

I am not now, nor have I ever been, a turnip.

Josh Parsons

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1 A two-step programme for analysing tense

Consider the following two-step programme for analysing tensed statements in natural language:

Step 1: Detense! Replace all tensed predication with temporal predications involving temporal indexicals. For example, “Pavarotti was singing” should become “there is a time t , such that t is earlier than now, and Pavarotti is singing at t ”.

Step 2: Detemporalize! Replace temporal predications with talk of temporal parts, according to the following rule:

P) Fa -at- t iff there is a z , such that z is the t -part of a , and Fz

If you’re in the business of giving metaphysically tractable accounts of tense, this programme is the one to beat. However, it has rarely been stated in a precise form; and this lack of precision has covered up some defects. In particular, the rule (P) cannot be applied in full generality. Not only does it produce absurd results, but it is incompatible with the metaphysics of temporal parts — perdurantism — that it employs (or so I will argue).

The absurd result has to do with a puzzle raised by Achille C. Varzi (2003), which I discuss in section 2. I argue for the incompatibility of (P) with the metaphysics of temporal parts in section 3, and offer a replacement for (P) that solves both problems in section 4. The solution depends on the distinction between sortal and non-sortal nouns, and in section 5 I put forward a novel and deflationary account of this distinction. Finally, section 6 replies to some objections. The remainder of this section offers some more details of the two step programme, which do not greatly affect the argument of the paper.

“ t -part”, as it appears in rule (P) is my abbreviation for “temporal part at t ”. Exactly what it is for an object to be the temporal part of another at a time is a matter of some debate, but it’s relatively easy to get a definition that would be acceptable by the lights of a typical believer in temporal parts. Here, for example, is a definition due to Theodore Sider:

x is an instantaneous temporal part of y at an instant $t =_{df}$ 1) x is a part of y ; 2) x exists at, but only at t ; and 3) x overlaps every part of y that exists at t . (2001a, p. 60)

This has some drawbacks: it only applies to instants. I would like to be able to speak of the temporal part of me that is (tenselessly) eating last night's dinner. Since a meal takes time, this temporal part must be temporally *thick* — it must have a duration. So, let's say that x is a t -part of y iff x is the mereological fusion of the instantaneous temporal parts of y at the instants within the interval t . This allows t -parts corresponding to instants, intervals, and even discontinuous or scattered times (if it takes a temporally thick t -part to eat a meal, then it takes a temporally scattered t -part to play a five day cricket match).

It would be nice to define this notion of a t -part — a cross-sectional temporal part — independently of the notion of instantaneous temporal parts, and in a way that doesn't presuppose that time consists of instants. Here is a way to do that: start with the notion of an object's being wholly located at a time, then define temporal part in terms of that. So: x is wholly located at t iff every part of x exists at t ; x 's t -part is the fusion of all parts of x which are wholly located at t .

I will speak throughout of the two step programme offering a translation of tensed statements into tenseless ones. My model, in purpose, though not in structure, is David Lewis's translation of statements of a modal language into the statements of counterpart theory. (Lewis 1968) The aim is not to give a formal semantic model of a tensed language, but to systematically paraphrase the statements of that language into the terms of a metaphysical theory — the theory of temporal parts. If you preferred a formal model, you could take the translation rules given by the programme, and treat them as pairing tensed sentences with their truth conditions given in a tenseless metalanguage.

The programme so outlined may sound Quixotic. It is now a cliché that one cannot translate tensed statements into tenseless ones.¹ However, I have in mind tenseless statements that may contain temporal indexicals, such as “now”. The cliché depends for its truth on counting these as “tense” — and rightly so, for it is no mean feat to eliminate them. The indexicals should be given a token-reflexive treatment, and it is here that translation is impossible — we must instead give truth conditions in a metalanguage.² For clarity of exposition I'll also employ predicates such as “is past”, “is present” and “is future”; these should be regarded as abbreviations for “is earlier than now”, “is simultaneous with now”, and “is later than now”, respectively.

¹For a classic argument to this effect, see Gale (1962).

²As in Kaplan (1989, pp. 520–521). More traditionally, “detensing” accounts of tense have given token-reflexive truth conditions directly to tensed statements. (Mellor 1981, pp. 40–42) However, this neglects one of the best points in favour of the token-reflexive account of tense: that ordinary language already contains indexicals referring to times. The “tenser” can't regard such indexicals as illegitimate philosophical inventions. But it takes no special theory of tense to make sense of them; all that's needed is a general theory of indexicals, such as Kaplan's.

2 Varzi's puzzle

Suppose we try to apply the two step analysis to

- 1) Some tenor was a child.

Applying the first step we get something like:³

- 2) There are x, t, t' such that:
 t is present, t' is past, x is a tenor at t , and x is a child at t'

Now apply the second step, rule (P):

- 3) There are $x, t, t', x_t, x_{t'}$ such that:
 t is present, t' is past, x_t is the t -part of x , $x_{t'}$ is the t' -part of x ,
 x_t is a tenor, and $x_{t'}$ is a child

This is fine — if you believe in temporal parts, (3) is probably the sort of thing you believe. Let Pavarotti be x . Pavarotti himself is a perduring entity, spread out over time. He has childish temporal parts at some past times (let one of those be $x_{t'}$), and a present part that sings in the tenor range (let that be x_t). So given the typical temporal parts metaphysics, (3) is true, and, if you believe that (3) is the correct analysis of (1), then (1) is true, as it should be.

The trouble is that exactly analogous cases, given just a little more of the temporal parts metaphysics, lead to absurdity. The example that Varzi uses is:

- 4) Some tenor was a turnip.

Applying the first step we get:

- 5) There are x, t, t' such that:
 t is present, t' is past, x is a tenor at t , and x is a turnip at t'

Now apply rule (P):

³By applying the first step in this way, I am settling an ambiguity in (1). In general, constructions like “Some S was/will be P” are ambiguous between a version where the tense of the verb modifies the subject and predicate, and a version where the predicate only is modified, and the subject is implicitly present tense. This can be naturally modelled in tense logic as a scope ambiguity: $(\exists x)(Tenor(x) \wedge P(Child(x)))$ versus $P((\exists x)(Tenor(x) \wedge Child(x)))$. (Here P is the past tense operator). It is clearly the former reading that is intended by Varzi.

- 6) There are $x, t, t', x_t, x_{t'}$ such that:
 t is present, t' is past, x_t is the t -part of x , $x_{t'}$ is the t' -part of x ,
 x_t is a tenor, and $x_{t'}$ is a turnip

A defender of the two step programme should hope that (6) turns out false. To my knowledge, no tenor has ever been a turnip. But, given one further assumption, quite popular among proponents of temporal parts, (6) is true.

The further assumption is unrestricted mereological composition: that, for any arbitrary plurality of Xs, there is the fusion of the Xs; the object that overlaps all and only those things that overlap an X. If this is so, then there is a fusion of the present part of Pavarotti — that part which figured as x_t before — and some past turnip. This object, the Pavarotti-turnip, has a tenor as its present temporal part, and a turnip as a past temporal part. It satisfies (6). So, if the two step programme is right, (4) is true. But that's absurd.⁴

3 The trouble with rule (P)

How should one react to this? There are three radical reactions: one might give up the two-step programme, in favour, say, of tense logic; one might give up perdurantism in favour of, say, stage theory⁵; one might give up unrestricted mereological composition. Or one might bite the bullet, accept that strictly speaking some tenor *was* a turnip, and explain the reluctance of common sense to accept this as the result of a contextual restriction on quantification.⁶ The main thing I have to say against these proposals is that they are unnecessary — that a better solution to the problem lies elsewhere — so a proper argument against them must wait until the conclusion of this paper.⁷

Before I state my solution, I would like to show an independent reason for rejecting rule (P). Not only does (P) lead to absurdity, but, in a significant way, it does not capture the perdurantist metaphysic. This also counts against the reactions to Varzi's puzzle discussed above. Because rule (P) should not be part of a sensible perdurantism, we should not reject or modify perdurantism because of the shortcomings of rule (P).

Perdurantism is sometimes stigmatised as the view that persisting objects are not literally identical from time to time. That criticism is a mistake. According to perdurantism, Pavarotti is a

⁴The title of this paper is a slightly more subtle version of this puzzle. It doesn't immediately follow from the type of reasoning we have just seen that "I was a turnip" is true. It does follow, however, that some author of this paper was a turnip; and, indeed, that some author now enjoying all the quasi-memories I enjoy was a turnip. How am I to know that I am not that former turnip?

⁵On stage theory, see Sider (1996), Sider (2001a, pp. 188–208), and Hawley (2001, pp. 41–48). Hawley links the distinction between stage theory and perdurantism to a difference over what the satisfiers of sortal predicates are. According to perdurantism they are worms, according to stage theory, stages. This fits with my diagnosis of Varzi's puzzle: (P) makes the satisfiers of sortal predicates stages, rather than worms.

⁶Varzi describes this as the "warm beer" strategy. (2003, p. 214)

⁷Though I ultimately have to use something like the warm beer strategy for a small number of cases: see the end of section 4

perduring space-time worm, with some temporal parts in, say, 1940, and some in 2003. Pavarotti himself exists at both these times, and never fails to be identical to himself (how could he?) It is literally the very same Pavarotti who exists in 1940 as in 2003.

Let us adopt the terminology of “stages” and “worms”. Pavarotti is the spacetime worm that exists from 1935 until the present day and beyond. The Pavarotti-stages are the various temporal proper parts of that worm. The complaint that Pavarotti is a different object in 2003 from the object he is in 1940 makes the mistake of confusing Pavarotti with the Pavarotti-stages. The 1940 Pavarotti-stage is not identical with the 2003 Pavarotti-stage, but no-one thinks they should be. Neither stage is identical with Pavarotti himself, and it is Pavarotti who is identical from time to time.⁸

If this isn't clear enough, consider this spatial analogy: suppose I stand in the doorway of my office with one foot in the corridor, and one in the office. This description does not in any sense say that I am not “identical from place to place”. On the contrary, I am literally both in the office and the corridor. It is literally the very same me who is in the office and the corridor. But of course, the view of the temporal parts theorist is just like this. Pavarotti is supposed to straddle the century in the same way I straddle the doorway.

Pavarotti is no special case. What may be said about him may be said about all persons, and indeed about animals, artifacts, about any persisting thing. All these things are worms, not stages, according to the perdurantist. But rule (P) would not let us say that. It insists that all the predicates that appear in tensed discourse must be translated into temporal parts talk in the same way — by being applied to stages, not to worms. The only thing we ever say about worms using ordinary language, according to (P), is that they have such-and-such a stage — a stage that is a person, or a child, or bent, or red, or drunk.

The point is not just that we can't say in tensed language what the perdurantist wants to say. It's that, by speaking of persons in tensed language, according to (P), we commit ourselves to something that's just false according to perdurantism: the view that the present stage of Pavarotti is a person.

4 (P) restricted

The remedy is to distinguish between predicates that apply to worms, and those that apply, strictly speaking, to stages. “Strictly speaking” is necessary here because, in tensed discourse, we seem to apply predicates of both kinds to the same things: “Some person is singing” for example. “is a person” is, by my lights, a predicate of the former kind; “is singing” is of the latter kind.

In drawing this distinction I want to appeal to an idea due, in its contemporary form, to P. F. Strawson: the distinction between sortal and non-sortal (or “characterising”) predicates. Strawson applies the distinction to universals:

⁸On this point, as it appears in a classic presentation of perdurantism, see Lewis (1976, p. 58), the paragraph beginning “But what does that show?”.

A sortal universal supplies a principle for distinguishing and counting individual particulars which it collects.... Characterising universals... supply such principles only for particulars already distinguished or distinguishable by some antecedent principle or method.... Roughly, and with reservations, certain common nouns introduce sortal universals, while verbs and adjectives introduce characterizing universals. (Strawson 1959, p. 168)

The common nouns Strawson had in mind are what grammarians call “count nouns”. But even among these, reservations must apply. English lets us make verbs into count nouns by adding “-er”, and contemporary English speakers often conjugate and use nouns as verbs, the practice known as “verbing”. Quite apart from those usages, philosophers feel free to introduce count nouns without explicitly giving any counting criteria (“Let us call something a blorf iff it is red”). Strawson’s idea, as I understand it, is that a sortal predicate is one that contains a *real* count noun, not one that was transparently defined up from a verb or adjective.

Strawson’s followers, especially David Wiggins, have added to this characterisation the idea that sortal predicates apply permanently and essentially to their instances. Wiggins distinguishes pure sortals, such as “is a person” and “is a human being” (which, he claims, obey this condition) from phase sortals such as “is a child” (which disobey this condition, while otherwise behaving like sortals in Strawson’s sense), (Wiggins 2001, p. 30) and from impure sortals such as “is a happy person” (which is transparently a conjunction of a sortal with a non-sortal). He also has a snappy way of drawing the distinction: an object’s sortal properties are “*what it is*”; its non-sortal properties are “*what it does*”.

I wish to distance myself from the theory that Strawson and Wiggins offer about this distinction — in particular from the claims a) that sortals supply counting principles (or “identity conditions”) that are not reducible to the way they collect particulars (their “application conditions”) and b) that every pure sortal is essential. However, it seems to me that there is a real intuitive distinction that they are tracking. Though I don’t agree with these philosophers about what it takes to be a sortal, I find myself able, merely on the basis of intuition, to predict very accurately just which predicates they would count as sortals. Later, I will be advancing my own theory about what makes a predicate a sortal. For now, I want to leave the distinction at an intuitive level.

With the distinction on hand, I can begin to describe my proposed replacement for (P). I will offer a series of rules for translating temporally indexed predications into non-indexed forms. Each rule will be restricted by the nature of the predicate involved.

First, in the case where F is a pure sortal:⁹

⁹Because of this rule, where sortals are concerned, the time index of a temporal predication drops out of the semantics. And therefore, so would the tense of a tensed predication. This might seem to produce bad results. If the present tense of the verb “to be” has no effect on “dinosaur” in “There are dinosaurs”, why isn’t that whole statement true? The answer to this question turns on the details of the first step of the two step program. I would regard the domain of quantification in “There are dinosaurs” as restricted to those things that presently exist. It’s not that dinosaurs have stopped being dinosaurs — rather, we just don’t quantify over them in the present tense. This point is discussed further in the appendix.

Ps) Fa -at- t iff Fa
(where F is a pure sortal predicate)

In the case where F is a pure non-sortal (i.e. neither a pure sortal, nor a phase sortal, nor an impure sortal) use rule (Pn):¹⁰

Pn) Fa -at- t iff there is a z , such that z is the t -part of a , and Fz
(where F is a pure non-sortal predicate)

This suffices to deal with the cases that perdurantists have most often discussed. For example “Some person is straight and was bent.” “is a person” is a sortal, and “is bent” and “is straight” are non-sortals, so this example is translated into a statement to the effect that some person has a straight present part, and a bent past part. Correctly, it doesn’t suppose that the person in question is a present-bound stage. (But the bent and straight things are.)

It also solves *some* versions of Varzi’s puzzle. “Some person was a turnip” is false. Both “is a person” and “is a turnip” are sortals, so this tensed statement gets translated to the tenseless statement “Some person is a turnip”, which is false, and is not rendered true by the existence of mereological fusions of persons and turnips (or of person stages and turnip stages). We may grant that such person-turnips exist, but they are neither persons, nor turnips.

“Some person was turnip-shaped” is also false. “is turnip-shaped” is a non-sortal, so the translation is “Some person has a past temporal part which is turnip shaped”. As before, we may grant that there are person-turnips, and that they have turnip-shaped temporal parts, but they are not persons.

Impure sortals are supposed to be transparently conjunctive. So we can treat them recursively:

Pi) Fa -at- t iff F_1a -at- t and F_2a -at- t and... F_na -at- t
(where F is an impure sortal predicate, and $F_1...F_n$ are its conjuncts)

As an example of the use of this rule, “Some happy person was sad” says that there is some person who has a present happy part and a past sad part.

The really difficult case is the case of phase sortals. Here we are tugged in two different directions. It’s tempting to say that children are strictly identical to persons — that the child of 1940 really is the famous tenor, Pavarotti, of 2003. But if we applied the sortal rule, (Ps), we could not say that anyone is a child at any time in their life unless they are a child at every time in their life.

¹⁰It may be that rule (Pn) needs to be refined, or supplemented. Some, deviant, non-sortals cannot be treated in this way even by the most gung-ho perdurantist: “is dead” for example, as used in “Some dinosaurs are dead”. It need not be imagined that any dinosaurs have contemporary, but dead, temporal parts for this to be true — one way of being dead is simply not to exist anymore.

So there is pressure to treat “is a child” as a non-sortal. It is no accident that the hardest versions of Varzi’s puzzle involve words like “child”.¹¹

The only way I see of dealing with phase sortals is to assimilate them to impure sortals. Suppose that for every phase sortal (“is a child”, for example) there is a pure sortal (“is a human being”) and a non-sortal (“is young”) such that the phase sortal is equivalent to the conjunction of the pure sortal and non-sortal. So:

Pp) $Fa\text{-at-}t$ iff $F_s a\text{-at-}t$ and $F_n a\text{-at-}t$

(where F is a phase sortal predicate, and F_s and F_n are its conjuncts)

If this is right, then it solves the very hardest versions of Varzi’s puzzle. For example: “Some child was a kitten” claims that there is something that is both a human being and a cat, has a past young part, and a present young part. This is false: there is no such thing. There is, no doubt, the mereological fusion of the kittenish temporal part of a cat and the childish temporal part of a human being; but this is neither a human being nor a cat, and certainly not both.

Some versions of the puzzle remain. These are the versions constructed only using pure non-sortals. “Something in this room crossed the Rubicon with Caesar” is true, because “is in this room” and “crossed the Rubicon with Caesar” are non-sortals. But this is hardly surprising, given the amount of metaphysical junk — arbitrary fusions of this, that, and the other — that is in this room.¹² If someone asserts this statement, a natural reaction is to want to know what kind of thing it was (or to assume an answer to that question, such as “an artifact”). But, unless you’re in a museum, “Something in this room crossed the Rubicon with Caesar, and is an artifact” is false: it is an instance of Varzi’s puzzle of the same kind as “Some person was turnip-shaped”, which I have already solved.

There’s a difference between what I’m saying about these cases, and Varzi’s “warm beer” solution. The warm beer solution proposed that some tenors *were* turnips, but that in normal conversational contexts we do not quantify over them, so that, in normal contexts, “Some tenor was a turnip” is false. I’m proposing that “Something in this room crossed the Rubicon with Caesar” is true; and that this is hardly surprising given how many arbitrary mereological fusions there are in the room. Something in this room is, for that matter, crossing the Rubicon right now (take the fusion of me with something that is crossing the Rubicon in the ordinary way). This is all perfectly familiar fallout from unrestricted mereological composition. But unrestricted mereological composition does not entail that there is a tenor in the room, or that a tenor is crossing the Rubicon.

¹¹I think that Varzi also believes “is a tenor” to be a phase sortal. This may be true, but I think a case may be made for its being a pure sortal. Being a tenor is dispositional: Pavarotti remains a tenor at moments when he is not singing, and even when he has laryngitis and loses his voice. You might even think that, before Pavarotti’s voice broke, though he didn’t sing in the tenor range, he still had the disposition to sing in that range in the right circumstances (adulthood being one of these). But in any case, Varzi could easily choose a new example which is unambiguously a phase sortal.

¹²It may also be boringly true that something in this room crossed the Rubicon with Caesar. Some fundamental particles that are now parts of me were perhaps once parts of Caesar when he was crossing the Rubicon.

5 A theory of the sortal / non-sortal distinction

I promised that I would give my own account of the sortal / non-sortal distinction which didn't trade on Strawsonian talk of "criteria of identity" or Wigginsian "what it is" versus "what it does". The account is very simple. Rules (Ps) and (Pn) are constitutive of what it takes for a predicate to be a pure sortal or a pure non-sortal respectively. On my view, sortals are just those predicates which are not relativised to times in the tenseless truth conditions of any tensed statements in which those predicates appear.

This account of sortals is a rival to the Strawson/Wiggins account, and differs from it in two important ways. First, I don't need the sortal dependence of identity; I don't need to hold that identity claims only make sense under a covering sortal. On my view, there is such a thing as absolute identity — the relation each thing bears only to itself — and it makes sense to count by this relation. It makes sense to ask, "how many *things* are there in this room?" but this is a deep metaphysical question, whose answer is likely to be vast and uninformative.¹³ It is this uninformative and opacity to common sense that accounts for the widespread illusion that such questions are senseless.

Second, I don't need to believe sortal essentialism. Things could, perhaps, have failed to fall under the sortals they in fact do. That's not to say that no sortal is essential, but sortals aren't essential just in virtue of being sortals. Nor is the sortal an object falls under in any sense the primary kind of thing that object is. Objects may fall under many sortals, none of which is primary. For example, an object may fall under both the sortals "is a person" and "is a human being" without either of these being more important, more primary, than the other.

Though I disagree with the tradition on these points, I think that my account explains the same semantic phenomena that Strawson and Wiggins are trying to explain. The two doctrines just denied may be seen as overreactions to truths about sortals that are predicted by my theory.

First, though diachronic identity statements containing non-sortal make sense, they are trivial. "Something that is red is identical to something that was blue" is true iff there is now something red and there was something blue. What is being said to be identical is the mereological fusion of those two things. This explains why it is natural to think that such identity statements are senseless (or that they only make sense when the context supplies a covering sortal) or that non-sortal do not determine "identity conditions" or "persistence conditions" for their instances.

Second, though sortals are not essential, they are necessarily permanent. Nothing that has such a property can ever lose it, nor can something that does not have that property gain it over time. This is because rule (Ps) does not allow sortals to be had at one time and not another. To have a sortal at a time is to just plain have it; to lack it at a time is to just plain lack it; having a sortal at any time is therefore incompatible with lacking it at any time. People frequently conflate necessary permanence with essentiality;¹⁴ this explains why it is natural to suppose that sortals

¹³For example, suppose that the correct view in ontology is this: there are the most fundamental objects of physical science — subatomic particles, say — and there are arbitrary mereological fusions of them, and nothing else. Then the answer to the question is $2^n - 1$, where n is the number of subatomic particles in this room.

¹⁴For example, people sometimes define "essential property" as "property that that its instances can't gain or

are essential.

This framework is neutral about which predicates are genuine sortals. In general, the mark of a sortal on my view is that its is necessarily permanent — indeed, that it doesn't make sense to speak of having it at one time, and not at another.¹⁵ There's room for debate about whether any particular predicate meets this criterion. What about "is a person" for example, which I have been assuming to be a sortal throughout? Isn't it metaphysically possible that an evil wizard could turn a person into a turnip? If not, isn't it at least conceivable? How do we understand stories about people who turn into turnips, and how do we understand philosophers who claim that they were once fetuses, but that a fetus is not a person? (Olson 1997, pp. 89–93)

I don't have to decide this issue. One view is that these are impossible scenarios, and that people who think that they are conceiving of them are confusing them with possible ones. Even the evil Lord Voldemort cannot turn Pavarotti into a turnip (if Pavarotti is a person, and "is a person" and "is a turnip" are sortals) but he can destroy Pavarotti and make a turnip from the matter that formerly constituted him.

Alternatively, perhaps "is a person" and "is a turnip" are phase sortals.¹⁶ If so, then, on my theory, they must both have a covering sortal. What could this be? We need a sortal that applies to all possible persons, including persons who are robots or Cartesian souls. Some perdurantists hold that not every mereological fusion of stages counts as a persisting thing: to persist an object must also be causally unified, each of its temporal parts being "nominally necessary" for the existence of the next. (Armstrong 1980, p. 75) This gives us a way to define a robust universal sortal. Let a *substance* be a maximal mereological fusion of nominally interdependent stages, and let it function in temporal predication according to rule (Ps). Then "is a substance" is the missing covering sortal for all phase sortals that seem to lack one.¹⁷

On this view, Voldemort can turn Pavarotti into a turnip. But he must take care when he does that the later, turnip stage of Pavarotti is properly causally connected to the earlier, person stage. To know what it would take to do this, we would need to know more about the type of non-Humean nomic interdependence that is part of the definition of "substance".

lose". This, however, is to confuse something that can't be lost with something that can't be lacked.

¹⁵This is certainly a necessary condition. Is it sufficient? One might think that there are necessarily permanent non-sortals: one suggestion is the "has mass". Is this not a necessarily permanent, non-sortal, predicate of physical objects? Yes; but there are other things that have mass non-permanently. Since "has mass" is a non-sortal, all it takes to fall under it is to have a temporal part with mass. So, arbitrary fusions of temporal parts of physical objects with massless things count as temporarily massive.

¹⁶For the view that "is a person" is a phase sortal, see Olson (1997, pp. 28–31).

¹⁷Interestingly, there is an offshoot of the Strawsonian tradition that seems to strikingly parallel this view. According to Michael Ayers, "physical objects are natural unities... which come into existence, continue to exist, and cease to exist quite independently of any conceptualising on our part. The principle of unity in each case is causal..." (1974, p. 114) Ayers regards this view as opposed to the sortal dependence of identity, but retains the Strawson/Wiggins framework in other respects.

6 Objections

Varzi considers something like my proposal in his paper and offers four objections. (2003, pp. 212–213) First, he doubts that there is a covering sortal available for every predicate. No problem for me: I’ve not assumed that — in fact I’ve dealt specifically with predicates of that kind. They fall under rule (Pn).

Second, he says that a sortal based solution would lead to regress. Suppose that “is a tenor” is an impure sortal, and that, therefore, (4) does not follow from (6). Just run the problem again, he suggests, using the pure sortal component of “is a tenor”: “is a person”. Isn’t “Some person was a turnip” true for just the same reasons as were given for (4)? No: that’s one of the easy cases of Varzi’s puzzle, and I’ve already explained why it is false.

Third, he says that, if the regress problem can be resisted, then it must be because sortals express maximal properties, in Sider’s sense. (Sider 2001b, p. 357) That is, for the example of “is a person”, it is partially constitutive of being a person that persons do not have other persons as temporal parts. Though I did embrace this idea in passing (in section 3) it was part of the motivation of my solution, rather than part of the solution itself. It is the case, however, that all sortals are permanent; it doesn’t make sense to think of “person” applying to an object at one time, and not applying to that same object at another (if, indeed, “person” is a sortal, and not a mere phase sortal).

Finally, he says that the proposal would call for “further, controversial semantic details”, which it certainly does. I’ve given those details, in the shape of rules (Ps), (Pn), (Pi), and (Pp). They may be controversial, but I hope that their utility in dispatching Varzi’s puzzle, explaining the difference between stage theory and perdurantism, and in making sense of the sortal / non-sortal distinction commend them.

Appendix: from tense logic to temporal predication

The two-step program attempts to give metaphysically perspicuous paraphrases of natural language statements. Because of this, even completing the first step — the transformation of tensed statements into temporal predications — is going to be a difficult task. It might be instructive, however, to see the first step completed for a simple, formal, tensed language.

To do this, I will describe a translation procedure that transforms sentences of tense logic into sentences containing no tense operators, but instead containing temporal predications, written like this: $[Fa]^t$ (this may be read “*a* is *F* at *t*”). As an intermediate stage in the translation, arbitrary sentences of tense logic may be time-indexed (i.e. put inside brackets, and followed by a superscripted letter), but it’s important to realise that these are not temporal predications.

The tense logic I am analysing contains the familiar truth functional operators, \neg (not), \wedge (and), \vee (or), \rightarrow (implies), and quantifiers \forall and \exists . It supplements these with four sentential tense

operators: P (it was the case that), F (it will be the case that), G (it was always the case that), and H (it will always be the case that).

There are two special predicates that may appear in the results of the translation: $<$ (before), a relation between times; and $@$ (exists at) a relation between a thing and a time.

To start the translation, take any sentence Φ of tense logic, and transform it into $[\Phi]^{now}$, where *now* is an indexical singular term referring to the present time, in just the way that “now” does in English.

Then apply the following rules recursively until none of them is applicable:¹⁸

1. Replace $[\neg\Phi]^\tau$ with $\neg[\Phi]^\tau$
2. Replace $[\Phi \wedge \Psi]^\tau$ with $[\Phi]^\tau \wedge [\Psi]^\tau$
3. Replace $[\Phi \vee \Psi]^\tau$ with $[\Phi]^\tau \vee [\Psi]^\tau$
4. Replace $[\Phi \rightarrow \Psi]^\tau$ with $[\Phi]^\tau \rightarrow [\Psi]^\tau$
5. Replace $[(\forall\alpha)(\Phi)]^\tau$ with $(\forall\alpha)(\alpha@ \tau \rightarrow [\Phi]^\tau)$
6. Replace $[(\exists\alpha)(\Phi)]^\tau$ with $(\exists\alpha)(\alpha@ \tau \wedge [\Phi]^\tau)$
7. Replace $[P\Phi]^\tau$ with $(\exists\tau')(\tau' < \tau \wedge [\Phi]^{\tau'})$
8. Replace $[F\Phi]^\tau$ with $(\exists\tau')(\tau < \tau' \wedge [\Phi]^{\tau'})$
9. Replace $[H\Phi]^\tau$ with $(\forall\tau')(\tau' < \tau \rightarrow [\Phi]^{\tau'})$
10. Replace $[G\Phi]^\tau$ with $(\forall\tau')(\tau < \tau' \rightarrow [\Phi]^{\tau'})$

It can be proved by induction on the syntax of tense logic that this procedure terminates with sentences in which the only time-indexing applies to atomic sentences. That is, it produces sentences in which the only time-indexing is temporal predication. And of course I have chosen the rules so that the intuitive meaning of the sentence produced matches the intended meaning of the original sentence of tense logic.

The rules for the quantifiers deserve comment (this connects with the issue raised in footnote 9). These rules make all quantifiers in tense logic restricted to a time. I could instead have given rules that make the quantifiers of tense logic unrestricted:

- 5'. Replace $[(\forall\alpha)(\Phi)]^\tau$ with $(\forall\alpha)([\Phi]^\tau)$
- 6'. Replace $[(\exists\alpha)(\Phi)]^\tau$ with $(\exists\alpha)([\Phi]^\tau)$

¹⁸The technique applied here owes much to treatments of modal logic by canonical translation, for example, those offered by Lewis (1968) or Forbes (1994, pp. 301–305). I am employing upper case greek letters as schematic stand-ins for sentences, and lower case greek letters as schematic stand-ins for individual terms.

This, however, would be in conflict with rule (Ps). Applying (6') to $(\exists x)Dinosaur(x)$ (“There are now dinosaurs”) results in $(\exists x)[Dinosaur(x)]^t$. Applying (Ps) to that results in $(\exists x)Dinosaur(x)$ again, which, read tenselessly, is true. So the tenseless translation of a false tensed sentence has come out true.

One solution would be to replace (Ps) with:

Ps') Fa -at- t iff $a@t \wedge Fa$
 (where F is a pure sortal predicate)

I don't like this, because it seems to imply that no dinosaur ever went out of existence; rather, they all just stopped being dinosaurs. One way to see this is to consider the following sentence:

$H(\exists x)P(Dinosaur(x))$ “There will always be something which was a dinosaur.”

Intuitively, this should come out false. And, indeed, using the rules I endorse — (5), (6), and (Ps) — it translates to:

$(\forall t)(now < t \rightarrow (\exists x)(x@t \wedge (\exists t')(t' < t \wedge Dinosaur(x))))$

This is false; it requires that there is a dinosaur existing at some time later than now. If we were to use the rules (5'), (6'), and (Ps'), we would get something different:

$(\forall t)(now < t \rightarrow (\exists x)(\exists t')(t' < t \wedge x@t' \wedge Dinosaur(x)))$

This is true, because all it requires is that there is a dinosaur existing at some past time. It seems to me that this gets both the truth value and meaning of “There will always be something which was a dinosaur” wrong.

University of St. Andrews

References

- Armstrong, D. M. (1980). Identity through time. In P. van Inwagen (Ed.), *Time and Cause*. Dordrecht: D. Reidel.
- Ayers, M. (1974). Individuals without sortals. *Canadian Journal of Philosophy* 4(1), 113–148.
- Forbes, G. (1994). *Modern Logic*. Oxford: Oxford University Press.
- Gale, R. (1962). Tensed statements. *Philosophical Quarterly* 12(46), 53–59.
- Hawley, K. (2001). *How things persist*. Oxford: Oxford University Press.

- Kaplan, D. (1989). Demonstratives. In J. Almog, J. Perry, and H. Wettstein (Eds.), *Themes from Kaplan*. Oxford: Oxford University Press.
- Lewis, D. (1968). Counterpart theory and quantified modal logic. See Lewis (1983), pp. 26–39.
- Lewis, D. (1976). Survival and identity. See Lewis (1983), pp. 55–72.
- Lewis, D. (1983). *Philosophical Papers*, Volume 1. Oxford: Oxford University Press.
- Mellor, D. H. (1981). *Real Time*. Cambridge: Cambridge University Press.
- Olson, E. T. (1997). *The Human Animal*. Oxford: Oxford University Press.
- Sider, T. (1996). All the world's a stage. *Australasian Journal of Philosophy* 74(3), 433–453.
- Sider, T. (2001a). *Four-dimensionalism*. Oxford: Oxford University Press.
- Sider, T. (2001b). Maximality and intrinsic properties. *Philosophy and Phenomenological Research* 63(2), 357–364.
- Strawson, P. F. (1959). *Individuals*. London: Routledge.
- Varzi, A. C. (2003). Perdurantism, universalism, and quantifiers. *Australasian Journal of Philosophy* 81(2), 208–215.
- Wiggins, D. (2001). *Sameness and Substance Revisited*. Cambridge: Cambridge University Press.