists at some time, and every part of  $\underline{y}$  that does not overlap  $\underline{x}$  exists only at times when  $\underline{x}$  does not exist.

Call this the usual account of temporal parthood.

Take your nose. Although it is (presumably) a part of you, it is not a temporal part, for it doesn’t overlap all of your parts that exist when it does. You have parts that exist when your nose does without overlapping it: your feet, for instance. Your nose doesn’t incorporate “all of you” while it exists: it is too small, mereologically, to be a temporal part of you. But suppose there is such a thing as your first half—and suppose further, if you can, that it is a part of you. Then it would take up all of you for as long as it exists. Any part of you that doesn’t overlap your first half—your final hour, say, or a certain wisp of gray hair—will exist only at times when your first half doesn’t exist. So your first half would be a temporal part of you.

But the usual account is not perfect. One obstacle to understanding it is that it explains temporal parthood in terms of what we might call timeless parthood. When we speak of the parts of an ordinary persisting thing, we typically speak of the parts it has at some time. But the usual account says that a temporal part is not a part of a thing at some time, but a part of it without temporal qualification.

The problem is not (or not merely) that the usual account defines the phrase ‘ $\underline{x}$  is a temporal part of  $\underline{y}$ ’ rather than ‘ $\underline{x}$  is a temporal part of  $\underline{y}$  at time  $\underline{t}$ ’. Four-dimensionalists invariably speak of the temporal parts a thing has simpliciter, and regard talk of the

temporal parts it has at some time as an eliminable manner of speaking (see below). The trouble is rather that the definition of the phrase ' $\underline{x}$  is a temporal part of  $\underline{y}$ ' begins by saying ' $\underline{x}$  is a part of  $\underline{y}$ ' without any temporal qualification: a temporal part of something is a part of it, timelessly speaking, which meets certain further conditions. And someone might wonder what it could be for a person or a dog to have something as a part—a proper part—timelessly speaking. Take your nose again. It is a part of you now. It was a part of you last year. With any luck it will be a part of you at every time when you exist. But your nose has to be a part of you at some time if it is a part of you at all, even if we don't bother to mention that time. What could it mean, then, to say that your nose is a part of you without any temporal qualification at all? That sounds like saying that a certain village is a mile away—not a mile away from here, or from anywhere in particular, but a mile away simpliciter.

Those who think this way will not understand the usual account of temporal parthood. Or insofar as they do understand it, they will take it to imply that the very idea of a proper temporal part, or at least a proper temporal part of an ordinary persisting thing, is logically incoherent: as they see it, such a thing could no more have a proper temporal part than a thing could be a mile away without being a mile away from anywhere. Either way, they will be unable to take four-dimensionalism seriously.

It is a bad thing when philosophers fail to understand each other. It would be nice if we could characterize temporal parthood in terms that non-four-dimensionalists can grasp—in terms, that is, of the ordinary notion of temporally qualified or time-relative parthood: a thing's having a part at a time.

Theodore Sider has tried to do just this. He proposes this definition:

$\underline{x}$  is an instantaneous temporal part of  $\underline{y}$  at instant  $\underline{t}$  =<sub>df</sub> (1)  $\underline{x}$  exists at, but only at,  $\underline{t}$ ; (2)  $\underline{x}$  is part of  $\underline{y}$  at  $\underline{t}$ ; and (3)  $\underline{x}$  overlaps at  $\underline{t}$  everything that is a part of  $\underline{y}$  at  $\underline{t}$  (1997: 205; 2001: 59).

Now this does not define the phrase that figures in the usual account, ' $\underline{x}$  is a temporal part of  $\underline{y}$ ', but rather, ' $\underline{x}$  is an instantaneous temporal part of  $\underline{y}$  at instant  $\underline{t}$ '. But this is a difference of form and not of substance. It is easy enough to transform Sider's proposal into a definition of the usual phrase. First we can drop the qualification 'instantaneous' if we let ' $\underline{t}$ ' range over stretches of time as well as instants. (All four-dimensionalists, including Sider himself, want to speak of extended temporal parts of things as well as momentary ones; Sider simply finds it convenient, for reasons that need not concern us here, to cast his account in terms of momentary temporal parts.) Second, we can eliminate the qualification 'at  $\underline{t}$ ' on the left-hand side by noting that for a thing to be a temporal part of an object at a time is for it to be a temporal part of that object simpliciter and to be located at that time--where a thing is located at a time when it is located, or exists, at that time and no other, save parts of that time. (Again, all four-dimensionalists speak of a thing's being a temporal part of an object timelessly.) That yields

$\underline{x}$  is a temporal part of  $\underline{y}$  =df there is a time  $\underline{t}$  such that (1)  $\underline{x}$  exists at, but only at,  $\underline{t}$ ; (2)  $\underline{x}$  is a part of  $\underline{y}$  at  $\underline{t}$ ; and (3)  $\underline{x}$  overlaps at  $\underline{t}$  everything that is a part of  $\underline{y}$  at  $\underline{t}$ .

Rephrasing this to match the usual account, we get

$\underline{x}$  is a temporal part of  $\underline{y}$  =df  $\underline{x}$  is a part of  $\underline{y}$  at every time when  $\underline{x}$  exists, and  $\underline{x}$  exists at some time, and whatever is a part of  $\underline{y}$  at any time when  $\underline{x}$  exists overlaps  $\underline{x}$  at that time.

Sider's proposal, then, is that a temporal part of you is something that is a part of you whenever it exists, and which overlaps all your parts when it exists. So your nose, once again, is not a temporal part of you, for although it may be a part of you whenever it exists, you have other parts at times when your nose exists that don't then overlap your nose, such as your feet. If there is such a thing as your first half, though, and if it is a part of

you when it exists, then presumably anything that is a part of you at any time when your first half exists will share a part with it then. So your first half would be a temporal part of you. That looks like what we wanted: a definition of temporal parthood in terms of the ordinary notion of time-relative parthood that three-dimensionalists understand.

Like other four-dimensionalists, Sider takes temporally qualified parthood to be only a dispensable manner of speaking, definable in timeless terms by this conversion formula (2001: 57):

$\underline{x}$  is a part of  $\underline{y}$  at  $\underline{t}$  iff  $\underline{x}$  and  $\underline{y}$  exist at  $\underline{t}$  and the momentary temporal part of  $\underline{x}$  located at  $\underline{t}$  is a part of the momentary temporal part of  $\underline{y}$  located at  $\underline{t}$ .

This would make Sider's account of temporal parthood equivalent to the usual account. Three-dimensionalists will of course have none of this. Even if they understand the phrase 'temporal part', they believe that a thing can have a part at a time without having any momentary temporal part located at that time: they believe that your nose is now a part of you even though there is no temporal part of you located now. For that matter, accepting the conversion formula comes close to four-dimensionalism itself. For every moment when I exist, I am a part of myself then, which by the conversion formula implies that I have an instantaneous temporal part located then. Given that any temporal parts of a thing have a mereological sum that is also a temporal part of it, it follows that I have a temporal part located at every time, momentary or not, when I exist.

Not only do three-dimensionalists reject the conversion formula, but they usually take parthood to be irreducibly time-relative: they think that for a thing to have a part is for it to have a part at some time. And they deny that we can explain away this temporal qualification by Sider's conversion formula or any other. At any rate they take ordinary things such as people and dogs to have their parts in an irreducibly time-relative way: if events, regions of spacetime, and the like have their parts timelessly, that is another matter. It is for their benefit that Sider offers the time-relative definition of temporal

parthood. It is meant to tell them what temporal parts are in terms that they understand.

I believe that Sider's ecumenical gesture cannot succeed. If we understand his account of temporal parthood as three-dimensionalists are intended to understand it, in terms of temporally qualified parthood, it fails to capture the standard notion of temporal parthood. The temporal parts that figure in orthodox four-dimensionalism can only be understood in terms of timeless parthood. This insight will then help us to clarify what four-dimensionalism amounts to.

## 2.

Let me first point out a feature of Sider's account that might be troubling. Imagine that we are three-dimensionalists: we believe that people and dogs persist but have no proper temporal parts. And suppose we take parthood--the sort of parthood that applies to people and dogs, anyway--to be irreducibly time-relative: we reject the conversion formula. Suppose, that is, that we are among those for whose benefit Sider offers his account.

Sider's account implies that whatever is a temporal part of you now must be mereologically the same size as you are now: it will now overlap all your current parts. But this is strange. How could something just as big as you are now could be a part of you now--a part other than yourself? Mustn't the whole be greater than the part? Mustn't the part be smaller than the whole? Your nose can be a proper part of you now because it is smaller than you are now. But your first half is not any smaller than you are now. So how could it be a proper part of you now?

The principle that the whole must be greater than the part has served for thousands of years as an example of a self-evident truth. It is expressed in an axiom of standard mereology (Simons 1987: 28):

If  $x$  is a proper part of  $y$ , then  $y$  has a further part that does not overlap  $x$ .

Like the rest of standard mereology this is put in terms of timeless parthood, but the obvious time-relative analog is this:

If  $x$  is a proper part of  $y$  at  $t$ , then  $y$  has a further part at  $t$  that does not overlap  $x$  at  $t$ .

Call this the first mereological principle. The idea is that whatever is now a part of you (other than yourself) must now leave some of you out: if you have one proper part now, you must also have at least one more part now that doesn't now overlap the first. If we combine this apparent truism with Sider's definition of 'temporal part', we get the result that nothing could ever be a proper temporal part of anything. A proper temporal part, on that account, is a proper part that is the same size as the whole; but no proper part could be the same size as the whole. This would make the very idea of a proper temporal part of something inconsistent.

Sider evidently rejects the first mereological principle, or at least expects three-dimensionalists to reject it. And some of them do. Suppose we knead a lump of clay into the shape of Socrates. Someone might suppose that we thereby bring into being a new object—a statue—made of the same clay as the lump. The lump and the statue would then coincide mereologically: every current part of the lump would now overlap something that is now a part of the statue, and every current part of the statue would now overlap a current part of the lump. Even so (we might suppose), the lump and the statue would be different things, since one existed before the other did. Call the view that numerically different objects can coincide mereologically at a time coincidentalism.

Many three-dimensionalists accept this. And some of them go on to say that the statue is now a part of the lump: the lump's current parts include not only its particles and any smaller lumps now contained within it, but also the statue. Those who say this usually say that the lump is now a part of the statue as well. More generally, they say that whenever objects coincide mereologically at a time, each is then a part of the other (Thomson 1983: 218, Simons 1987: 180). And this is incompatible with the first

mereological principle.

This may sound mad. How could the relation between two things of the same size that completely overlap be that of part to whole? We might accept that the statue is a temporal part of the lump in a timeless sense, insofar as the lump is timelessly larger than the statue along the temporal dimension: it has temporal parts, located at times when the statue doesn't exist, that aren't parts of the statue. That would be consistent with the principle of standard mereology from which the first principle was derived. But how can anyone think that the statue is now a part of the lump in the ordinary, temporally qualified sense of 'part'? Why give up the truism that the whole must be greater than the part?

Well, consider a second mereological principle:

If  $x$  exists at  $t$  but is not a part of  $y$  at  $t$ , then  $x$  has a part at  $t$  that does not overlap  $y$  at  $t$ .<sup>1</sup>

If something is not now a part of you, the principle says, then it must now have a part that is now completely disjoint from you. If all of an object's current parts now share a part with you, then that object is now one of your parts. This second principle may seem just as attractive as the first one. If it hasn't served for thousands of years as an example of a self-evident truth, that may be only because it can't be stated as a snappy slogan. But if coincidentalism is true, the two principles are incompatible. Take two objects that now coincide mereologically, such as our lump and statue. The first principle entails that neither object is now a part of the other, since they now entirely overlap: every part of each object now overlaps a part of the other. But according to the second principle, this very fact entails that each is now a part of the other.

What to do? We might endorse the first mereological principle and reject the second. Or we might keep the second and drop the first. Or we could keep both principles and give up coincidentalism. (That would be my own preference.) But who's

to say which response is the right one? In this way one might come to doubt whether the whole must be greater than the part.

Those three-dimensionalists who are still convinced that the whole must be greater than the part will find Sider's definition of 'temporal part' inconsistent (a complaint they won't have with the usual account). But the rest of them--those who reject the first principle, or who are willing to suspend their belief in it for the sake of argument--may still find Sider's definition useful.

Advocates of the first principle might consider a variant of Sider's account:

$\underline{x}$  is a temporal part of  $\underline{y}$  =<sub>df</sub>  $\underline{x}$  exists at some time and  $\underline{x}$  coincides mereologically with  $\underline{y}$  at every time when  $\underline{x}$  exists.<sup>2</sup>

This is consistent with the first principle because it doesn't say that a temporal part of something has to be a part of it at all. Indeed, given the first principle, the variant implies that a temporal part of you is not a proper part of you: the variant says that a temporal part of you has to be just as big as you are whenever it exists, which according to the first principle no proper part of you could be. It would follow that temporal parts aren't parts--or at least not parts in the ordinary, temporally qualified sense of the term.

Presumably temporal parts are supposed to be parts: why else would anyone call them parts? But maybe nothing important turns on this. Temporal parts might just be badly named. If we can understand better what they are supposed to be by not taking them to be parts, where's the harm?

Thus, something like Sider's account, anyway, need not violate the conviction that the whole is greater than the part. And it may not matter much if it does.

### 3.

I turn now to the real problem with Sider's account, which afflicts the variant as well. Consider once more the view that different objects can coincide mereologically at a

time: coincidentalism. Suppose for the sake of argument that a statue S now coincides mereologically with a lump L numerically different from it. To keep things simple, let L exist before and after S does, and let S coincide with L throughout S's career.

Sider's definition is intended to imply that S is a proper temporal part of L. (He says so himself: 2001: 65.) First, S is a part of L at every time when S exists—a proper part, for S and L are numerically different. At any rate S is a proper part of L at those times in whatever sense a thing can be a proper part of another at a time despite their being the same size then. Second, whatever is a part of L at any time when S exists shares a part with S then: otherwise L would be larger than S is then and they would not coincide mereologically. If this is not a case where Sider's definition of temporal parthood applies, it is hard to see what it would count as a proper temporal part of something. (It is obvious that S is a temporal part of L on the variant account.)

Most coincidentalists take mereological coincidence to be a common occurrence. Given Sider's definition, this amounts to saying that many ordinary things have proper temporal parts. A typical clay statue is a proper temporal part of a lump of clay. A person is usually a proper temporal part of his body (which continues to exist after the person expires). A sweater that is never mended is a proper temporal part of a certain piece of yarn. If there are Lockean "masses of matter" that exist only as long as their particles cohere, a biological organism has a succession of such masses as proper temporal parts. And so it goes.

This is surprising. Coincidentalists were supposed to be three-dimensionalists. They don't call statues temporal parts of lumps, or people temporal parts of their bodies. They believe that ordinary things have no proper temporal parts at all (insofar as they understand the notion, anyway). Sider's definition implies that they are confused: coincidentalism says that ordinary objects have all sorts of proper temporal parts.

In fact there is little difference, on Sider's picture, between coincidentalism and four-dimensionalism. He defines four-dimensionalism as the view that persisting things have arbitrary temporal parts: for every time when any object exists, be it momentary or

extended, continuous or discrete, there is a temporal part of the object located then.<sup>3</sup> Thus, I have as many temporal parts as there are times when I exist. On Sider's view, most three-dimensionalists simply take things to have fewer temporal parts than this. If we knead a lump of clay gradually into the shape of Socrates, three-dimensionalists may say that we end up with a statue that is a temporal part of the lump, but they will not usually agree that we get a new temporal part of the lump at every moment in its career. Only those three-dimensionalists who reject mereological coincidence outright deny that ordinary things have any proper temporal parts at all. Three- and four-dimensionalists differ in nothing more than how many proper temporal parts they take ordinary persisting objects to have.

This means that most of us have been wrong about the difference between three- and four-dimensionalism. We thought three-dimensionalists could accept as many objects as four-dimensionalists do: they could say that for every time when any object exists, there is something that exists and coincides with it at that time alone. But on Sider's view this "capacious three-dimensionalism" is really four-dimensionalism. The more coinciding objects you believe in, says Sider, the more temporal parts you accept. If you started as a three-dimensionalist and gradually added more and more coinciding objects to your inventory of being you would end up willy-nilly as a four-dimensionalist. You would not need to do anything further.

#### 4

I believe that three- and four-dimensionalists disagree about something other than how many coinciding objects there are. They disagree about the nature of persistence and change. This is reflected in the subtitle of Sider's own book, 'An ontology of persistence and time'. It is no accident that the dispute is often put by saying that according to three-dimensionalism objects persist by enduring, whereas on four-dimensionalism they persist in a different way, by perduring. How could a dispute about what it is for a thing to persist concern nothing more than how often an object comes to

coincide with something new?

This disagreement about persistence has to do with what it is for something to have a part at a time—or more generally what it is to have a property at a time. (I say more generally not because a thing's parts are among its properties but because having a certain part is a property.) What orthodox four-dimensionalism has and Sider's version lacks is the idea that things have their parts and their properties without temporal qualification.

We can see this by considering the so-called “problem of temporary intrinsics” or “problem of change”. If there is one thing that four-dimensionalists agree on, it is that four-dimensionalism can solve this problem in a way that three-dimensionalism cannot. They may disagree about how much force this has as an argument for four-dimensionalism (that is, about how bad the non-four-dimensionalist alternatives are); but they all accept it.

The problem is to explain how persisting things can have incompatible intrinsic properties (Lewis 1986: 202-204, 2002; Sider 2001: 92-98). Being bent and being straight are incompatible intrinsic properties if any are. Yet I am both bent (when I sit at noon) and straight (when I stand at midnight). How can I be both bent and straight? Three-dimensionalists answer that I am bent and straight at different times: bent (and not straight) at noon, straight (and not bent) at midnight. But how does that solve the problem? What is my relation to the properties of bentness and straightness if I don't simply have them?

Some three-dimensionalists say that bentness is not really a monadic property but rather a relation to a time: I bear the bent-at relation to noon and the straight-at relation to midnight. Bentness and straightness are incompatible in that nothing can bear the bent-at and the straight-at relations to the same time. Four-dimensionalists object that bentness and straightness are monadic properties and not relations.

Others say that having or instantiating is a triadic relation among a property-bearer, a property, and a time, rather than a dyadic relation between a property-bearer and a

property. So I really do have the monadic properties bentness and straightness, but I have them relative to different times: I bear the having-at relation to bentness and noon on the one hand, and to straightness and midnight on the other. Four-dimensionalists complain that this is hardly better, for it still implies that I don't strictly have either bentness or straightness, but merely stand in some relation between them and various times.

I don't want to adjudicate this debate. My point is that for whatever it's worth, four-dimensionalists can accommodate both the conviction that bentness and straightness are non-relational properties and the claim that having them is not a relation to a time. They say that when I sit, something really is bent in itself and not merely somehow related to bentness and a time; and when I stand something is straight in itself. This is possible because the bent thing and the straight thing are numerically different: I am bent at noon and straight at midnight insofar as the temporal part of me located at noon is bent and the temporal part of me located at midnight is straight.

But four-dimensionalism doesn't solve the problem of temporary intrinsics merely by asserting the existence of these further objects. The mere existence of bent things and straight things coinciding with me, no matter how many, does nothing to explain how I can be both bent and straight. The four-dimensionalist solution rests on a claim about what it is for a persisting thing to have an intrinsic property temporarily. The claim is that to be bent at a time is to have a temporal part located at that time that is bent without temporal qualification, and to be straight at another time is to have a temporal part located at that other time that is straight without temporal qualification. So my properties are not the incompatible bentness and straightness but rather having a bent temporal part and having a straight temporal part. These properties are compatible (assuming that the notion of a temporal part is itself consistent), just as having a hand-shaped spatial part and having a foot-shaped spatial part are compatible. In the last analysis, intrinsic properties such as straightness are not had temporarily by persisting things, but non-temporarily by momentary things. This is what solves the problem of

temporary intrinsics for the four-dimensionalist. None of it follows from the mere existence of things coinciding with me.

It is essential to this story that my bent part and my straight part be bent and straight without temporal qualification. Otherwise bentness and straightness (or the having of them) would be relational in the same way as they are according to three-dimensionalism. If it is objectionable for three-dimensionalists to say that my being bent is my bearing a relation to a time, it is surely just as bad to say that my temporal part's being bent is its bearing a relation to a time. Likewise, those things must be parts of me without temporal qualification. Otherwise I should have a bent part at noon and not have a bent part at midnight; and having a bent part and not having a bent part are incompatible in whatever way bentness and straightness are, thus raising the original problem once more. If we can't say that being bent is bearing a relation to a time, we can no more say that having a bent part--being partly bent--is bearing a relation to a time. (Having a bent part is as much an intrinsic property as being bent is.) The four-dimensionalist solution to the problem of temporary intrinsics requires that all things have their properties and their parts timelessly. Things have properties temporarily, it says, only insofar as they stand in timeless relations to temporary objects that have the properties timelessly.

Whatever the merits of this view may be, it is unavailable to three-dimensionalists, no matter how many objects they believe in. Consider capacious three-dimensionalists, who believe that I coincide with as many objects as four-dimensionalists believe I have temporal parts. They agree with the four-dimensionalist that I coincide at noon with a momentary object that is bent throughout its brief career, and that I coincide at midnight with another momentary object that is straight throughout its career. They may even agree that those objects are, successively, parts of me. But they are unlikely to agree that I have those objects as parts, or that they are bent and straight, without temporal qualification. Nor will they agree that my properties are not strictly bentness or straightness but rather having a bent part and having a straight part. They are more likely to say that I am bent and straight in the same way as the things coinciding with me are

bent and straight. They will not agree that to be bent at a time is to relate in a certain timeless way to something else located at that time that is timelessly bent. At any rate no philosopher I know of who calls herself or is called by others a three-dimensionalist would accept these claims. More to the point, capacious three-dimensionalists need not agree to them in order to count as four-dimensionalists by Sider's lights. They could accept Sider's four-dimensionalism, yet insist that instantiation and parthood are irreducibly time-relative. In that case they would be unable to accept the four-dimensionalist solution to the problem of temporary intrinsics.

So the orthodox four-dimensionalism that purports to solve the problem of temporary intrinsics in its own characteristic way is different from capacious three-dimensionalism. Capacious three-dimensionalism is not the four-dimensionalism that figures in familiar metaphysical debates—or for that matter the four-dimensionalism that Sider himself accepts. Capacious three-dimensionalism is not four-dimensionalism ordinarily so called. But if we try to state four-dimensionalism using Sider's time-relative account of temporal parthood, capacious three-dimensionalism is all we get. It follows that Sider's account of temporal parthood does not capture the notion of a temporal part that four-dimensionalists have in mind.

I doubt whether any other attempt to define 'temporal part' in terms of temporally qualified parthood will do any better than Sider's. You need to understand parthood timelessly in order to understand the concept of a temporal part. To put it paradoxically, temporal parts are timeless parts. Sider's admirable goal—to explain what temporal parts are to those who take parthood to be irreducibly time-relative—can never be attained.

## 5.

Let me say something positive after all this complaining. Orthodox four-dimensionalism is the view that for an object to exist at a time is for it to have a temporal part that exists or is located only at that time, and I have argued that this must be a temporal part as defined by something like the usual account rather than Sider's

time-relative account. We can now see better what this amounts to.

Orthodox four-dimensionalism first makes an ontological claim:

1. For any time when an object exists there is a thing coinciding mereologically with that object at that time which exists only then.

(Those who take things to have their properties timelessly can rephrase this according to the conversion formula of §1.) Sider's account of temporal parthood implies that this is all there is to four-dimensionalism, and I have disputed this. What more is needed?

Well, our discussion of temporary intrinsics showed that orthodox four-dimensionalism also makes a claim about instantiation:

2. All things have their properties without temporal qualification.

Call this timeless instantiation.

But the ontological claim and timeless instantiation don't yet give us orthodox four-dimensionalism. Someone might solve the problem of temporary intrinsics by saying that being bent at noon is having the property bentness-at-noon, and being straight at midnight is having the property straightness-at-midnight.<sup>4</sup> These properties are compatible (though bentness-at-noon is incompatible with straightness-at-noon). On this view (suitably generalized), things don't have incompatible properties temporarily; rather, they have compatible time-indexed properties timelessly. So it endorses timeless instantiation. Someone might combine this view with the ontological claim by holding that for every time when a thing exists it coincides-at-that-time with an object that exists only then. But this would not yet make him an orthodox four-dimensionalist, for he may not agree that to be bent at a time is to relate in some timeless way to another thing that is bent simpliciter. He could say that ordinary persisting objects are bent or straight in the same sense as the momentary objects coinciding with them are bent or straight. He

could say, that is, that both I and the momentary object that coincides-now with me have the property being-bent-now, and not, as orthodox four-dimensionalists say, that I have only the property having a bent temporal part located now. The four-dimensionalist solution to the problem of temporary intrinsics would then be unavailable to him.

So orthodox four-dimensionalism makes the further claim that things have temporary properties by proxy:

3. A persisting object has a temporary property at a time only in the sense of relating in some way to another thing that exists at that time and has that property in a more straightforward sense.

Call this proxy instantiation. It implies that I don't strictly have the temporary property of bentness. Rather, other things have it, and they relate to me in a way that makes it true to say that I am bent at times when they have it. This is essential to the four-dimensionalist account of temporary intrinsics.

Four-dimensionalists also say that these proxy objects--the objects that strictly bear the properties we correctly attribute temporarily to persisting things--are what coincide with persisting things according to the ontological thesis. So:

4. The proxy objects that bear the properties attributed temporarily to persisting things coincide mereologically with those things whenever those objects exist.

Finally, the short-lived objects spoken of in the ontological thesis are supposed to be temporal parts of the persisting things they temporarily coincide with--temporal parts not merely in Sider's time-relative sense, but in the timeless sense of the usual account. Thus,

5. The short-lived objects of the ontological thesis are temporal parts (by the usual

account) of the persisting objects they temporarily coincide with.

Most so-called four-dimensionalists accept these five claims, and most three-dimensionalists reject them. I propose that four-dimensionalism as it is most commonly understood is the conjunction of claims 1-5. By accepting some of the claims but not others, though, we can describe views that are more or less similar to orthodox four-dimensionalism.

Take the ontological claim. As we have seen, combining it with Sider's account of temporal parthood yields the view that all persisting objects have arbitrary temporal parts. This is what Sider offers those who have trouble understanding orthodox four-dimensionalism. And in many ways it is rather like the real thing. Some of the principal objections to four-dimensionalism (e.g. Thomson 1983) are objections to the ontological thesis rather than to any of the other four claims. It also has some of four-dimensionalism's theoretical virtues: for instance, it offers us the characteristic four-dimensionalist solution to problems about vagueness of identity over time.

In the simplest case, the solution goes like this<sup>5</sup>: Suppose the dog Tray has an adventure that leaves us uncertain, no matter how much we learn, whether he is identical with the resulting dog. And suppose we infer from this that the sentence 'Tray still exists' is neither definitely true nor definitely false. Many philosophers are convinced that numerical identity itself can never be vague: two things--if we may so describe them--can never be "sort of" one and "sort of" two. If we accept the ontological claim, we can account for the vagueness in this case in terms of the ambiguity of the name 'Tray', without saying that identity itself is vague. We can say that the name refers ambiguously to one object that definitely survives the adventure (or more likely to many such similar objects that differ from one another only trivially in when they begin or end) and to another object (or objects), coinciding mereologically with the first before the adventure, that definitely doesn't survive. Given that a sentence of the form 'x is F' is definitely true if and only if each referent of 'x' is definitely F and definitely false just

when each referent is definitely not  $\underline{F}$ , our sentence ‘Tray still exists’ comes out neither definitely true nor definitely false, just as it should. None of this requires any of the other four claims of orthodox four-dimensionalism.

Because the ontological claim does much of what an ontology of temporal parts is supposed to do, there may be some justice in calling it a version of four-dimensionalism, as Sider does.

Here is another view that endorses some but not all of the five claims: Dogs and other ordinary objects are abstract—they are set-theoretic constructions or the like. But it is true to say that Tray barks at noon if and only if he relates in some way to a concrete proxy object that exists only at noon and barks in some more straightforward sense. This view endorses proxy instantiation, but not the ontological thesis. At any rate it doesn’t say that there are things coinciding mereologically with dogs, for no concrete object can coincide mereologically with something abstract—though it is committed to another ontological claim about the existence of all those short-lived concrete objects. Perhaps there is no great harm in calling these proxy objects “temporal parts” of dogs in an attenuated sense of the term. This view at least bears a striking resemblance to orthodox four-dimensionalism. One orthodox four-dimensionalist, David Lewis, sees it as a variant of his own view:

It does not matter what sort of “aggregate” [a persisting object or continuant is]. I prefer a mereological sum, so that the stages are literally parts of the continuant. But a class of stages would do as well, or a sequence or ordering of stages, or a suitable function from moments or stretches of time to stages. (1976: 39, n.4)

It is hard to know what to call positions intermediate between orthodox four-dimensionalism and paradigmatic three-dimensionalism. But maybe it doesn’t matter what we call them. The important thing is to see that they are distinct.<sup>6</sup>

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## Notes

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<sup>1</sup>This is a temporalized version of Simons' "strong supplementation principle" (1987: 29). Sider endorses it at 2001: 58.

<sup>2</sup>I owe this suggestion to Ted Sider. Thomson (1983: 208) says something similar: that  $\underline{x}$  is a temporal part of  $\underline{y} =_{df} \underline{x}$  exactly spatially coincides with  $\underline{y}$  at every time when  $\underline{x}$  exists.

<sup>3</sup>This is meant to be an informal restatement of Sider's more precise formulation at 1997: 204. I don't think any four-dimensionalist would dispute it.

<sup>4</sup>Parsons (2000) gives an account of this sort--though what he calls "four-dimensionalism" is quite different from what is at issue here.

<sup>5</sup>E.g. Sider 2001: 148-150. See 120-139 for a different sort of case.

<sup>6</sup>I am grateful to Katherine Hawley, Ted Sider, and several referees for suggesting improvements to this paper.