Temporal Predication with Temporal Parts and Temporal Counterparts

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Those who believe that ordinary objects have temporal parts or, alternatively, that ordinary objects have temporal counterparts are committed to an account of the truth conditions of temporally modified predications of the form 'a is F at t' in terms of temporal parts or temporal counterparts. The aim of this paper is to show that both the temporal-parts account and the temporal-counterparts account of temporal predication are untenable.

1 Temporal Parts, Counterparts and Predication

The theory of temporal parts may be outlined as follows. To keep things simple, it will be helpful to draw the following analogy to space: just as places are spatial regions, times are temporal regions; and just as objects are located at, or occupy, spatial regions, objects are located at, or occupy, temporal regions. We can then say that just as a spatial part of an object occupies a sub-region of the spatial region occupied by the whole object, a temporal part of an object occupies a sub-region of the temporal region occupied by the whole object. Moreover, just as objects have arbitrary spatial parts, they have arbitrary temporal parts. That objects have arbitrary spatial parts means that for any way of dividing the spatial region occupied by a given object into sub-regions, there is a corresponding way to divide that object into spatial parts that exactly occupy those sub-regions. Analogously, the thesis that objects have arbitrary temporal parts means that for any way of dividing the temporal region occupied by a given object into sub-regions, there is a corresponding way to divide the object into temporal parts that exactly occupy those sub-regions. Among the sub-regions of temporal regions we may distinguish between *temporally unextended*, or *instantaneous*, ones

and *temporally extended* ones – temporally extended regions being mereological sums of non-simultaneous instantaneous regions. So objects have arbitrary instantaneous and extended temporal parts. (Henceforth I will only distinguish between instantaneous and extended temporal parts when the distinction plays a role; otherwise I will mean instantaneous temporal parts when I say 'temporal parts'.)

Given that there are objects and temporal parts of objects, which of these things are the particles and persons of our pre-philosophical ontology? The standard answer is that particles and persons are sums of temporal parts that are maximal under some *unity relation*. There is, for instance, a unity relation for persons, and a person is a maximal sum of instantaneous temporal parts, each of which stands in the unity relation for persons to all the others (and to itself) [Lewis 1983: 59]. Moreover, not only ordinary objects but also their temporal parts have various properties and relations. Temporal parts of persons, for instance, have a certain posture, height and weight. So much for a rough metaphysical picture.[1]

Friends of temporal parts describe ordinary objects in temporally unmodified terms; a person is said to have temporal parts *simpliciter* that have a certain posture, height and weight *simpliciter*. But this is not how we speak about things on the street. In ordinary, temporally modified terms we describe a person as having a certain posture, height and weight *at a time*. Why should the friend of temporal parts care about how we speak outside the metaphysics lab? One reason is that an important motivation for believing in temporal parts arises from the claim that the theory of temporal parts affords the best solutions to certain metaphysical puzzles. And these puzzles are stated in ordinary, temporally sensitive language. For example, the puzzle of change demands an explanation of how something can have different, incompatible properties at different times. Moreover, the puzzle of coincidence demands an explanation of how distinct things can be in the same place at the same time. The first step in providing such explanations is to establish a link between ordinary, temporal language and the technical, atemporal language of metaphysics. In the case of temporal-parts theory, the first step is to specify truth conditions of temporal predications of the form 'a is F at t' in terms of objects and their temporal parts. The obvious way to do this is to understand an object's being a certain way at a time in terms of the way its temporal part at this time is. This observation leads to the following account of the truth conditions of temporal predications:

[1] Contemporary friends of temporal parts include Armstrong [1980], Heller [1990], Lewis [1983 + postscript B] and Sider [2001].

(TP1) Necessarily, (a is F) at t iff a has a temporal part that is located at t and that is F.

To see why this account is compulsory for the theory of temporal parts, remember that the task is to explain the temporal talk of ordinary objects' having properties at times in terms of the technical, atemporal talk of ordinary objects' and their temporal parts' having properties simpliciter. There are two general ways of explaining a's being F at t: (i) to explain it in terms of a's being F simpliciter, so that (a is F) at t iff... a is F simpliciter; or (ii) to explain it in terms of a temporal part of a's being F simpliciter, so that (a is F) at t iff... a_t is F simpliciter. Suppose now that Zoe is happy at t_1 and unhappy at t_2. Option (i) entails that Zoe is happy simpliciter and unhappy simpliciter, which is contradictory. Option (ii), on the other hand, entails that Zoe's temporal part at t_1 is happy and Zoe's temporal part at t_2 is unhappy, which is free of contradiction. So Zoe's mood at a time t must be explained in terms of the mood of the temporal part that Zoe has at t.[2]

There is, further, a question about the generality of (TP1). My argument that the friend of temporal parts is committed to (TP1) relies on temporary properties that an object has at some times of its existence and lacks at others. But how about permanent properties that an object has at all times at which it exists? Should having such a permanent property at a time also be explained in terms of (TP1)? We do not need to decide. I shall assume (TP1) in full generality. But the case to be made in the ensuing sections would still hold if (TP1) were to be restricted to temporary properties, for all examples to be given will involve temporary properties.

Different versions of (TP1) may be distinguished with respect to how the left-hand side of (TP1) should be regimented. For convenience, temporal predications are here regimented as containing sentence-modifiers of the form 'at t' – formally, At t(F(a)). Other readings are possible but need not be taken into account, since questions of logical form play no significant role in the present discussion.[3] Further, temporal predications are understood as containing tenseless predicates and tenseless quantifiers. This assumption about the status of grammatical tense is a component of *detenserism*, a view

[2] I am not ruling out that there is a fundamentally different theory of temporal parts than the one stated above that might lead to a fundamentally different account of temporal predication. But the theory assumed here, or a close enough variant of it, is the standard one.

[3] A problem for the temporal-parts account that raises questions of logical form and alternative readings of temporal predications are discussed in [Sattig 2002].

in the philosophy of time endorsed by most friends of temporal parts.[4]

There is a close variant of the theory of temporal parts: the theory of temporal counterparts. The two theories share the thesis that there are objects with arbitrary instantaneous and extended temporal parts. But instead of construing ordinary objects as sums of instantaneous temporal parts that are maximal under some unity relation, the theory of temporal counterparts construes ordinary objects as instantaneous temporal parts of what may be called *super-objects* – such as super-particles and super-persons – which are understood as sums of instantaneous temporal parts that are maximal under some unity relation. As a consequence, ordinary objects stand in unity relations to other ordinary objects. These unity relations may be called *temporal-counterpart relations*. Then a super-person is a maximal sum of counterpart-interrelated persons. So the theory of temporal counterparts of ordinary objects is a theory of temporal parts of super-objects.[5] Furthermore, the theory of temporal counterparts is committed to the following account of the truth conditions of temporal predications:

(TP2) Necessarily, (a is F) at t iff a has a temporal counterpart that is located at t and that is F.

In what follows, the temporal-parts account of temporal predication, (TP1), and the temporal-counterparts account of temporal predication, (TP2), will be criticised. Both accounts will be shown to assign the wrong truth values to certain ordinary temporal predications. I shall begin with the temporal-parts account.

2 Closure Under Parthood

The temporal-parts account of temporal predication, (TP1), says that a is F at t iff a has a temporal part that is located at t and that is F. An important consequence of this account is that temporal predication is *closed under the temporal-part relation* in the following sense. Since all that is required to be F at t is to have a temporal part, a_t, that is located at t and that is F, every object that has a_t as a temporal part is F at t. Hence, if a is F at t, then every object that overlaps with a in that it has a_t as a temporal part is also F at t. Closure under parthood has various counterintuitive consequences.

[4] For a defense of detenserism, or the B-theory of time, see [Mellor 1998].

[5] This is my way of putting what Sider calls the *stage view*. See [Sider 2001: chapter 5, section 7].

The first difficulty concerns predicational fit. Consider the predicate 'is married'. It is clear that only certain kinds of things can truly be said to be married at a time, namely persons. If a person P is married at t, then it has a temporal part, p_t, that is located at t and that is married. Since P is a sum of temporal parts that is maximal under the unity relation for persons, P has many extended proper temporal parts that also have p_t as a temporal part. By parthood closure, every object that has p_t as a temporal part is married at t. Hence, if P is married at t, then there are many proper temporal parts of P that are also married at t. But proper temporal parts of persons are not themselves persons, according to the theory of temporal parts, and therefore cannot be married at any time. Note that the intuition that the only things that are married at a time are persons should not be taken as an intuition that the only things that are married simpliciter are persons. We have no intuitions of the latter sort. Ordinary intuitions are intuitions about temporal predications. Atemporal predications are the business of the metaphysician. That a proper temporal part of a person is married simpliciter is thus not counterintuitive, but that a proper temporal part of a person is married at a time is counterintuitive.

The second difficulty with closure under parthood concerns uniqueness. Consider the following example:

(1) Zoe, and only Zoe, is happy at t.

This must surely be possible. By the temporal-parts account, Zoe has a temporal part, z_t, that is located at t and that is happy (simpliciter). Given that Zoe is a person and has infinitely many temporal parts, she has infinitely many proper temporal parts which also have z_t as a temporal part. Focus on one of them and call it 'Zoe-minus'. Then Zoe-minus has a temporal part, z_t, that is located at t and that is happy. By closure under parthood, it follows that Zoe-minus is happy at t, which contradicts the assumption that Zoe is the only one who is happy at t because Zoe-minus is a proper part of Zoe and therefore distinct from Zoe. Hence, (1) is impossible. Or suppose, to give another example, that Zoe is a wife of Billy at t. By the dyadic version of (TP1), Zoe has a temporal part, z_t, at t and Billy has a temporal part, b_t, at t and z_t is a wife of b_t. Given that Billy is a person, he has infinitely many proper temporal parts that also have b_t as a temporal part. By parthood closure, it follows that Zoe is not only a wife of Billy at t but of infinitely many of his temporal parts as well. The theory of temporal parts thus entails polygamy on a massive scale.

What this seems to show, more generally, is that closure under parthood renders it impossible that an ordinary, persisting object could be the *only*

object that has a certain property at a time or that bears a certain relation to another object at a time. There will necessarily be infinitely many temporal parts of the object that also have that property or relation at that time.[6]

What can the friend of temporal parts do to remove the problem with (1)? A good start is to point out that there are two different readings of (1). Informally, (1) can be read as 'Zoe, and only Zoe, is such that at t(she is happy)' or as 'at t(Zoe, and only Zoe, is happy)'. Formally:

(2) At $t(\text{Happy}(z))$ & $\forall x(\text{At } t(\text{Happy}(x)) \supset x = z)$.

(3) At $t(\text{Happy}(z)$ & $\forall x(\text{Happy}(x) \supset x = z))$.

The difference between (2) and (3) concerns the position(s) of the temporal modifier 'at t'. In (2), the universal quantifier and '$x = z$' lie outside the scope of 'at t', and so (2) implies '$\exists!x(\text{At } t(\text{Happy}(x)))$'. In (3), the universal quantifier and '$x = z$' lie within the scope of 'at t', and so (3) implies 'At $t(\exists!x(\text{Happy}(x)))$'.

The reading of (1) that leads to trouble is (2). The problem arises because if Zoe is happy at t, then Zoe has proper temporal parts that are also happy at t and yet distinct simpliciter from Zoe. The friend of temporal parts may thus claim that (2) should be rejected in favour of (3). The reason why no trouble arises from (3) is that although an object x that is happy at t is distinct simpliciter from a proper temporal part y that is also happy at t, x is identical to y at t. For instance, Zoe and Zoe-minus share a temporal part, z_t, that is located at t and that is identical to itself. By the dyadic version of the temporal-parts account, it follows that Zoe is identical to Zoe-minus at t.[7] The point is that if we count by the atemporal notion of identity, then infinitely many things are happy at t if Zoe is happy at t. But

[6] There is a superficial resemblance between this problem and Unger's 'problem of the many'. In both cases there are many things where we thought there was just one. But the two problems are independent in the sense that if one is resolved, the other remains. Lewis's 'almost one'-solution, for instance, cannot be applied to the present problem. For we cannot say, in Zoe's case, that the many objects sharing her temporal part at t are 'almost one', since only one of them, Zoe, is a person. We can say, however, that the many objects sharing her temporal part at t are identical at t (see the first reply in the text). But this is still different from the 'almost one'-solution, since now the many objects are completely one at t, not almost one. Conversely, the identity-at-a-time reply to the present problem cannot be applied to the problem of the many. See [Unger 1980] and [Lewis 1993].

[7] The dyadic version of (TP1) says that, necessarily, (a is R to b at t) iff a has a temporal part, a_t, that is located at t & b has a temporal part, b_t, that is located at t & a_t is R to b_t.

if we count by the temporal notion of identity at a time, then Zoe is the only one who is happy at t, because infinitely many things that are distinct simpliciter can be identical at t.[8]

This response seems appropriate in cases involving a single temporal modifier. But now consider a similar case involving several modifiers:

(4) Zoe, and only Zoe, is happy at t_1 and sad at t_2.

Notice first that (4) is not saying that only Zoe is happy at t_1 and only Zoe is sad at t_2. (4) is rather saying that Zoe is the only one who is both happy at t_1 and sad at t_2. (4) must therefore be read as 'Zoe, and only Zoe, is such that at t_1(she is happy) and at t_2(she is sad)'. Or formally:

(5) At t_1(Happy(z)) & At t_2(Sad(z)) & $\forall x$(At t_1(Happy(x)) & At t_2(Sad(x)) $\supset x = z$).

As in the case of (2), the universal quantifier and the identity '$x = z$' lie outside the scope of the temporal operator 'at t', and so (5) implies '$\exists!x$(At t_1(Happy(x)) & At t_2(Sad(x)))'. Accordingly, the temporal-parts account of temporal predication renders (5) false just as it renders (2) false. Since temporal predication is closed under parthood, if Zoe is happy at t_1 and sad at t_2, then Zoe has proper temporal parts that are also happy at t_1 and sad at t_2 and yet distinct simpliciter from her. No alternative reading of (4) seems to be plausible, and so the temporal-parts account makes (4) impossible.

As an attempt to overcome the difficulty with (4), the friend of temporal parts might suggest that (4) contains an implicit temporal modifier 'at t_0' yielding:

(6) At t_0(Zoe, and only Zoe, is happy at t_1 and sad at t_2).

The sentence modified by 'at t_0' may be unpacked as (5), which has the consequence that '$x = z$' lies within the scope of 'at t_0'. Analogously to the case of (3), (6) seems to come out true on the temporal-parts account because all of the things that are happy at t_1 and sad at t_2 but distinct simpliciter from Zoe are identical to Zoe at t_0. Apart from being completely *ad hoc*, this suggestion is unacceptable because temporal predications such as 'At

[8] In a related context, Lewis distinguishes between the simple relation of identity and the weaker relation of *identity-at-t*: Persons are identical-at-t iff they have stages (temporal parts) at t that are identical. Then Lewis suggests that we sometimes count by identity and sometimes by identity-at-t. See [Lewis 1983: 63-4].

t_1(Happy(z))' end up inside the scope of a further temporal operator 'at t_0', and hence as multiply temporally modified. The problem is that (TP1) renders every multiply temporally modified statement false. Consider the simple '((a is F) at t_1) at t_2'. The statement governed by 'at t_2', '(a is F) at t_1', is true if and only if a has a temporal part at t_1 that is F. Accordingly, the whole statement is true if and only if a's temporal part at t_1 has a temporal part at t_2 that is F. Since an instantaneous temporal part that is located at one time cannot have an instantaneous temporal part located at another time, the statement cannot be true. An alternative treatment of iterated temporal operators is to construe the outermost temporal operator as vacuous, so that '((a is F) at t_1) at t_2' is true iff '(a is F) at t_1' is true.[9] This move allows us to drop the operator 'at t_0' from (6), and hence does nothing to remove the original difficulty with (4).

A third difficulty with closure under parthood concerns continuity. Consider the following example:

(7) Everything that is happy at t_1 is still happy at t_2.

Intuitively, there is no doubt that this statement can be (non-vacuously) true. But take an arbitrary object x such that x is happy at t_1. Since temporal predication is closed under parthood, x_{t1} is also happy at t_1, x_{t1} being x's instantaneous temporal part located at t_1. For an object to exist at t_2, it needs to have a temporal part that is located at t_2. The instantaneous x_{t1} fails to have such a temporal part and so does not exist at t_2. Accordingly, x_{t1} is not happy at t_2. But then it follows that for every object that is happy at t_1 and at t_2 there is an object that is also happy at t_1 but fails to be happy at t_2. Hence, (7) cannot be (non-vacuously) true. To sum up the difficulties concerning uniqueness and continuity, just as closure under parthood renders it impossible that a persisting object be the only object that has a certain property at one time and a different property at another time, so closure renders it impossible that every object that has a certain property at one time still has that property at another time. Both results are unacceptable.

3 Sortal Restriction

Can closure under parthood be blocked? Consider the following statement:

(8) A single person is happy at t.

[9] This treatment was suggested to me by an anonymous referee.

This statement contains an explicit invocation of a sort and is thus not falsified by closure under parthood. Suppose that Zoe is the single person that is happy at t. Analogously to the case of statement (1), the temporal-parts account has the consequence that Zoe-minus, a proper temporal part of Zoe, is happy at t. But this does not contradict the assumption that Zoe is the only *person* that is happy at t. For unlike Zoe, Zoe-minus is not maximal under the unity relation for persons, and hence Zoe-minus is not a person, according to the theory of temporal parts.

This observation points to a way of dealing with the problems caused by closure under parthood. The problems discussed above were all stated in terms of temporal discourse that does not explicitly invoke any sort. However, it is open to the proponent of temporal parts to claim that temporal discourse implicitly invokes sorts, that temporal discourse is implicitly sortally restricted. The idea behind such sortal restriction is that ordinary temporal discourse, or at least a part of it, is true only of ordinary objects, i.e. of objects that fall under some ordinary sortal predicate, such as 'is a person'. I shall consider two strategies of implementing this idea.

The first strategy is quantifier domain restriction.[10] Let ordinary domains of quantification be restricted to ordinary objects, i.e. let these domains typically contain only objects falling under ordinary sortal predicates. Notice that this strategy does not avoid closure under parthood. Since (TP1) is still active, it still holds that if a is F at t, then every object that overlaps with a in that it has a_t as a temporal part is also F at t. What this strategy does instead, is render closure unproblematic in cases involving quantification. As regards the problem of uniqueness, it is now possible for Zoe to be the only one who is happy at t_1 and sad at t_2, because Zoe can be the only object in an ordinary domain that has a happy temporal part at t_1 and a sad temporal part at t_2. That proper temporal parts of Zoe can also be happy at t_1 and sad at t_2 is irrelevant, since such temporal parts are not in the ordinary domain. As regards the problem of continuity, it is now possible for everything that is happy at t_1 to remain happy at t_2, because it is possible for every object in an ordinary domain that has a happy temporal part at t_1 to have a happy temporal part at t_2 as well. However, quantifier domain restriction fails to render closure unproblematic in cases involving no quantification. If Zoe is married at t, then Zoe-minus, a proper temporal part of Zoe, is also married at t. But proper temporal parts of persons are not themselves persons, according to the theory of temporal parts, and therefore cannot be married at any time. So the problem of predicational

[10]This strategy was suggested to me by an anonymous referee.

fit remains.

The proponent of quantifier domain restriction might try to avoid the problem of predicational fit by claiming that our intuitions in this case are sortally restricted as well. She might claim that our intuitions in effect say only that no objects in ordinary domains of quantification other than persons can be married at times. It seems right that ordinary intuitions are sortally restricted. But the reply overlooks the fact that the statement 'only a person can be married at a time' is true by definition. For the truth of this statement follows from the definition of 'marriage'. Roughly, marriage is a legal union of two persons. And this definition constitutes the unrestricted truth about marriage, not just the truth with respect to ordinary objects. Similarly, it is true without sortal restriction that if x is 25 years old now, then x has lived for 25 years. For it would be absurd to claim that it is an open question whether a non-ordinary object can be 25 years old now without having lived for 25 years. Suppose, then, that Zoe is 25 years old now. By closure, Zoe_{now} – Zoe's present temporal part – is also 25 years old now. But Zoe_{now} has not lived for 25 years. Since Zoe_{now} is an instantaneous temporal part, (TP1) entails that Zoe_{now} has only lived for a single instant. The strategy of sortally restricting our intuitions cannot handle these cases.

The second strategy is predicate modification. The proponent of temporal parts might claim that a temporal predication of the form '(a is F) at t' implicitly invokes a sort by containing an implicit modifier of the form '*as an* X', yielding '(a is F *as an* X) at t', where 'X' is a sortal term, such as 'person' or 'table'. The sortal information in the elliptical '(a is F) at t' may be specified on the basis of the linguistic or non-linguistic context. Given that temporal predications are sortally modified in this way, the temporal-parts account of the truth conditions of temporal predications, (TP1), may plausibly be adjusted as follows:

(TP1*) Necessarily, (a is F *as an* X) at t iff a is an X that has a temporal part that is located at t and that is F.

Note that, according to (TP1*), a sortal predicate, such as 'is a person', applies to Zoe but not to any of her temporal parts. Alternatively, we might have said that, necessarily, (a is F *as an* X) at t iff a has a temporal part that is located at t, that is an X and that is F. But the latter approach, on which an instantaneous temporal part of Zoe is a person, is incompatible with the theory of temporal parts stated in section 1. According to this theory, a person is a sum of instantaneous temporal parts that is maximal under the unity relation for persons. (A view on which instantaneous temporal parts are persons will be discussed in the following section.)

That no instantaneous temporal part of Zoe is a person has the consequence that Zoe is not a person at any time. Zoe is only a person simpliciter. For to be a person at a time is to have a temporal part that is located at that time and that is a person simpliciter. Thus, the proponent of the theory of temporal parts is committed to the view that ordinary sorts, such as being a person, are neither permanent nor temporary properties, but rather atemporal properties. It would be interesting to discuss this feature in relation to problems of coincidence – e.g., in relation to the question whether a statue goes out of existence when flattened or whether it just ceases to be a statue. But for reasons of length I cannot do this here.

The predicate modification strategy avoids closure under parthood, wherein it differs from the quantifier domain restriction strategy. On the old account of temporal predication, all that is required to be F at t is to have a temporal part, a_t, that is located at t and that is F. Thus, every object that has a_t as a temporal part is equally F at t. On the sortal modifier account, to be F at t is really to be F as an X at t, where 'X' is a sortal term specifiable in a given context. Moreover, to be F as an X at t requires more than just having a temporal part that is located at t and that is F. It also requires being an X; and to be an X is to be maximal under the unity relation for Xs. Proper temporal parts of a that also have a_t as a temporal part therefore do not come out as being F as an X at t as well, since a proper temporal part of an X is not itself an X. Hence, combining the thesis that ordinary temporal predications are implicitly sortally modified with (TP1*) has the consequence that ordinary temporal discourse cannot be true of proper temporal parts of ordinary objects.

By avoiding closure, the sortal modifier account of temporal predication can handle all three problems from the previous section. As regards the problem of predicational fit, Zoe-minus, a proper temporal part of Zoe, cannot be married at a time, according to the sortal modifier account. For 'Zoe-minus is married at t' is short for 'Zoe-minus is married as a person at t', and Zoe-minus cannot be married as a person at t, according to (TP1*). As regards uniqueness, it is possible for Zoe to be the only one who is happy at one time and sad at another time, according to the sortal modifier account. For it is possible for Zoe to be the only one who is happy as a person at one time and sad as a person at another time. As regards continuity, it is possible that everything that is happy at one time remains happy at another time, according to the sortal modifier account. For it is possible that everything that is happy as a person at one time remains happy as a person at another time. In each case, the difficulty disappears because the sample predication contains the implicit modifier 'as a person' and because proper temporal

parts of persons are not themselves persons.

These considerations assume that the sorts that are implicitly invoked by temporal predications are of the ordinary form, for example being a person or being a table – i.e. sorts which have a corresponding unity relation and for which we have words in ordinary language. In the normal case, proper temporal parts of ordinary objects do not themselves fall under any ordinary sort.[11] But is the restriction to ordinary sorts compulsory? Why cannot temporal predications invoke sorts under which arbitrary temporal parts fall – sorts which lack a corresponding unity relation and for which we lack words in ordinary language? For instance, why cannot sortal 'X' in (TP1*) be 'temporal part of a person'? Here is a good reason why not. Consider again the predicate 'is married'. As stated earlier, it is clear that only certain kinds of objects can truly be said to be married at a time, namely persons. Taking into account sortal modification, the intuition is that an object can only be married *as a person* at a time. Suppose now that Zoe is married as a person at t. By (TP1*), Zoe is a person that has a temporal part, z_t, that is located at t and that is married. Call 'Zoe-minus' one of Zoe's proper temporal parts that also have z_t as a temporal part. Since Zoe-minus is not a person, Zoe-minus is not married as a person at t. If 'temporal part of a person' is admitted as a sortal modifier, however, it follows by (TP1*) that Zoe-minus is married *as a temporal part of a person* at t, since Zoe-minus is a temporal part of a person, that has a temporal part, z_t, that is located at t and that is married. This result is counterintuitive because an object can only be married as a person at a time. To avoid this problem of predicational fit from recurring, sortal modification of temporal predications must be restricted to ordinary sortals so that proper temporal parts of persons, like Zoe-minus, do not fall under any sort.

According to the sortal modifier account of temporal predication, ordinary temporal discourse is completely blocked from saying anything true about objects that do not fall under any ordinary sort. I shall now argue that this is much too strong a restriction. Consider an object's spatial parts. A table, for instance, has various spatial parts at any time at which it exists. The spatial parts of a table are not themselves tables, just as the temporal parts of a table are not themselves tables. Some spatial parts of a table belong to different sorts, such as a table's legs. But these 'ordinary' parts

[11] A case in which an object that falls under an ordinary sort has a proper temporal part that itself falls under an ordinary sort is a case in which two distinct ordinary objects coincide. In the case in which a lump of clay is formed into a statue, to mention one example, there is a lump of clay and a statue, and the statue is a proper temporal part of the lump of clay. Cases of coincidence are special cases.

do not exhaust the table's spatial parts. According to the doctrine of arbitrary spatial parts, for any way of dividing the spatial region occupied by a table at a time t into sub-regions, the table has corresponding spatial parts at t that occupy these sub-regions at t. If the doctrine of arbitrary spatial parts is true, then a table has spatial parts that, unlike its legs, do not belong to any sort, for instance the left half of a table. If temporal predication is sortally modified, however, spatial parts that do not fall under any sort cannot have any properties at any times. The left half of a table fails to have a shape at any time, because it is not the case that the left half of a table has a shape *as an* X at any time, for any sortal term 'X'. That arbitrary spatial parts cannot be the subject of temporal discourse is problematic because these sortless spatial parts must somehow be individuated and therefore must have various properties at various times, such as a certain shape and mass. Hence, the thesis that temporal predication is sortally modified cannot be held in combination with the doctrine of arbitrary spatial parts.

In response, one might point out that in this argument only ordinary sorts are admitted. It is true that the left half of a table does not fall under any ordinary sort but, so one might suggest, it does fall under such a non-ordinary sort as being a spatial part of a table, and hence the doctrine of arbitrary spatial parts can be saved. This move, however, is not a sensible one for the proponent of the sortal modifier account to make. As we have seen above, the sortal modifier account is plausible only if restricted to ordinary sortals, and hence only if sortals such as 'temporal part of a table' are ruled out. As a consequence, sortals such as 'spatial part of a table' must be ruled out as well. As an alternative response, one might reject the doctrine of arbitrary spatial parts and try to construe ordinary talk of such things as table-halves as non-literal. This second move, like the first one, is unavailable to the friend of temporal parts. For the doctrine of arbitrary temporal parts, which lies at the heart of the theory of temporal parts, mirrors the doctrine of arbitrary spatial parts. And since the beauty of space-time symmetry is a major factor in selling the theory of temporal parts, the friend of temporal parts had better keep arbitrary spatial parts and drop sortal modification.

In the previous section we saw that the temporal-parts account of sortally unrestricted temporal discourse is untenable. In this section we saw that the strategy of sortally restricting temporal discourse – either by way of quantifier domain restriction or by way of predicate modification – is implausible. The conclusion is that the project of giving truth conditions of temporal predications in terms of temporal parts is misguided. Is the

temporal-counterparts approach more attractive?

4 Closure Under Counterparthood

The temporal-counterparts account of temporal predication, (TP2), says that a is F at t iff a has a temporal counterpart, a_t, that is located at t and that is F. This account has the consequence that temporal predication is *closed under the temporal-counterpart relation* in the following sense. Since all that is required to be F at t is to have a temporal counterpart, a_t, that is located at t and that is F, every object that has a_t as a temporal counterpart is F at t. Under normal circumstances, the counterpart relation is reflexive, symmetric and transitive.[12] So if a has a_t as a counterpart, then each of a's counterparts, including a_t itself, has a_t as a counterpart. Hence, if a is F at t, then every temporal counterpart of a is also F at t.

We have seen that closure under parthood has counterintuitive consequences. Does the same hold for closure under counterparthood? Some of the difficulties that arise in connection with closure under parthood do not arise in connection with closure under counterparthood. Firstly, there is the problem of predicational fit. Closure under parthood has the consequence that if a person is married at t, then there are many proper temporal parts of this person that are also married at t. But proper temporal parts of persons are not themselves persons and therefore cannot be married at any time. According to temporal-counterpart theory, a person is an instantaneous temporal part of a super-person. A super-person is a maximal sum of instantaneous temporal parts, each of which stands in the counterpart relation for persons to all others (and to itself). So any person has infinitely many temporal counterparts. Hence, if a person is married at t, then there are infinitely many temporal counterparts of this person that are also married at t. However, since each temporal counterpart of a person is itself a person, the intuition that only persons can be married at a time is preserved.

Secondly, there is the problem of continuity. The temporal-parts account renders (7) necessarily false because not every object that has a happy temporal part at t_1 can have a happy temporal part at t_2. An instantaneous temporal part that has itself as a happy temporal part at t_1 is an example. The temporal-counterparts account, on the other hand, has no trouble with (7) because it is possible that every object that has a happy temporal counterpart at t_1 also has a happy temporal counterpart at t_2.

[12] In Parfit-style cases of fission, the temporal-counterpart relation is non-transitive. See [Parfit 1975] and [Sider 1996].

To see where counterpart closure goes wrong, reconsider example (4) which is regimented as (5). By the temporal-counterparts account, if Zoe is happy at t_1 and sad at t_2, then Zoe has a temporal counterpart, z_{t1}, that is located at t_1 and that is happy, and Zoe has a temporal counterpart, z_{t2}, that is located at t_2 and that is sad. Since the counterpart relation is reflexive and transitive, both z_{t1} and z_{t2} have a counterpart at t_1 that is happy and one at t_2 that is sad, and so both z_{t1} and z_{t2} are happy at t_1 and sad at t_2. But z_{t1} and z_{t2} are distinct simpliciter. Hence, if Zoe is happy at t_1 and sad at t_2, then Zoe is not the only thing that is happy at t_1 and sad at t_2, which makes (4) impossible. The problem of uniqueness thus remains.[13]

Although the temporal-parts account cannot handle such statements as 'Zoe, and only Zoe, is happy at t_1 and sad at t_2', the account can handle such statements as 'a single person is happy at t_1 and sad at t_2'. The reason for this is that of all temporal parts that are happy at t_1 and sad at t_2 only one is maximal under the unity relation for persons. The temporal-counterparts account, on the other hand, cannot handle statements of the latter sort: if a person is happy at t_1 and sad at t_2, then it has many distinct temporal counterparts that are also happy at t_1 and sad at t_2, and that are also persons. So, unlike in the case of closure under parthood, sortal restriction of temporal discourse, whether explicit or implicit, has no effect on closure under counterparthood.

The cases that create trouble for the theory of temporal counterparts are ones in which we speak about what happens to a particular thing over a certain period of time. Theodore Sider, a recent advocate of the theory of temporal counterparts – or the *stage view*, as he calls it – notices the difficulty pointing out that the theory has a hard time giving the intuitively correct answer to such questions as 'how many people have been sitting in my office during the last hour?' [Sider 1996: 448]. In response, Sider suggests combining the theory of temporal counterparts with the theory of temporal parts. The difference between the two theories may be understood as a semantic one, as a difference concerning what to call 'persons'. According to Sider, the sortal term 'person' is ambiguous. The things we *typically* call 'persons'

[13] Analogously to the case of the temporal-parts account, the problem of uniqueness is fatal for the temporal-counterparts account only with respect to examples such as (4), but not with respect to simpler examples such as (1). The proponent of (TP2) may avoid the trouble with (1) by saying that if we count by the atemporal notion of identity, many temporal counterparts of Zoe are happy at t if Zoe is happy at t. But if we count by the temporal notion of identity at a time, then Zoe is the only one who is happy at t, because many temporal counterparts that are distinct simpliciter can be identical at t.

are temporal counterparts. But in certain special cases the things we call 'persons' are maximal sums of temporal counterparts. Correspondingly, on one disambiguation of the sortal 'person', the truth conditions of a temporal predication containing 'person' involve temporal counterparts, and on the other disambiguation the truth conditions involve temporal parts. Among the special cases, so Sider, are those in which we trace a particular individual through time. Thus, when we say that a single person is happy at t_1 and sad at t_2 or that a single person has been sitting in my office during the last hour, 'person' is used to range over sums of temporal counterparts, instead of temporal counterparts. As Sider admits, the ambiguity strategy is somewhat *ad hoc* and uneven. But he claims that the price is right, and so these drawbacks may be tolerated.

The first thing to notice about the ambiguity strategy is that it only takes care of part of the difficulties for temporal-counterpart theory. Temporal predications containing an explicit invocation of a sort, such as 'a single person is happy at t_1 and sad at t_2', can be straightforwardly handled by the original temporal-parts account (TP1). But such temporal predications as 'Zoe, and only Zoe, is happy at t_1 and sad at t_2' can neither be handled by (TP2) nor by (TP1). The only way to deal with this kind of case is to claim that temporal predication is implicitly sortally modified and to adopt the altered temporal-parts account (TP1*) which was earlier shown to be untenable for other reasons.

Moreover, the friend of temporal counterparts cannot restrict the application of the temporal-parts account to 'special' cases, since these cases sometimes interact with 'typical' cases in such a way that the temporal-parts account must be applied to the latter as well. Consider the following valid argument:

(9) Zoe is sad at t_1.

(10) Zoe = the person that is happy at t_2

(11) Therefore, the person that is happy at t_2 is sad at t_1.

Premise (9) is an ordinary monadic temporal predication, and so presumably the friend of temporal counterparts takes (9) to be a typical case the truth conditions of which are given by (TP2). If (TP2) is applied to conclusion (11), the latter comes out incapable of truth (as was shown above). So (11) is one of those cases where the temporal-parts account, (TP1), is called for help. (11) is reached by substituting the definite description 'the person that is happy at t_2' in (10) for the name 'Zoe' in (9). As a consequence, the

sortal term 'person', as it occurs in (10), is used in the same way as in (11), namely as ranging over sums of temporal counterparts. Assuming that (9) and (10) are true, the singular terms in (9) and (10) thus refer to a person as construed by the theory of temporal parts. Correspondingly, the truth conditions of (9) are not given by (TP2), but rather by (TP1), which contradicts our initial assumption. The strategy of restricting the application of the temporal-parts account only to a few 'special' cases therefore fails. The extremely unappealing result is that even the simplest temporal predications are ambiguous in that sometimes their truth conditions are determined by the temporal-counterparts account and sometimes by the temporal-parts account.

To sum up, just as the temporal-parts account of temporal predication is closed under parthood, so the temporal-counterparts account is closed under counterparthood. Both closure under parthood and closure under counterparthood have counterintuitive consequences. In each case, closure can only be avoided by making certain implausible changes to the initial account of temporal predication, be it in the form of stipulating hidden modifiers or in the form of restricting the scope of the account. I conclude that neither the theory of temporal parts nor the theory of temporal counterparts can serve as the ontological basis of temporal predication.[14]

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