

The Paradox of Fission: A Semantic Dissolution of a Metaphysical Mystery

Draft Date: January 5, 2007
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Abstract

The fission of a person involves what common sense describes as a single person surviving as two different people. Thus, say most metaphysicians, this paradox shows us that common sense is inconsistent with the transitivity of identity. Those attempting to resolve the paradox conclude that common sense is mistaken and that the proper resolution of the paradox requires a particular metaphysic. I disagree on both counts. A semantic study shows that our natural language quantifiers are temporally relativized and that our talk of persons allows for one person having two different futures. Thus, we can save common sense after all. Moreover, because this dissolution relies solely on semantics, we can remain neutral with respect to the metaphysics.

Tomorrow Adam will undergo fission. His fission will be like that of an amoeba's, with the two resulting people, call them Cain and Abel, both bodily and psychologically continuous with Adam.

Since the fission will not take place until tomorrow, it seems that today Adam is still one person. Once the fission is complete, Cain and Abel will, it seems, be two different people. Both of these conclusions are supported by the concept of a person. If there is an embodied mind that is independent of other bodies and minds, then it constitutes a single person. If Adam is two people right now — or, more properly, if 'Adam' ambiguously refers to two people — how could we explain the fact that both are standing in the exact same spot having exactly the same thoughts? Wouldn't this identity of mental and bodily properties *constitute* their being the same person? Similarly, if next week at this time Cain and Abel are identical, how could we explain the one's being in Cairo wondering if he paid the child support for the month while at that same moment the other is in Dallas envying his neighbor's new kayak? Doesn't this difference *constitute* their being different people?

Yet it also seems that Adam will not cease to exist once he undergoes fission tomorrow. The mental and physical changes that will lead from Adam to Cain are of a piece with the changes that we all undergo every day — except, of course, for the fact that some great mass of flesh will separate from him. Similarly, *mutatis mutandis*, for the changes that will lead from Adam to Abel. Intuitively, Adam does not die but survives. The puzzle is that what results from his survival are *two* people. Focusing on Adam and Cain and the series of changes between them, it seems they are the same person, yet similar reasoning suggests that Adam and Abel are also the same person. But how can this be, for, as we've said, surely Cain and Abel are *not* the same person? Common sense seems to have led us to deny the transitivity of identity.¹

¹ I speak of what 'common sense' says about such cases. Some might object that I am unfairly stretching the meaning of this expression since there is nothing common about the fission of persons. However, the expression does not mean that *what is being judged* is common; rather, it means that the judgment is the unreflective opinion of

The paradox of fission pits our concept of a person — both what it is to be one versus two persons *at a time* and what it is to continue to be the same person *over time* — against the transitivity of identity. Thus, the paradox has been taken to show that we should reject our common sense intuitions, and the puzzle has therefore been to determine *which* piece we are to reject. Chisholm insists that, despite the apparent symmetry, Adam survives as one of the two later people, though we simply don't know which of the two he is.² Lewis argues that Adam is in fact two people, while Ehring takes the opposite tack and claims Cain and Abel are one person.³ Parfit takes the puzzle to show that the best description is that Adam ceases to exist, so he will later be neither Cain nor Abel.⁴ Johnston concludes that in cases of fission, “there is no fact of the matter about personal identity,” for our concept of a person doesn't apply in such bizarre cases.⁵

We must deny common sense, say so many metaphysicians. I disagree. I say our concept of a person and the intuitions that come with it are *not* inconsistent. We simply need to have a better understanding of the intuitions and claims of common sense. That is, we need to examine the semantics of the putatively contradictory statements of common sense and we'll find that, properly understood, the statements do not conflict after all. My view takes its cue from Lewis's, so in section 1 I begin with his solution appealing to temporal parts. I explore and defend Lewis's distinction between identity and tensed identity, or 'sameness' as I shall call it, since this distinction is a major plank of my view. This bit of semantics allows us to understand the sense in which Lewis's two overlapping people are 'two' and yet reconcile this with the common intuition that prior to fission there is only 'one' person present; more generally, this

the common *person*. It is not at all unusual to ask what common sense says about whether it is right or wrong to do act A, where A is something never encountered.

² Chisholm, *Person and Object*, Ch. 3.

³ Lewis, “Survival and Identity”; Ehring, “Personal Identity and Time Travel.”

⁴ *Reasons and Persons*, Part III.

⁵ “Fission and the Facts,” p. 393.

semantic story dissolves the purported inconsistencies of everyday claims about fission. In section 2, however, I depart from Lewis to recognize branching persons, the other major plank of my position. A branching person is a person who will be, or who once was, two people. Once we deploy the distinction between identity and sameness we see that the raft of problems thought to beset such a position rest upon confusion. Finally, in section 3 I argue that the resolution is purely semantic and, therefore, that we can kick away the commitment to temporal parts as we please.

1. Lewis's Solution

Lewis advocates temporal parts theory. Impressed by the analogy between space and time, temporal parts theorists say that just as objects have spatial parts, so too do they have temporal parts. Me from my left foot to my knee is a spatial part of me; me from birth to my tenth birthday is a temporal part of me. A temporal slice, or stage, is a spatially maximal momentary temporal part of an object.⁶ For example, the current stage of me is that which extends in space exactly as far as I currently do but, unlike me, exists only at the current moment. Furthermore, predicates apply in virtue of the properties of the temporal parts of the object existing at the time indicated by the tense.

“Eleanor will be tall” is true at t iff a stage of Eleanor after t is tall.

“Eleanor was tall” is true at t iff a stage of Eleanor before t is tall.

“Eleanor is tall” is true at t iff a stage of Eleanor at t is tall.

Many predicates require a more complex analysis involving more than just a single slice existing at the time indicated by the tense. For example,

⁶ Sider gives a more rigorous definition: “ x is an instantaneous temporal part of y at instant t =df (1) x exists at, but only at, t ; (2) x is part of y at t ; and (3) x overlaps at t everything that is part of y at t ” (Four-Dimensionalism, p. 59). We need not worry about niceties at this point, though, for in section 2 I will argue for a different definition of a stage.

“Eleanor is growing” is true at t iff throughout some interval surrounding t , each of the stages of Eleanor is larger than all previous stages of her during that interval.

To explain what is going on in cases of fission, Lewis employs the notion of the I-relation, that relation that holds between any two stages of a single person.⁷ According to Lewis, a person is a maximal sum of I-interrelated stages. That is, for any collection of person stages that (a) are all I-related to one another, and for which (b) no other stage is I-related to them all, the sum of that collection is itself a person. We need not bicker over the details of the I-relation. You might think what underlies me being the same person as the youth I once was is that the youth and I have mental states that are similar or that are connected by a chain of gradual changes; or perhaps bodily continuity is required instead of or in addition to the appropriate sort of mental continuity. The paradox of fission is largely independent of the details of the I-relation, so I leave these for others.

Against this background, Lewis accounts for fission as follows: There is one series of stages up to the point of fission and two series of stages that result from the fission. Importantly, the I-relation is not a transitive relation. It holds between any ‘Cain’ stage and any ‘Adam’ stage, and it holds between any ‘Adam’ stage and any ‘Abel’ stage, but it does not hold between a ‘Cain’ stage and an ‘Abel’ stage. Thus, there are two maximal sums of I-interrelated person stages. One consists of the stages up to the point of fission — the ‘Adam’ stages — together with the stages forming one future branch — e.g., the ‘Cain’ stages. The other consists of the ‘Adam’ stages together with the ‘Abel’ stages. In short, Lewis claims that ‘Cain’ and ‘Abel’ refer to two people that are now spatially coincident but will diverge at the time of fission, and ‘Adam’ is an ambiguous term since it applies equally well to either of these two people.

⁷ See Lewis, “Survival and Identity.”

1.1. Defending a Distinction: Identity vs. Sameness

One may object that Lewis's solution conflicts with common sense, for it surely *seems* that there is only a single person standing in front of us! But Lewis has a story to tell.⁸ When we count objects, he claims, in many contexts we count not by identity but by *tensed identity*, or *identity-at-t*, where A and B are identical-at-t iff they share a stage at t.

How many persons entered the duplication center yesterday? We may reply: [Cain] entered and [Abel] entered, and no one else; although [Cain] and [Abel] are not identical today, and are not identical simpliciter, they were identical yesterday. So counting by identity-yesterday, there was only one. Counting by identity-today, there were two; but it is inappropriate to count by identity-today when we are talking solely about the events of yesterday. Counting by identity simpliciter there were two; but in talking about the events of yesterday it is as unnatural to count by identity as it is to count by identity-today.⁹

In this way Lewis tries to reconcile temporal parts theory with the everyday intuition that only one person enters the chamber.

Lewis thought of stage sharing as occurring only in “science fiction stories and philosophy examples” — as “pathological” rather than “ordinary”.¹⁰ Furthermore, he seemed to think that the problem surfaces as a peculiarity in how we count. Thus, his solution may strike some as ad hoc. I agree with Lewis's appeal to identity-at-t, but I think it plays a much larger role in metaphysical puzzles than Lewis and others have recognized. This is both because stage sharing is in fact ubiquitous, occurring whenever two objects coincide at a time, and because identity-at-t plays a quite general role in our language. This position requires some defense, though, so to this task I now turn.

Our concern, I believe, is not restricted to how we count but includes all linguistic constructions that ride on the number of objects being discussed — what Quine calls “the cluster of interrelated devices in which quantification becomes central.”¹¹ The issue is what conditions are required to make it the case that x and y are *one* and *the same* thing, that x *is* y, that we have

⁸ See Lewis, “Survival and Identity”. Cf. Robinson, “Can Amoebae Divide Without Multiplying?”

⁹ “Survival and Identity,” p. 63.

¹⁰ *On the Plurality of Worlds*, pp. 218-219.

¹¹ “Ontological Relativity,” p. 32.

a thing rather than some things, etc. My claim is that these ‘natural language quantifiers’, as I will call them, are relativized to times and worlds; that is, their semantic values index a time, typically that specified by the tense, as well as a world. For example, the statement “Bob is Mr. Kohl” doesn’t claim that a simple two-place relation (viz., absolute identity) holds between Bob and Mr. Kohl; rather, it claims that a four-place relation holds between Bob, Mr. Kohl, the time of utterance, and the world of utterance. (The relativization to a world is unimportant for fission cases and will henceforth be ignored). Although the resolution of the paradox of fission only requires that our natural language quantifiers are *sometimes* relativized, I will try to offer some evidence that they in fact are *always* relativized.

We are trying to determine, then, if our natural language quantifiers distinguish *x* and *y* whenever *x* and *y* were, will be, or could be different or, instead, if all that is relevant is whether *x* and *y* are *currently* different. That is, we need to see whether *x* and *y* are counted as two objects if they differ merely in their temporal and modal properties or if instead they must differ in their properties rooted in the relevant time — typically, that specified by the tense.¹² In fact, everyday language suggests we think temporal and modal differences *do not* matter. Consider whether the statue and the lump of clay of which it is made are ‘one’ and ‘the same’, a question that raises the issue of temporary identity while abstracting away from concerns peculiar to personal identity and to the unusual circumstances involved with fission. When told that the statue was created today from a lump of clay that had been sitting on the workbench for a week, the untutored are not at all moved to doubt that the lump of clay *is* a statue or that there is only *one* object on the mantle or that when we discuss the statue and when we later discuss the lump of clay we are discussing *the same* object. But when told that the lump of clay is painted entirely white while the statue is unpainted, they think there must, after all, be two different objects at

¹² I follow Chisholm (*Person and Object*, ch. 3) in speaking of properties ‘rooted’ inside the times they are had. Perry calls these “basic” properties (“Can the Self Divide?” p. 470). Peter Simons calls them “time-blinkered properties” (*Parts*, p. 229). I think the intuitive idea is clear, though one could take other notions as basic, such as ‘constitution’: “X and Y are the same” is true at *t* iff (z)(z constitutes X at *t* iff z constitutes Y at *t*).

hand. Why when presented with clear differences in temporal properties does common sense not see this as conflicting with the objects being ‘one’ and ‘the same’, yet when presented with differences in current properties it sees this as necessitating that we have multiple objects? The simplest and most charitable answer is that what we mean by saying x is ‘the same’ as y in such contexts requires only that x and y be *currently* the same, or, in other words, that they be identical-at-t, that the predicate ‘is the same as ...’ obtains solely in virtue of how the world is at the contextually specified time.¹³

It seems, then, that at least in some contexts we count x and y as ‘two’ things only if they differ in their properties rooted in the relevant time rather than in their properties simpliciter — or, in other words, only if they don’t have identical stages at the relevant time. Moreover, since we’re fully aware of the temporal and modal differences between the statue and the lump of clay, we apparently *intend* to count this way. Of course, this leaves open whether we intend to count this way because we thereby say something literally true or if instead what we say is literally false but we thereby convey useful information. That is, we haven’t settled whether the temporal relativity of our natural language quantifiers is part of their semantic content or it merely plays a role in implicating something.

Since Lewis says that it is ‘appropriate’ to say Adam is one person even though he “is really two nonidentical persons”, it appears that Lewis thinks what we say is not literally true.¹⁴ I’m not sure why we should see it this way. Lewis doesn’t explain *why* people would purposely say something they take to be false. The claim that Adam is one person doesn’t fit the mold of a Gricean implicature, and it is not a case of restricted quantifiers.¹⁵ Moreover, the untutored will

¹³ Consider an additional piece of evidence. We say things like, “Unbeknownst to those who were living in the peaceful North End, Druitt was Jack the Ripper — they were one and the same person!” If this is asserting identity and not a relation indexed to a time, why doesn’t it sound strange when marked with the past tense? I count this as weak evidence since there are other possible explanations of the phenomenon.

¹⁴ “Survival and Identity,” p. 64. Similarly, in *On the Plurality of Worlds*, p. 218, Lewis says, “Strictly speaking, two people are present.”

¹⁵ For the former point, it fails Grice’s test of cancelability: common sense wouldn’t say that there is only one person present when Adam enters the duplication chamber but then add that literally speaking there are two people

not agree to even a qualified concession when faced with disagreement, as they do where accounts involving implicature seem promising — e.g., “Well, she’s not *literally* a saint,” or “Okay, it’s not *perfectly* flat.” Instead, even though told that he will undergo fission common sense insists that literally and strictly speaking what we have in front of us is one person, not two. As a result, I will take Lewis’s appeal to tensed identity as giving the semantic content of our counts or, in other words, as specifying the conditions under which there *really is* one thing present.

Notice, though, that whether tensed identity is part of what is said or is instead part of what is merely conveyed is of secondary concern for the resolution of the paradox of fission I am defending. While I have argued that the claims of common sense are literally true by giving truth conditions that show how the seemingly inconsistent claims can in fact all be true, my primary concern is that the so-called ‘truth conditions’ that I offer at least specify the rules governing *appropriate* English usage and that these rules show how common sense thinking is in fact consistent. If these rules actually are not giving truth conditions for our utterances but instead are laying out some sort of implicature rules, they will nonetheless show that common sense is not, after all, benighted. I hope to have convinced some that the claims of common sense are literally true, but if they are false, what people convey with these claims will nonetheless be correct and require no repudiation or revision from metaphysicians.

Many other philosophers, driven by somewhat different concerns, have also argued — though they have not put it this way — that a relation weaker than identity plays a central role in our natural language quantifying expressions. For example, according to both White and Rea, Aristotle distinguished identity, or sameness in being or in substance, from accidental sameness, where things are identical only if they share *all* properties, including temporal and modal properties, and things are accidentally the same merely by sharing those properties rooted in the

who are temporarily coincident. For the latter point, because of the symmetry we can’t say that our restricted quantifiers are omitting Cain but not Abel or vice versa.

time and world in question.¹⁶ The lump of clay is accidentally the same thing as the statue that was formed from it this morning since they share all properties rooted in the current time. But they are not strictly identical since they differ temporally and modally: the clay existed yesterday but the statue did not; the clay could have survived being squashed but the statue could not.

Once we concede that things differing temporally and modally are not strictly identical, we can easily recognize a weaker relation holding between coincident objects. As Yablo says, “that the bust and the wax are in *some* sense the same thing is perfectly obvious.”¹⁷ Similarly, Wiggins, and many following in his path, have distinguished the ‘is’ of identity from the ‘is’ of composition, thereby explaining why we say that the lump of clay *is* a statue.¹⁸ The ‘is’ of composition is a temporally relative, or tensed, relation, just like Lewis’s. What these authors are advocating, each in somewhat different ways, is that the semantics of many occurrences of our English quantifying expressions — e.g., ‘is’, ‘one’, and ‘the same’ — contain relativizations to times and worlds while the semantics of the philosopher’s notion of identity does not. Identity-at-t, or ‘sameness’ as I will call it, is not identity. The paradox of fission, however, gets a grip only if we conflate the two.

Let’s next consider some objections. To begin, one might think that the competing hypothesis — i.e., that we count by identity — is simpler and therefore preferable to the hypothesis that we count by tensed identity. “A theory positing a simple binary relation is preferable, *ceteris paribus*, than one that posits some complex mechanism indexing a time.” However, so many of our other predicates apply solely in virtue of how things are at the relevant time, and most, if not all, predicates apply relative to a time, so if anything it seems the simplest

¹⁶ See Nicholas White, “Identity, Modal Individuation, and Matter”; and Michael Rea, “Sameness without Identity.”

¹⁷ “Identity, Essence, and Indiscernibility,” p. 295.

¹⁸ See Wiggins, *Sameness and Substance*; Yablo, “Identity, Essence, and Indiscernibility”; Johnston, “Constitution is not Identity”; Baker, “Why Constitution is not Identity”; Thomson, “The Statue and the Clay”. Besides those following in Wiggins’ footsteps, a similar conclusion is found with Perry’s “The Same F”. At least for Wiggins, the ‘is’ of constitution is a symmetric relation. See *Sameness and Substance*, p. 197f1.19.

semantic story would have our counts fall in line with other predicates. Predicates such as ‘is tall’, ‘has a gold tooth’, ‘is green’, and so forth apply solely in virtue of how things are at the current moment. While predicates such as ‘is ten years old’, ‘is growing’, and ‘is an ex-marine’ don’t apply solely in virtue of properties rooted in the current time, even these predicates are not tenseless but apply in virtue of how the subject is in some way that indexes the current time (e.g., having existed for ten years prior to *now*, or having sizes at times surrounding the *current* moment that increase monotonically). The issue, then, is whether predicates like “... is a single person’ and ‘... are two people’ apply absolutely or instead apply in virtue of how the subjects are at the contextually specified time. If anything, simplicity suggests that our counts and our other predicates would be given a uniform treatment, i.e., one holding relative to a time.

One might instead use conceptual analysis to argue that we count by identity. It seems this is Sider’s thought when he protests that “it is part of the meaning of ‘counting’ that counting is by identity.”¹⁹ But the relation of absolute identity differs from tensed identity only in that the latter allows the relata to differ temporally and modally while the former doesn’t. We certainly do have the intuition that x and y can be ‘one’ thing only if x and y don’t differ and only if they are the very ‘same’ thing. But our use of ‘differ’ in this sentence is most plausibly also temporally relativized, and ‘the same’ follows suit, on this account, so this intuition does not help to resolve the issue.

Finally, one might worry whether there is always a time relative to which the sameness relation is indexed. “How can our natural language quantifiers hold relative to a time when there are clear cases in which we count things *across* times? Aren’t sentences like the following appealing to a cross-temporal relation? ‘The boy who hit the homerun *in 1972* is the same person as the actor you will see *tomorrow* on stage.’” Although the relata are picked out by features they have at different times, this doesn’t mean we’re dealing with a cross-temporal

¹⁹“All the World’s a Stage,” p. 440.

relation, for the relata persist through time. The boy *did* appear in the photograph and the actor *will* be seen on stage, but this doesn't in any way show that the statement isn't saying that the former *is*, i.e. *currently is*, the latter. Of course, in this and many other cases the relata are identical, and so are related by sameness at each moment they exist. And since people do not actually undergo fission or fusion, we unthinkingly infer identity from sameness for persons; or, in other words, we conflate the claim of sameness of persons with the claim of their identity.

More troubling, perhaps, are cases in which the relata do not simultaneously exist. "The statement, '(Exactly) Three people have climbed the south face of Lhotse,' can be true whether or not the three lived at the same time, so how could this count involve a sameness relation that is relative to *a* time? Which time could possibly be the relevant time?" First, a point about the dialectic. Notice that Lewis, as well as any other temporal part theorist appealing to identity-at-t, face the same problem. Either they can admit that while in *some* cases our counts hold in virtue of identity-at-t, in *other* cases they hold in virtue of identity, or they can try to come up with a time relative to which the identity-at-t relation holds. The present account faces the same predicament.

But I think the case is not nearly so bleak, for *every* account, whether embracing or eschewing temporal parts, faces essentially the same problem with other ordinary predicates. In other words, we have independent grounds for thinking there is already a mechanism for handling exactly this problem. Let me explain. First, according to the traditional story the statement "(Exactly) Three people have climbed the south face of Lhotse" gets something like the following analysis: $(\exists x)(\exists y)(\exists z)[Cxl \ \& \ Cyl \ \& \ Czl \ \& \ (x \neq y) \ \& \ (x \neq z) \ \& \ (y \neq z) \ \& \ (\forall w)(Cwl \supset ((w = x) \vee (w = y) \vee (w = z))]$. Appealing to sameness rather than identity, we can use the same analysis but say that each '=' is temporally relativized (i.e., each '=' in the equation expresses sameness, not identity).

The apparent problem, however, is in specifying the time relative to which these sameness relations hold. When saying that *x*, one of the climbers of Lhotse, is not the same as the others, a reasonable tactic would be to say that the time which indexes this sameness relation

is the time when x in fact climbed Lhotse. x is not the same as y , who lived a century before, because there is no stage of y that is identical to the Lhotse-climbing stage of x . This, though, doesn't seem to give us a neat and tidy story. For one thing, there isn't one exact time when a climber is climbing the mountain and, worse, she may have climbed it multiple times. My claim, however, is that some such account is required anyway. Consider relations that we all agree are relative to a time, such as x being taller than y . What are we to say about "Lincoln was taller than Socrates"? A height is something one has *at a time*, so one can only be taller than another when making the comparison relative to certain times. Does the statement claim that Lincoln's greatest height was greater than Socrates'? Or is it talking about their average height or how tall they are generally? I don't think any of these is satisfactory, but the point remains that context must somehow provide the times relative to which the heights are considered.²⁰ And, of course, the point extends to other predicates, so our language must have a general mechanism that provides the times relative to which we compare properties that are had relative to a time. And, since we know there is some mechanism at work to provide temporal indices for other relations, the sameness relation can employ that same mechanism. Thus, sameness does not require something that is either implausible or that adds to the complexity of language.

1.2. A Problem for Lewis: Is 'Adam' Ambiguous?

Even if we construe Lewis's account as specifying the conditions under which sentences containing English quantifiers are literally true, the idea that 'Adam' is ambiguous still doesn't quite match linguistic intuition. To understand my objection, consider first what I take to be a bad line of attack: "According to Lewis, we can say that there is exactly one person standing

²⁰ If we discovered that Socrates drank a potion that dramatically increased his height for ten seconds, we would not, I think, take this to show that Lincoln was not taller than Socrates. If Bob reached his adult height of 6'-0" at 18 but died at 32, while Sue reached her adult height of 5'-4" at 16 and died at 85, we would not say that Sue was taller than Bob, even though her average height was greater. If in addition, Bob reached 4'-0" at 2 years of age and stayed at this height until his growth spurt at 18, even though he was 4'-0" for longer than he was 6'-0", we would still say he was taller than Sue.

before us despite the fact that if we talk about ‘him’ or about ‘Adam’, our sentences are ambiguous. But this just sounds confused. How can we reconcile the claim that there is only one thing here with the claim that terms purporting to refer to it are ambiguous? Furthermore, if *before* the fission I say, ‘Adam has a headache’, intuition tells us the referent is not at all ambiguous. Thus, it seems we have even more evidence that statements about Adam are *not* ambiguous, that such statements are quite different than true ambiguities such as ‘Bush was my favorite president’ as spoken by someone who heard about ‘Bush’ during both the Bush presidencies, not realizing he was hearing about two people.”

This line of objection, however, trades on a failure to distinguish identity and sameness. First, Lewis can respond that while according to our everyday counting by tensed identity there is ‘one’ person prior to the fission, there nonetheless are two people as individuated by their temporal properties, and this is the sense in which there is an ambiguity. Second, a temporal part theorist would say that the ambiguity of ‘Adam’ and the ambiguity of ‘Bush’ are not analogous since the two referents of ‘Adam’, unlike those of ‘Bush’, overlap and, thus, are related by sameness. An ambiguity that provides a closer parallel, a temporal part theorist would insist, is that of a statue and the piece of bronze of which it is made since these *do* overlap. If I say, “This weighs five stone,” while pointing at the statue/piece, intuition suggests there is only a single object that might serve as the referent and, much like the sentence saying “Adam has a headache,” intuition sees the sentence as unambiguous. Of course, with the statue and piece, one reason for saying there are, at least in some sense, multiple objects and that the reference is therefore ambiguous is because there are other sentences concerning this ‘one’ object that pre-theoretically *do* strike us as ambiguous. If I claim, “I created this myself,” while pointing at the statue/piece, we must rely upon context to disambiguate whether I mean that I, as artist, crafted this *statue* from the pre-existing piece of bronze or that I, as metallurgist, combined the copper and tin to form this *piece of bronze*. Thus, it seems Lewis has a parallel motivation for saying that ‘Adam’ is ambiguous since when we talk about what Adam *will* do, it’s unclear whether we’re talking about the one branch or the other.

The crux of the issue, however, is whether this parallel in fact holds. I'm not so concerned that with 'Adam' the two referents are of the same sort while with the statue/piece they are not. I, for one, *do* buy arguments that two things of a sort can coincide, such as Fine's two letters written on the same piece of paper.²¹ In the case of the two letters, however, we can pre-theoretically distinguish them even when they coincide, whereas there is no fact concerning what Adam is like prior to fission that makes it the case that there are two Adams. Of course, we can distinguish them by the properties they *will* have. Because of this, I think our 'person' talk *could have* developed as Lewis suggests. Just as the fact that highway 27 and highway 138 diverge north of town constitutes a difference between highway 27 and highway 138 even though right here they are 'the same' road, so too could we intend that the future differences between the people resulting from the fission constitutes the multiplicity of people prior to the fission. But *do* we talk this way about persons? I think not. That is, I don't think 'Adam' is ambiguous.

Consider the statement, "I will visit London tomorrow," uttered by Adam an hour before the fission. Lewis claims the name 'Adam' is either ambiguous or improper, failing to refer, and that sentences containing the name cannot be satisfied. The same holds for demonstratives and indexicals.²² Thus we should say that if Cain visits London tomorrow but Abel doesn't the sentence cannot be satisfied or, at best, is partly true and partly false. However, linguistic intuitions — or at least *my* linguistic intuitions — suggest this claim is simply true in such a case. Adam *does* succeed in visiting London. We can focus on Abel, and say that *he* won't visit London, but if we focus on Adam, that person entering the duplication chamber, the claim that *he* won't visit London is simply false.²³

²¹ See Fine's "A Counter-example to Locke's Thesis".

²² See "Postscripts to 'Survival and Identity'", p. 75.

²³ Thus I take it that 'Adam' also does not doubly refer, a possibility raised by an anonymous referee. That is, Adam's utterance of "I will visit London" is not wholly true *and* wholly false.

Sider, whose theory delivers the same results, agrees.²⁴ However, linguistic intuitions are rather murky in this case, so one might well object that our theories are driving our intuitions. To garner additional support let's examine my opponents, Parfit and Lewis. Both have accounts with serious problems, problems that are easily, and most naturally, resolved by saying that 'Adam' refers, unambiguously, to an individual who will have two distinct futures.

Parfit distinguishes the traditional issue of personal identity across time from the issue of "what matters" regarding survival. The former concerns what is required for person *p* existing at time *t* to be identical to person *p'* existing at time *t'*. The latter concerns, roughly, what is required for person *p* existing at time *t* to have that which one ought to value in surviving to *t'*. Parfit himself concedes that it is intuitively compelling that one has what matters if one simply survives or, in other words, if one continues to exist. Parfit, however, thinks this intuition is wrong, arguing that with cases of fission personal identity pulls apart from what matters. Like most, Parfit thinks psychological continuity is a key ingredient for personal identity. However, because a person undergoing fission is psychologically continuous with the two *different* people resulting from their fission, Parfit, again like many others, argues that personal identity consists in psychological continuity that takes a *non-branching* form. One can't be identical with the *two* products of fission, he urges, since personal identity would then "not fit the logic of identity."²⁵ Hence, the best description is that one ceases to exist with fission. Nonetheless, he reasons, if I undergo fission, I do have what matters with survival since "my relation to each of the resulting people . . . contains everything that would be needed for me to survive as that person," namely, psychological continuity.²⁶

In talking about 'what matters', Parfit clearly doesn't mean what is morally right or what serves one's own projects, since it would be trivial to show that these can be satisfied by a course

²⁴ See, e.g., *Four-Dimensionalism*, p. 201.

²⁵ *Reasons and Persons*, p. 262.

²⁶ *Reasons and Persons*, p. 261.

of action on which one ceases to exist. But then it's hard to see what notion would justify swallowing his conclusion. When I write a book, I may desire the advancement of the field, and when I kayak a river, I perhaps enjoy the impersonal fact that the river is being enjoyed in its natural state, but the main things I value is *my* doing those things, selfish as it may be. It simply can't be rational for me to value having someone *else* write my book, love my wife, and care for my children just as much as I value my doing it, no matter how closely related that other person is to me. As Lewis says, the idea that what matters is identity is "a commonsense ... platitude that cannot credibly be denied."²⁷ Point one: in separating what matters from personal identity, Parfit swallows a quite dubious conclusion.

Instead, if we accept Parfit's thesis that what matters is simply psychological continuity but eschew Parfit's dubious conclusion and instead maintain the 'commonsense platitude' that personal identity is what matters, then we have a view on which the claim "Adam will be in London" is true iff Cain *or* Abel visits London. Thus, point two: the semantics I am advocating are the natural consequence of Parfit's central thesis that psychological continuity is what matters. In this way, I think Parfit's own account gives some support to the account I am endorsing. Of course, I have said nothing yet to counter Parfit's claim that the sort of account I am advocating conflicts with the logic of identity. Much of the remainder of the paper is given to showing that this simply isn't true, that we can grant Adam two different futures without deviating from the traditional logic of identity.

Point three: Lewis says that one cannot credibly deny that what matters is identity, yet his metaphysic does not deliver this. What matters to Cain before the fission is, if identity is what matters, that *he* survive, and yet with Lewis's account when we encounter cases of fission we see that Cain can have what matters even if he doesn't survive.²⁸

²⁷ "Survival and Identity," p. 56.

²⁸ Similar arguments are given by Sider (*Four-Dimensionalism*, pp. 202-204) and Parfit ("Lewis, Perry, and What Matters", §1).

Lewis focuses in his “Postscripts to ‘Survival and Identity’” on the commonsense desire to survive, or something as commonsensical as possible. The net result is that Lewis tells us that we all actually have two desires, one expressed by “Let me survive” and the other, which can be satisfied in cases of fission, expressed by “Let at least one of us survive.” The reason Lewis gives for thinking we all have this other desire is, briefly, that we have a desire that is satisfied in cases of fission and yet the singular first person desire is not.²⁹ Thus, we must have the plural desire. This reasoning, however, seems to apply much more broadly than to a) first person b) desires for c) survival. It seems we have equal reason to think that there is a plural propositional attitude in cases where a) I desire that *Adam* survive, where c) either Adam or I desire that he *visit London*, or even where b) we *believe* that he will visit London. Hence, point four: it looks as though on Lewis’s account we must swallow the idea that for each propositional attitude we have, we also have a second one of which we’re unaware — a quite extraordinary commitment!

Parfit argues that what matters is psychological continuity. Lewis argues that what matters is both psychological continuity and identity. The natural result of these commitments is a view on which Adam will visit London iff either Cain or Abel does. But both Parfit and Lewis avoid this conclusion with drastic costs, Parfit saying that what matters is not identity, and Lewis delivering a metaphysic on which identity is not what matters and on which he commits to a widespread duplication of propositional attitudes. If possible, surely it is better to avoid these consequences. And this is easily done.

2. The Alternative: Branching Persons

The alternative I propose is to say that besides Cain and Abel, there is also Adam, a branching person, i.e., a person who has two distinct series of events composing his life after his fission. In the temporal part theorist’s argot, ‘Adam’ refers to the sum of pre-fission stages called ‘Adam’, the post-fission stages called ‘Abel’, *and* the post-fission stages called ‘Cain’ —

²⁹ “Postscripts to ‘Survival and Identity’”, pp. 74-75.

in short, to a two-headed time worm. The synchronic identity conditions for persons define what it is to be a person stage. That is, a person stage at t is a momentary part of matter arranged person-wise at t , where what it is to be 'arranged person-wise' at a time is given by our concept of a person. The diachronic identity conditions for persons in turn define, given the notion of a person stage, what it is to continue to be that very person, or, in other words, they tell us under what conditions a person stage at t and a person stage at t' are stages of the same person, again as dictated by the concept of a person. Parfit and so many others agree that intuitively a person stage preceding fission is connected in the appropriate way with both the diverging branches that result from the fission. But we must deny this intuition, they say, since it conflicts with the transitivity of identity. I will argue that there is no conflict. Thus, say I, at a time immediately following the fission Adam has two stages. Since tensed predications are analyzed in terms of an existential quantifier over stages, it can be true that Adam will be in London at t and true that Adam will be in Tokyo at t , but false that Adam will be bi-located at t , have two left feet at t , or double in weight suddenly at the time of fission since, respectively, there is a stage of Adam that is in London at t , a stage that is in Tokyo at t , but there is no stage that is located at both places, no stage that has two left feet, and no stage that weighs 340 pounds.

2.1 More Details: On Reference, the I-relation, and Slices vs. Stages

Two-headed worms accord with the semantics of untutored claims about cases of fission, and so could be justified upon this basis alone. But further justification comes from a simple underlying picture about how reference works. Philosophers disagree whether a singular term — whether a name, a pronoun, a demonstrative, etc. — refers to an object in virtue of the object fitting descriptions associated with the term or in virtue of an appropriate sort of causal chain originating with the object and terminating with the use of the term or with the associated concept. But it is what a persisting object is like *at a particular time* that fits our descriptions or that causes our ideas about it. Thus, though we refer to the persisting object, we do so in virtue of it being a certain way at a certain time or times. A persisting object has a property at a time,

the temporal parts theorist would add, in virtue of a stage having the corresponding property. Reference to a persisting object therefore obtains in virtue of this sort of ‘connection’, let us call it, to one or more stages of that temporally extended worm. What I suggest, then, is simply that when we refer to an object of kind *K*, we are connected to a *K*-stage *s* and the object we refer to, then, is the sum of all *K*-stages I_K -related to *s*.³⁰ Adam, that person who is standing before us, awaiting his fission, is the sum of all person stages I_{person} -related to that stage currently before us. Cain, the one who will first leave the duplication center, is the sum of all person stages I_{person} -related to that stage that leaves the duplication center first. Likewise, Abel is the sum of all person stages I_{person} -related to that stage that leaves the duplication center second. Depending upon which stage you focus on, you thereby refer to Adam, Cain, or Abel. Adam is a branching, or two-headed, worm; the other two are single-headed worms.³¹ If it is natural, as Lewis says, to

³⁰ Of course, often when we refer it is not a single stage in virtue of which we refer. If I refer to the man I just met, my concept of that man is formed through a causal connection with the many stages that span the five minutes I talked with him. Worse yet, my reference to my mother succeeds in virtue of stages spread throughout my entire lifetime. But this is no problem, for in these cases the sum of all stages *I*-related to one of these stages picks out the same worm as the sum of all stages *I*-related to another. We have an ambiguity, but an ambiguity hidden below the level of the referent or the sentence. The only ambiguities that surface at the sentence level are those we would want to surface, for example if I were ignorant of the fission and associated the name ‘Adam’ with the person I met before fission we’re calling ‘Adam’ and also with the person after the fission others call ‘Cain’. In this case the referent is ambiguous and sentences such as “Adam has never been to Tokyo” reflect this with an ambiguous truth value (assuming Abel has visited Tokyo but Cain has not).

³¹ Perry advocates an alternative account employing two-headed worms in “Can the Self Divide?” and, I believe, anticipates much that later appears in the literature on fission. Yet his (rather complex) account doesn’t work. According to Perry (pp. 482-3), names are assigned to person stages. The *primary referent of* (a name) *N* is the sum of stages *I*-related to the stage assigned to *N*. The *secondary referent of N at t* is the unique sum of stages *I*-related to the stage existing at *t* which includes the stage assigned to *N*. If there is not a unique sum, then *N* is improper at *t*. The sentence “*N* has *F* at *t*” is then true iff the secondary referent of *N* at the time of utterance contains a person stage at *t* that has *F*.

There are various problems with this account. First, Perry’s specification of when names are improper does not match linguistic intuitions. According to his semantics, “Adam fears his fission” is proper when uttered before the fission, but “Adam feared his fission” is improper if uttered after the fission. Why make the referent of a name vary with the time of utterance?

Second, Perry gives a rather strange analysis of temporal adverbs. “At *t*, *N* has *F*” contains a proper reference to *N* iff the secondary referent of *N* at *t* is proper. “*N* has *F* at *t*,” in contrast, contains a proper reference to *N* iff the secondary referent of *N* at the time of utterance is proper. “Adam will be in London after the fission” is true, when uttered before the fission, since the two-headed worm has a stage that will be in London, though “After the fission, Adam will be in London” is false, since ‘Adam’ has no secondary referent after the fission.

talk about there being *one* person who entered the duplication chamber, so too is it natural, say I, to *refer* to *him*, i.e. to the sum of stages I-related to the stage we are focusing on at the time in question.

What may not be obvious is that a consequence of my endorsement of branching persons is a departure from Lewis regarding the form of the I-relation. The I-relation — or more exactly the I_K -relation, for each different sort K — is that relation between stages in virtue of which different stages are stages of a single object of kind K . There are two reasonable forms this relation can take. According to Lewis, the I_{person} -relation is a relation that holds between any two stages of a single person. A person is then a maximal sum of stages all of which are inter-related by the I_{person} -relation. According to me reference involves a connection to one or more stages, so the I_{person} -relation is a relation that holds between a particular stage s and all other stages of the person one would refer to if one referred to a person by focusing on s . A person is then the sum of all stages I_{person} -related to any stage s .

To illustrate this difference, let's contrast spatial fission with temporal fission. First consider spatial fission, i.e., cases where what appears to be one person at one location is spatially connected to what appears to be two people at other locations. Imagine we see only a hand, but the hand we see is in fact shared by a pair of congenitally joined twins. Notice that this seems to be exactly the right description to give: there are *two* people and we have seen a part that is shared by them. What we might first have thought was one person, when looking at the hand, is in fact two. Thus, the relation between parts that determines which collections of parts form a person at a time cannot be a relation that holds between that part we see and each of the other parts of a person, for any relation between the shared hand and the head of one of the twins would, by symmetry, also relate the hand to the head of the other twin. Thus, what distinguishes

Third, consider the case in which the Cain stages visit London and the Abel stages visit Tokyo. Although Perry's semantics makes both "Adam will be in London" and "Adam will be in Tokyo" true if uttered before the fission, correctly in my opinion, it also makes "Cain will be in Tokyo" true when uttered before the fission since the secondary reference of 'Cain' prior to the fission is the two-headed worm which does have a future stage in Tokyo.

a person at a time must instead be some relation, P, that holds between *all* of the parts of a person. A person, then, will be a maximal sum of parts inter-related by P.

Let's now consider temporal fission, i.e., cases where what appears to be one person at one time is temporally connected to what appears to be two people at another time. In this case we see what we would call 'one' person at some particular time, but after fission there are intuitively 'two' people that result. In this case let's again ask what sort of relation we need to distinguish a person. We could, following Lewis, say that a person is a maximal sum of slices inter-related by some relation, I. This would mean that there are, as with congenitally joined twins, two overlapping persons. But our intuitions in this case differ. When apprised of the fact that the one hand is spatially connected to two bodies, we retract our previous judgment that there is only one person. In contrast, when apprised of the fact that the one stage is temporally connected to two different stages at a future time, we retain our judgment that what we have prior to fission is a single person. With the case of spatial fission, we seem to be equivocating if we point at the hand and say that this person has long red hair and that this very same person has a shaven head, assuming these descriptions fit the two twins. With the case of temporal fission, in contrast, it seems we're not equivocating when we say that tomorrow this person before us will be in London and that tomorrow this person before us will be in Tokyo. The person tomorrow in London may be a different person from the person tomorrow in Tokyo, but there is one person here now who both a) will be in London, and b) will be in Tokyo. If we are to let ordinary language guide us, we have two people in the case of spatial fission yet one person in the case of temporal fission. And this means that while we need to distinguish a person in the spatial case using some relation that inter-relates all spatial parts of a person, we need to distinguish a person in the temporal case using some relation that holds between a particular

stage and all other stages of the person, for that is the relation that allows for branching persons in cases of fission.³²

³² I have argued that a person is the sum of stages I-related to one particular stage, rather than, as Lewis has it, that a person is a maximal sum of I-interrelated person stages. Lewis himself gives no argument for his view. Consider how Lewis motivates an appeal to mental continuity and connectedness:

“I find that what I mostly want in wanting survival is that my mental life should flow on. My present experiences, thoughts, beliefs, desires, and traits of character should have appropriate future successors. My total present mental state should be but one momentary stage in a continuing succession of mental states. These successive states should be interconnected in two ways,” i.e., these states should differ only gradually from those they succeed and they should be caused by those they succeed (“Survival and Identity,” p. 55).

In my opinion, Lewis lays out common sense rather nicely, saying that what one wants in wanting survival is that their current mental state ‘flows on’, which, he explains, means that the succession of their future mental states “should conform, for the most part, to lawful regularities concerning the succession of mental states—regularities, moreover, that are exemplified in everyday cases of survival.” It sounds like all stages that flow from one’s present stage, and, presumably, all those which flow into their present stage, where this notion of ‘flow’ is cashed out in terms of psychological succession in the right way, constitutes that person. But what he has so far described is the account I favor and not his own! In the final sentence quoted above, Lewis adds the requirement that stages *all* be *interconnected* by the right sort of relation. This, when understood as Lewis’s account requires, specifies that any future stage of a person must flow from or flow into any other future stage of her. In so doing, he amends the nice-sounding description he has so far given and *stipulates* without argument that multiple branches are not allowed within a single person’s future.

Additional evidence in favor of an I-relation relating all stages to a stage of focus is supplied by considering Methuselah cases. Perhaps, as Lewis thinks, the concept of a person requires that a person cannot change too much psychologically and still continue to exist. ‘Methuselah’, if the psychology changed enough, would then be an ambiguous name referring to many different overlapping people. Let’s say that every century Methuselah changes enough such that a person could survive one such change but *not two*. Suppose, further, that in between such times of drastic change in her psychology Methuselah says, “The person you met *one century* ago was quite a bit different than me, but still similar enough such that she in fact was me.” According to Lewis’s account, this sentence either a) has no content since ‘I’ fails to refer determinately to an individual, or b) has an ambiguous content, ambiguous between i) saying truly of the person who will cease to exist at the next change in psychology that she was quite a bit different when the addressee met her, and ii) saying falsely of the person who will survive the next change in psychology that she was quite a bit different when the addressee met her. According to the account proffered here, the statement will simply be true. On Lewis’s account the above requirement that “a person cannot change too much and still continue to exist” will be interpreted to limit the amount of change from life to death, whereas on the account I endorse, it will place a limit on the amount of change from the stage being focused upon. Intuitively, Methuselah’s statement is simply true, supporting both the account involving a relation to a focal stage and supporting the corresponding interpretation of the requirement.

Finally, Lewis himself appears to slip into the more natural way of seeing the I-relation as a relation between a particular focal stage of a person and all other stages of that person. Consider the following passage: “In wondering whether you will survive the battle ... you wonder whether the continuant person that includes your present stage is identical with any of the continuant persons that continue beyond the battle. In other words: whether it is identical with any of the continuant persons that include stages after the battle. In other words: you wonder whether any of the stages that will exist afterward is I-related to—belongs to the same person as—your present stage.” (“Survival and Identity”, p. 59) Whether or not an individual will survive the battle is *not*, given Lewis’s view of the I-relation, equivalent to whether or not the current stage of the individual is I-related to some stage after the battle. Cain could die shortly after fission, but his present, pre-fission stage is nonetheless I-related to stages of Abel after the battle.

Another respect in which the present account differs from others is that it is usually assumed that a stage of an object at t is a cross-sectional ‘slice’ of the object at t , so an object will, *by definition*, have only one stage at any time. In contrast, I claim that an object can have multiple stages at a time. If I am correct that ‘Adam will visit London’ is true and therefore that it quantifies over multiple stages existing at the same time, then this shows us that the usual analysis must be wrong. But cases of time travel provide independent evidence, for even if when I’m sixty years old I travel back to the present moment, we still want my current utterances of “I weigh 173 pounds” and “I have two hands” to come out true in virtue of my younger stage weighing 173 pounds and having two hands.³³ Thus, we need to distinguish a temporal *slice* of an object, i.e., a part existing entirely at one time that is the sum of all parts that exist entirely at that time, from a *stage* of an object of kind K , a part existing entirely at one time that is arranged K -wise.

Hand in hand with the distinction between a stage and a slice is the idea that the notion of a person stage is prior to that of a person. This may strike some as implausible. But only the priority of the notion of a person stage can explain why debates over what is required for the identity of a person *over* time are spelled out in terms of those states, whether physical or psychological, that a person has *at* a time. One might object that our understanding of the phrase ‘person stage’ requires our prior understanding of the word ‘person’. I agree, but this does not mean that the concept of a person stage — or perhaps I should say, of a person-stage — is prior to the concept of a person. An analogy may help: our understanding of the phrase ‘the gender of an aunt’ depends upon our prior understanding of the word ‘aunt’, yet nonetheless the concept of being an aunt requires previous mastery of the gender an aunt must have.

Philosophers have traditionally eschewed two-headed worms, assuming that countenancing such referents would mean sacrificing either common sense or the transitivity of

³³ Cf. Lewis, who says that the time traveler “has two different complete stages located at the same time at different places” (“The Paradoxes of Time Travel”, p. 162).

identity. “If Adam is a two-headed worm, that explains our intuition that Adam survives,” goes the thinking, “but this means that when we speak of the two future branches, we are talking about *one* person, or, with Cain and Abel, *three* persons. And yet clearly what we have after the fission are *two* people.” However, once we distinguish identity and sameness, we see that no such untoward consequences result. Just as there is only ‘one’ person prior to the fission, as counted by tensed identity, even if there are, as Lewis claims, two people as individuated by their spatio-temporal extensions, so too are there ‘two’ people after the fission, even if there is only a single, two-headed worm or even if there is a two-headed worm in addition to two overlapping normal worms. If there are two person stages at the time we’re discussing, then as with Lewis’s story the proper count to give is ‘two’.

³⁴ This, say I, preserves common sense.³⁵

2.2. In Praise of Branching Persons

Let’s see what’s to be said in favor of branching persons. In other words, let’s examine why it is natural to think of a person as the sum of all stages I-related to a stage. As mentioned previously, it would be natural for Parfit and for Lewis to countenance branching persons since this would allow them to maintain their central theses without grave costs. Parfit wouldn’t have

³⁴ On this view, the number of objects (counting by identity) to which we can refer at a time by thinking of objects that exist at that time is the number of objects we get counting by identity-at-t. If we think about the duplication chamber prior to the fission, we can only pick out one person, Adam (to pick out Cain, e.g., we have to think of that person who, at some time after the fission, did such and such). If we think about the chamber shortly after the fission, we can only pick out two people, Cain and Abel. As we see, the tie between sameness and reference is quite intimate.

³⁵ A note on methodology: I say the theory *preserves* common sense but not that the theory itself *is* common sense. Unlike many metaphysicians, I see the goal to be theories which preserve the claims of common sense, not theories whose theoretical posits are themselves fitting with common sense. For like-minded voices, compare Stalnaker’s “Counterparts and Identity,” p. 127: “The semantic thesis, and the contrasting one from the standard theory, should be judged on how well they account for the use of ordinary modal language, and not on alleged intuitions about how theoretical terms of the theory relate to the modal language they are being used to explain.” Similarly, see Hazen, “Counterpart-Theoretic Semantics for Modal Logic”, pp. 320-324.

to deny that what matters is identity. Lewis could reconcile what matters with identity and could avoid committing to a plethora of propositional attitudes of which we're unaware.

I have given another reason for countenancing two-headed worms, viz., that when we speak of a person who will undergo fission we say that she will do those things that *either* future branch does. I think we can support this semantic hypothesis by examining our concept of a person. Lewis, like others, has appealed to the analogy between splitting roads and splitting people. But there are other ways we could, and in fact do, individuate objects. The logic of talk of rivers seems to be quite different, for at the confluence of two rivers, one of them necessarily ends. For those who, like me, believe psychological continuity underlies personal identity while physical continuity underlies the identity of most other physical objects, we can perhaps explain why we treat persons differently in cases of fission. For when a non-thinking object splits, as with the fission of an amoeba, *half* of the matter goes to form one of the resulting amoebae while the *other half* goes to form the other. In contrast, with the fission of people *all* of the beliefs, desires, etc. persist unaltered in both resulting streams of consciousness. Perhaps, then, it is the large sudden change in the essential make-up of physical objects and the lack of a change in the essential make-up of thinking things that explains why we treat cases of the fission of persons so differently. Thus, if one believes it is the physical make-up that is key for the persistence of most objects but the psychological make-up that is key for the persistence of thinking objects, it is very natural to say that Adam is a single person who will survive as two different people, even though we wouldn't say something similar for chairs or amoebae.³⁶

³⁶ In fact, there are other sorts of physical objects that also undergo fission. Waves are not individuated by their matter so much as by the energy they carry. For example, when waves pass through each other, there is no fact of the matter about which bits of water belong to which. It is perhaps because of this that we countenance cases of fission in waves. When a northbound wave and a southbound wave pass through each other, the result is a larger wave. Even though aware that there were two approaching waves and that afterwards there will be two departing waves, we would say that right now there is a *single* large wave. The two waves became one wave at the moment of constructive interference.

Similarly, a single wave passing in one direction can undergo fission. Imagine that a tidal wave, generated by an earthquake, approaches a small island from the south, the wave splitting when it hits the southern point of the island such that the western part of the wave travels up the west side of the island and the eastern part travels up the east

A final reason to countenance branching persons, at least for those like Lewis who think we count by tensed identity, is that we can then explain *why* we count in this way. Lewis tells us it is appropriate to count by tensed identity when talking about the events of a particular time, but he offers no explanation. (In fact, he tells us we're counting people by identity-at-t, but how do we know we're not counting person-stages by identity? We say we're counting people, which supports the one hypothesis, but we also insist we're incrementing the count for each person.) We don't count this way out of ignorance, for even when we know Adam will divide we say he is one person. A more promising explanation is that we say there is one because for practical purposes, or for purposes restricted to a time, this is how we should count. We don't want to count Cain and Abel as two people prior to fission since this multiplicity doesn't affect our daily decisions such as how many plates to set or how many potatoes to cook for dinner. Some story like this, though, doesn't jibe with people's insistence that there really is only one person here now.

I would say instead that we are counting by identity, that we increment our count for each person *at that time*. First consider the count after fission. The only two people that exist then are Cain and Abel, so the proper count is 'two'. One might protest: "What about Adam? Doesn't he exist at that time?" Yes, he does, but he is not *a* person; instead, he is two — specifically, he is Cain and Abel! And prior to fission there is only one person, viz. Adam. "What about Cain and Abel? Aren't they *different* people, and don't they exist prior to fission? They do exist prior to fission, but they aren't different people prior to fission; rather, prior to fission they just are Adam. Thus, on the present account, when we count people at a time, there are particular

side. But let's say the wave traveling up the eastern side reaches the northern tip of the island first, whether because the western shore of the island juts out more and is longer than the eastern shore or because the water is deeper on the western side of the island making the wave on that side slower. The result is that the eastern wave leaves the northern tip of the island first, and some thirty seconds later the western wave hits the northern tip and continues north *following* the wave that came from the eastern side. Thus, after the waves have passed the island we would see what all would describe as *two* waves traveling north, one behind the other. Yet we would also say of each of the two waves that it originated at the site of the earthquake and, paradoxically, that at the site of the earthquake only one wave was spawned, a wave that continued past the island.

individuals we are counting. Prior to fission we count one, viz. Adam. After fission we count two, Cain and Abel. Without branching persons we can't say this. Prior to fission we perhaps could *say* there is one, but there would be no particular individual that we count.

2.3. Considering Objections

Sosa contends that Lewis's account does not explain away the paradox of fission, that common sense conflicts with the story Lewis tells. He considers a case of fission that occurs at t_1 , where according to Lewis two people, P1 and P2, spatially coincide prior to t_1 and diverge thereafter, P1 then traveling to London and P2 to Tokyo.

Suppose at time $t(0.5)$ the stream of consciousness contains the thought T_a : [I will be in London at t_2]. At $t(0.5)$ each of P1 and P2 thus self-attributes the property of being in London at t_2 . It might now be thought that T_a itself must then turn out both true and false. But this is open to a reply: "It is not T_a that can be true or false, just as the sentence 'I will be in Tokyo at t_2 ' can be neither true nor false on its own. What is true or false is rather the thought T_a *relative* to a time/person context such as $t(0.5)/P_1$ or $t(0.5)/P_2$." This seems a promising reply, but there is still trouble ahead.

Suppose that at $t(0.5)$ the stream of consciousness also contains the thought T_b : [I will be in Tokyo at t_2]. At $t(0.5)$ each of P1 and P2 thus self-attributes the property of being in Tokyo at t_2 . But surely at $t(0.5)$ the following thought T_c might also occur: [Noone is both in London and in Tokyo at t_2]. Simple logic then leads from T_a and T_c to $T_b\Box$: [I will *not* be in Tokyo at t_2]; and from T_b and T_c to $T_a\Box$: [I will *not* be in London at t_2]. But it seems absurd to suppose that anyone could at any time fully assent to both T_a and $T_a\Box$ or to both T_b and $T_b\Box$.³⁷

And why exactly is it that I can reasonably believe at $t(0.5)$ *both* that I'll be in London at t_2 *and* that I'll be in Tokyo at t_2 ? According to Sosa,

... T_a and T_b both deserve a place in that stream of consciousness, on the following basis: If one will be in a certain city C at some future time $t\Box$, later than t , it is then logically, metaphysically possible for one to believe correctly at t that one will be in C at $t\Box$, and compossible with anyone else's doing otherwise.³⁸

However, notice that this principle that Sosa endorses states that one can correctly believe certain things compossible with *anyone else's* doing otherwise. In general this principle seems quite reasonable, but in Sosa's argument the force of this is that when we're considering what it is possible for P1 to believe, this is independent of what P2 believes at that time, and in this case it seems intuitively wrong. The problem is that we are not distinguishing between things being

³⁷ "Surviving Matters," p. 300.

³⁸ "Surviving Matters," pp. 300-1.

wholly distinct and things being only *partially distinct*. It is possible for one piece of metal to be in one city while *any other* piece of metal is in another city, but only if ‘any other’ means something wholly distinct from the first. The upper two-thirds of the Eiffel Tower cannot be in London while the lower two-thirds is in Tokyo, for the two are ‘partially identical’. Similarly, Lewis would claim, P1 and P2 overlap, sharing many temporal parts, and therefore the beliefs of P1 at $t(0.5)$ are *not* metaphysically independent of the beliefs of P2 at $t(0.5)$. Prior to fission, P1 can only believe something if P2 also believes it since, after all, in all respects rooted in such times P1 *just is* P2. According to Lewis, ‘Adam’ is ambiguous, referring to two partially overlapping people, and thus if Adam is thinking about his impending fission, each of the overlapping people could believe “*One of us* will be in Tokyo at t_2 ” consistent with believing “*One of us* will be in London at t_2 ”, but they could not entertain the inconsistent first-person singular beliefs required for Sosa’s argument. Lewis’s account is thus immune to Sosa’s objection, for the thoughts Sosa considers are not, after all, compossible.

I, on the other hand, still have some explaining to do. Because Adam is a single individual that has two future branches, it seems it *is* possible and, moreover, reasonable (if he knows of his fission) for him to believe both that he’ll be in Tokyo at t_2 and that he’ll be in London at t_2 . And this, it seems, leads me back into Sosa’s trap. But this puzzle rests on a simple scope ambiguity. Because as temporal parts theorists we are analyzing tensed predications as quantifiers over stages, and because we are now countenancing two-headed time worms, ordinary tensed statements will not be ambiguous, but those involving logical operations will be. “I will be in Tokyo” is true iff *any* future stage of the speaker is in Tokyo. The statement “I will not be in Tokyo at t_2 ,” though, has two readings that in ordinary cases are equivalent but in cases of fission are not. Giving the negation wide scope, the statement is true iff it is not the case that there exists some stage of the speaker at t_2 that is in Tokyo — i.e., iff *neither* branch is in Tokyo at t_2 . Giving the quantifier wide scope, the statement is true iff there

exists some stage of the person at t_2 that is not in Tokyo — i.e., iff *one* of the branches isn't in Tokyo at t_2 .³⁹ This explains away the puzzle that Sosa presents, for not only can someone believe “I will be in Tokyo at t_2 ” and “I will not be in Tokyo at t_2 ”, but, giving the quantifier wide scope, one can even believe both of these *correctly*!

Going further, the claim “Nobody is both in London and in Tokyo at t_2 ,” presents two ambiguities. One ambiguity rests upon whether the conjunction or the quantifier is given wide scope. If a person undergoes fission, perhaps he will be in London at t_2 (by having a stage of one branch there) *and* he will be in Tokyo at t_2 (by having a stage of the other branch there), and so if we interpret “I will be in London and in Tokyo at t_2 ” as equivalent to “I will be in London at t_2 and I will be in Tokyo at t_2 ”, the statement could easily be true. But giving the quantifier wide scope the statement is true iff he has a *stage* that at t_2 is both in London *and* in Tokyo, something precluded by current day geography and human physiology.

The second ambiguity lies with the interaction of the tense of ‘is’ and the range of the quantifier ‘Nobody’. If ‘Nobody’ ranges over all people of all times, and ‘is’ is tenseless, then the statement is false since Adam, the person who entered the duplication chamber at $t(0.5)$, is in London at t_2 and is in Tokyo at t_2 . Of course, it may be technologically, or even physically, impossible for such a thing to happen, but if we’re asking whether fission is conceptually possible, intuitively it is. A more natural way to read the statement, however, is with ‘Nobody’ ranging over the people *at t_2* , and ‘is’ being a present tensed claim of what is *then* possible for those people. But if we pick out any person existing at t_2 by focusing on a slice at t_2 , we find that the person thereby picked out cannot, given current day physiology, be in two different

³⁹ It may seem odd to say that the sentence “I will not be in Tokyo at t_1 ” is ambiguous. We can expect talk of fission to introduce oddities, but this ambiguity is of a piece with what we already find in English. Consider a rich woman saying, “I will not be rich tomorrow.” Is this true if there is a time the following day at which she is not rich, or does its truth require that there not be a time the following day at which she is rich? That is, if she loses her fortune at noon the following day, is the statement true or false? One plausible account is that this is ambiguous in just the way that Adam saying “I will not be in Tokyo at t_2 ” is ambiguous, since both statements involve a scope ambiguity between a quantifier (over times/stages) and a negation.

locations at t_2 . Thus, on its more natural reading the statement is a truth that does not conflict with fission.

Sosa has further suggested that the account I am endorsing violates the requirement of the unity of consciousness.⁴⁰ I take the foregoing discussion to show that the requirement needs to be disambiguated but, properly construed, it is in fact an essential part of the account. Any person we pick out at any time can have at that time only one stream of consciousness. Nonetheless, it is possible that at some later or earlier time that person *will have* or *did have* two streams of consciousness — or, more properly, since on the most natural reading even this will be necessarily false since a person can't have a future or past stage that has two streams of consciousness, that person can at some other time t have a certain stream of consciousness s_1 and that same person can, at t , have stream of consciousness s_2 , even though $s_1 \neq s_2$. As soon as we think of her at that other time and thus think of her two bodies or streams of consciousness, we are then thinking of two persons. Thus, if we conceive a person *at a time* we can never conjure up an image of someone who 'has' two streams of consciousness. It is only when we conceive a branching person using a conception that involves their life stretching out across time that we can truly say, using tenseless predications, that such a person 'has' two streams.

Fine raises a related worry.⁴¹ Consider the sentence "I will think that I am in London," as uttered by Adam prior to his fission. We're concerned with the reading on which Adam will at some later time think that he is *then* in London, not the reading on which he will later think that he was in London at the time of his original utterance. Intuitively the utterance should count as true in the imagined circumstance since, on the semantics I am advocating, Adam *will be* in London and — let's assume he'll be aware of his whereabouts — it seems he *will* think he's there. The difficulty is in specifying the referent of the second 'I', the 'I' in the embedded clause.

⁴⁰ In conversation.

⁴¹ In conversation.

To see the worry, here are various considerations that pull in opposite directions. 1) On the traditional story, a propositional attitude verb like ‘think’ expresses a relation between a subject and a proposition, and the ‘that’-clause following the propositional attitude verb names the proposition so related. So if we say the second ‘I’ refers to Adam, we have Adam later thinking that *Adam* is in London, which would be true if either branch were, at that time, in London. Intuitively, this is not at all what we want. 2) I have suggested that ‘I’ refers to the sum of all stages I-related to the stage that does the uttering, which would mean that both the first and second ‘I’ refer to Adam. 3) However, similar reasoning suggests that when Adam later thinks, “I am in London”, that ‘I’ must refer to Cain. But since it is this later thinking of “I am in London” that makes true Adam's original statement, the proposition expressed by the sentence “I am in London” must, it seems, be the same proposition that Adam's original statement says will be thought by Adam. So it looks like the second ‘I’ refers to Cain. 4) On the other hand, if Cain and Abel both visit London and both think “I am in London”, then the same reasoning we have just gone through can be used to conclude both that the second ‘I’ refers to Cain *and* that it refers to Abel. Since ‘I’ only refers to one individual, the symmetry of the case precludes both that it refers to Cain and that it refers to Abel. In short, it looks like we get into quite a mess once we countenance branching persons.

The problem, however, lies not with branching persons but with the naive semantics we’ve presupposed. One might think the ‘that’-clause, “that I am in London”, names the particular proposition to be thought, a proposition containing the subject, the property the subject instantiates, and the time at which the subject instantiates that property.⁴² But this can't be so. One way to see this in our case is to concentrate not on the role of ‘I’ in Adam's statement but on ‘am’. Just as a simple story for ‘I’ is that this refers to the speaker, so too does a simple story for

⁴² We often ignore the time in question since our concerns lie elsewhere, but there's a long tradition going back at least to Frege insisting that the time is also to be included. "If a time-indication is conveyed by the present tense one must know when the sentence was uttered in order to grasp the thought correctly. Therefore the time of utterance is part of the expression of the thought." ("Thought", p. 332; see also, p. 343)

'am' say that it refers to the time of utterance. But when Adam says "I will think that I am in London" this means (on the intended reading) that he will have a thought at some future time t and what he will think is that he is in London *at t*, i.e. at the time the thought occurs. In fact, speaking of *the* time is misleading since Adam's statement is true iff there is *at least* one time t such that he thinks at t that he is in London at t . Thus, either 'that I am in London' doesn't name a proposition or propositions don't contain particular times. This is hardly news, of course.⁴³ Instead, the correct story will have to say something about 'am' lying within the scope of the future tense of the main clause and therefore being 'shifted by' or 'indexed to' a time satisfying that tense.⁴⁴

If the tense of an embedded clause does not refer to a determinate time but instead is shifted by, or indexed to, the tense of the embedding clause, it seems a similar story can be told for the first person pronoun. The view previously set out was that singular terms refer to some object in virtue of the speaker being 'connected' to a particular stage of the object, the object being the sum of all slices I-related to that focal stage. But we can adjust our story to take into account more complex cases of embedded tenses, just as we altered the naïve story for 'am'. Just as 'am' picks out the time of utterance, which then gets shifted by each tense having scope over it, 'I' focuses on the current stage of the speaker, which then gets shifted by each tense having scope over it. So in this case, 'I' focuses on the stage of the speaker at the time of the utterance, which is then shifted by the future tense having scope over it. Shifting a time is straightforward: 'am' picks out the time of utterance but, because it is within the scope of the future tense of the main clause, the time it picks out is shifted to be a time after this. Similarly, shifting a stage is straightforward: 'I' focuses on the stage of the speaker at the time of the utterance but, because it

⁴³ As Salmon notes, "It has become well known since the middle of the 1970s that the phenomenon of tense cannot be fully assimilated to temporal indexicality, and that the presence of indexical temporal operators necessitates 'double indexing'." ("Tense and Singular Propositions," p. 356.)

⁴⁴ I am purposely steering clear of current controversies about the mechanisms of 'shifting' or 'indexing', since the current issue rides only on there being something of this sort.

is within the scope of the future tense of the main clause, the focus is shifted to a stage that exists after the time of utterance and that is I-related to the pre-shifted stage.⁴⁵

Is this shifting ad hoc, and should this count against a theory countenancing two-headed worms? I think not. First, I have tried to motivate it by considering the independently established shifting of tenses. Second, this shifting is in fact nothing new but is exactly what was already taking place with the treatment of tense in more usual contexts. "David was bent" is true when uttered at t iff 'David' focuses on a stage s and some stage *shifted* from s , i.e. some stage that exists prior to t and is I-related to s , is bent. So we've been shifting stages based upon the tense from the start. Finally, *if* we are to countenance branching persons, then it seems this sort of reference shifting is what we should expect. That is, *if* what happens to Cain and what happens to Abel are things that *will* happen to Adam, and, extending this idea, *if* what currently happens to Bob, who later fuses with Cain, are things that *will have* happened to Adam, then the natural way to capture this is by means of a stage which can shift forward in time along the Adam/Cain worm and backward along the Bob worm. Thus, the notion of shifting stages is not ad hoc but part and parcel of a theory of branching persons.

One might protest that rejecting branching persons allows us to keep our traditional semantic picture according to which 'that'-clauses name propositions that contain subjects and properties, as long as we don't require propositions to contain times as well; for example, some think that propositions are not timeless but are true or false relative to a time. In this way, we could retain the attractive view on which pronouns are connected to referents by means of a simple reference relation. Remember, though, that we already need to explain constructions such as "Each girl will think that *she* is in London" (with the quantifier having wide scope), where pronouns clearly aren't connected by a simple reference relation to an individual. Thus, we

⁴⁵ Of course, while I discuss the shifting of the time and the shifting of the stage separately, they both must shift together, so these two shifts are not independent.

already think some pronoun uses are to be treated as bound variables and thus 'that'-clauses can't name a proposition as traditionally conceived.

Perhaps, though, the real reason we hesitate at the thought of extending indexing to the first-person pronoun and to names is simply because we think that there is no ambiguity about what such terms refer to. Similarly, perhaps we hesitate at the idea that a person could have two futures or two future streams of consciousness because this strikes us as so fantastic. But this is to be expected since we live in a world in which people *don't* undergo fission or fusion. Since we ordinarily do not deal with fission, it should come as no surprise that we see 'I' as in no sense ambiguous and that we conflate different interpretations that pull apart with science fiction. But if we do consider science fiction cases, I suggest, it is natural to think that even though Spock will be on the planet at *t*, this shouldn't stop us from thinking that, because of his fission, it is also the case that he will be on the Enterprise at *t*, just as science fiction so commonly has it.

By separating what we find fantastic from what we consider metaphysically impossible, we can address another line of objection. “You claim to preserve common sense and linguistic intuition,” runs the objection, “and yet there are many claims and inferences quite contrary to common sense that this account will endorse. So at best your account is like all others, preserving some intuitions while sacrificing some. As one example, common sense judges the following inference as valid:

Adam will visit London.

Abel won't visit London.

Therefore, Adam is not the same person as Abel.

The proposed account, however, will endorse the premises and reject the conclusion!”⁴⁶

I claim that the reason common sense recoils at such an inference is because fission is so fantastic, not because the inference requires something that is metaphysically impossible. But

⁴⁶ I owe this objection to an anonymous referee.

how can we know which of these reasons explains why we recoil at this and other claims and inferences? The answer, I believe, is simple. We begin by imagining the fantastic fission case, described neutrally, of course. Only *then* do we probe intuitions and ask whether it would make sense to say that Adam will visit London, that Abel won't, and that Adam and Abel are the same person. The answer, I've suggested, is that common sense then finds no contradiction. The apparent contradiction is felt only when not thinking about the fantastic scenario, for *in everyday cases* it is certainly the case that if X will \square and Y won't, then X and Y are not the same.

A final objection is that, despite my claims to the contrary, the distinction between sameness and identity doesn't fully resolve the paradox, for our intuitions tell us not only a) that people that aren't *the same* can't coincide, but also b) that people that aren't *identical* can't coincide. This objection rests upon two possible mistakes. First, as has been suggested before, most of us think that human fission is practically or medically or perhaps even nomologically impossible, but we must not confuse these intuitions with intuitions of metaphysical impossibility. Perhaps a more common source of error, though, is to explicitly distinguish sameness and identity while nonetheless conflating them in thought. To justify this claim, let's think about how we know whether we're counting by sameness or by identity when we think that two people can't coincide. I know of only one way of telling whether we are focusing on identity. As mentioned, 'the same' and even 'identical' are usually used for qualitative identity, and our counts are often (if not always) counting by sameness, so we can't simply ask ourselves whether two people, or people who are not the same, or even non-identical people, could coincide. Rather, judgments of identity surface in our language when we *re-identify* something. If I say "Yosemite was formed by a glacier" and shortly afterwards say "We'll visit Yosemite again next weekend", I am, presumably, referring to identical places.⁴⁷ The presumption is even stronger with anaphoric references, such as "David ate the fish, but *he* never got sick at all!" or

⁴⁷ Separate arguments are necessary to convince stage theorists.

“The toadstool he was holding, *which* he had found in the Taylor pasture, was poisonous”. Thus, to see whether we intuitively think that coinciding non-identical people are metaphysically possible we simply see how we re-identify people in scenarios in which we’ve imagined fission. What we find, however, is that people are quite willing to say *of Cain*, a person whom we’ve identified after the fission, that he entered the duplication chamber before the fission, and they’ll even say, if I am correct, that *Adam*, a person whom we identify prior to the fission, will visit London after the fission. That is, as we see from our own intuitions and even more starkly with so many science fiction stories, when presented with fission cases we blithely re-identify the person who exists prior to fission with each person who results from the fiction. Thus, our ordinary language intuitions seem to lie squarely within the camp that says that non-identical objects *can* coincide. The supposed intuition that such coincidence is impossible rests, instead, in the conflation of sameness and identity.⁴⁸

3. Remaining Metaphysically Neutral

We have examined Lewis’s resolution of the paradox of fission and my own alternative to his story. Both take our quantifying expressions to be temporally relative. Thus, both can explain how ‘multiple things’, at least in one sense, can be located at the same place at the same time without any mysterious interpenetration of one by the other.⁴⁹ But while I have presented these resolutions of the paradox within the framework of temporal parts theory, the work in resolving the paradox is being done solely by the semantics, and this is, at least to some extent, *independent* of the underlying ontology. Hence, I will now abstract away from the commitments

⁴⁸ Many other theoretical arguments have been given for the impossibility of fission. In my “Statues and Lumps” I argue that these too rest in the conflation of sameness and identity.

⁴⁹ I say ‘in one sense’ because when we are counting by tensed identity we never have two objects constituted of the same parts. At times when Cain and Abel were colocated, there was only *one* person present. However, assuming we also count by identity, then in *this* sense there were two — or, if I am correct, three — people located at the same place at the same time.

of the formulations we have been employing to convince those who eschew temporal parts that the argument I have given up to this point should be equally palatable to them.

3.1. Abstracting Away from Commitments to Temporal Parts

To illustrate this abstraction from metaphysical commitments, let's examine temporal parts theory and one of the metaphysical views competing with it, the theory saying that instead of temporal parts of perduring objects bearing temporary intrinsic properties there are simply enduring objects bearing relations to times.⁵⁰ Thus, while Lewis presents the following sort of truth conditions for future tensed predications:⁵¹

“X will be \square ” is true at t iff a stage of X at some $t' > t$ bears the property \square ,

Lewis's opponent, call her a relationist, provides somewhat different conditions:

“X will be \square ” is true at t iff X bears the relation \square to some $t' > t$.

These two contrasting specifications are in fact each accomplishing two independent tasks. First, they are spelling out what speaker competency of future tensed predications consists in — this is a ‘semantic theory’ in a narrow sense, a Davidsonian truth theory. Second, they are spelling out the ontology underlying change. The first task is carried out simply by stating the truth conditions for our future tensed language in an untensed meta-language.⁵² This can be accomplished with a rather trivial statement as part of a theory of *semantic competence* as follows:

“X will be \square ” is true at t iff X is \square at $t' > t$,

where ‘is \square ’ is a tenseless predication. Corresponding statements handle other tenses.

⁵⁰ Lewis lays out these two views in *On the Plurality of Worlds*, pp. 202-205. A third position that has emerged is that objects instantiate intrinsic properties yet it is the instantiation relation which is temporally relative. I will not discuss this view, though the arguments I am presenting apply equally well, *mutatis mutandis*, to it.

⁵¹ These statements hold only for those properties (or relations, according to the relationist) that are rooted in a time. Properties that *are not* rooted in a time can be analyzed in terms of other properties that *are* rooted in a time.

⁵² As Lepore and Ludwig have argued, because a context insensitive metalanguage is essential for the generality of the analysis, an untensed metalanguage is necessary to capture the indexical nature of our tensed language. (“Outline of a Truth Conditional Semantics for Tense,” §2)

The second task is to state the underlying ontology *in virtue of which* X is \square at t. For the temporal part theorist, a single statement in one's *metaphysical* theory will suffice:⁵³

X is \square at t in virtue of a stage of X at t being \square .⁵⁴

For the relationist, the corresponding statement is:

X is \square at t in virtue of X bearing the \square relation to t.

Those subscribing to yet other metaphysical views will endorse yet other statements.

Now that we see in outline how to separate semantic competence from metaphysics, we can sketch the semantic competency of tensed identity, or sameness, in an ontologically neutral way. First, for comparison, here is the temporal part theorist's statement of tensed identity:

"X and Y are the same" is true at t iff the stage of X at t is identical to the stage of Y at t.⁵⁵

⁵³ Again, these statements hold only for those properties (or relations, according to the relationist) that are rooted in a time.

⁵⁴ As Sally Haslanger has helpfully impressed upon me (in correspondence), the two occurrences of ' \square ' mean slightly different things. The first picks out a relation to a time while the latter picks out a property corresponding to the relation. For ease of exposition, I ignore this here, though this becomes critical in evaluating Lewis's argument from temporary intrinsics.

⁵⁵ First: Notice a worry on this account: Fine has argued ("A Counter-example to Locke's Thesis") that two messages scrawled on the same piece of paper constitute two coincident letters. Intuitively they are 'two' as counting by tensed identity, since it is in virtue of features rooted in a time that we count them as two. If this is right, it suggests that we need to alter Lewis's account such that x and y are the same F at t iff they have identical temporal parts at t *and* the features that make x an F and the way in which those features make it an F are identical to the features that make y an F and they way they do so. It is the one pattern of ink stains that make this piece of paper letter x and another that makes it letter y. Or, in the case of one pattern of ink stains constituting two different messages in different languages, it is the fact that the ink stains mean M_x in language L_x , that makes the piece of letter containing them letter x, and it is the fact that the ink stains mean M_y in language L_y , that makes the piece of letter containing them letter y, even though both letters have both patterns of ink stains on them. I ignore such worries, for the same problem occurs, and the same problem can be fixed just as easily, whether we're spelling out sameness using temporal part talk or ontology-neutral talk.

Second: I say Y is the same as X at t iff *the* stage of X at t is identical to *the* stage of Y at t, yet we can conceive of cases in which X has multiple stages at a time. Branching worms are one example, but a less controversial case is that of the time traveler. Pat travels back to t to warn her younger self of the hard life she will face. There are, it seems, two people in the room, Wizeden Pat with her gray hair bun and Naïve Pat with her flowing auburn locks streaked with blue. One potential problem is that it seems wrong to say that Wizeden Pat's hair is auburn at t. If 'Wizeden Pat' is the name of a person, presumably Pat, then on the current semantics it looks like both "Wizeden Pat has gray hair at t" and "Wizeden Pat has auburn hair at t" should both be true, since Pat has a stage at t with gray hair and also has a stage at t with auburn hair. But notice that phase sortals commonly restrict attention to particular stages depending upon context. While "This toddler will some day be forty years old" is felicitous, "The toddler

To remain neutral with respect to the underlying ontology, we can simply say:

“X and Y are the same” is true at t iff the set of properties X has that are rooted in t are identical to the set of properties Y has that are rooted in t.

These truth conditions remain metaphysically neutral, allow for ‘one’ thing to become ‘two’, and yet allow us to avoid the inconsistencies thought to be inherent in everyday talk of fission. Whichever metaphysical theory might turn out to be true, or even if there is no deeper metaphysical truth about what it is for something to change, we can dissolve our paradox solely with semantics.

Of course, not only can we remain neutral in spelling out sameness. We can also spell out various theories of personal identity with purely semantic theories. And again our specification of semantic competence can look much like the temporal part theorist’s statements, though this time about personal identity. In fact, we can mimic the temporal part theorist’s

joined the Navy” sounds wrong if she didn’t join the Navy until the age of nineteen. Presumably, context determines whether ‘toddler’ is restricting our quantifiers to stages of toddlerhood or whether it is being used solely to pick out the subject. Similarly, ‘Wizened Pat’ can, depending upon context, serve not only to pick out Pat but also to restrict our quantifiers to range only over older stages of Pat. A similar story would seem to resolve potential problems with claims of sameness. Intuitively, Wizened Pat and Naïve Pat are the two people in the room at t, and thus the semantics for sameness would seem to steer us wrong since Wizened Pat has a stage at t that is identical to a stage of Naïve Pat’s. But restricted quantifiers will, as before, preclude quantifying over a stage of Wizened Pat that is from her youth. Consider an independent motivation for this view. Philosophers and linguists have discussed how “Four thousand ships passed through the lock last year” can have two readings, one on which there must be four thousand *ships* and one on which this requires only that there be four thousand *ship passings*. Barker (“Individuation and Quantification”) argues that the latter reading requires quantifying over ship segments that extend throughout a passage or perhaps somewhat beyond. Szabó (forthcoming) suggests that we instead quantify over extended *states* of ship passings. In either case, the net effect is to restrict which momentary stages that will be considered as part of the objects in question, exactly what we currently need. Thus, in most cases, even if there are multiple stages of an object in question, quantifier restriction will restrict attention to the stage of concern. For this reason, and for ease of exposition, I spell out sameness in terms of *the* stage at t. Nonetheless, there will be some cases in which context does not specify which of multiple stages at a time is intended, so the truth conditions for sameness, like those for predication, are more properly spelled out in terms of *a* stage at t.

Third: The standard temporal parts view is that two objects, b and c, that are constituted of the same things at t will share a stage at t. One might have a competing view, however, that the stage of b at t and the stage of c at t might not be identical since they differ modally. Thus, a more general way to express the temporal parts truth conditions would be:

“X and Y are the same” is true at t iff the non-modal properties of the stage of X at t are identical to the non-modal properties of the stage of Y at t.

account. The temporal part theorist that I have envisioned says persons are sums of all person stages I-related to a particular stage. Person stages are, in turn, sums of simultaneous stages of pieces of matter that bear the S-relation to each other, let us say.⁵⁶ Note that the temporal part theorist we are considering helps herself to the I-relation, i.e., the general conditions for constituting a person *over time*, as well as to the S-relation, i.e. the general conditions for constituting a person *at a time*. In fact, all the temporal part theorist *does* provide is the underlying ontological basis for persons, i.e., that persons are sums of person stages that are sums of stages of pieces of matter.

Keeping to a neutral framework we can instead say that a person is constituted of, as common sense has it, a quantity of matter. Which quantity of matter? For any time *t*, a quantity of matter constitutes a person at *t* iff it satisfies the same conditions, though relativized to a time, that the temporal part theorist presupposes in her conditions for being a person stage. Where the temporal part theorist specifies when the *constitution* relation holds between *particle stages* and *person stages*, we can remain ontologically neutral by specifying when the *constitution at a time* relation holds between *particles* and *persons*. For example, perhaps the temporal part theorist says particle stages constitute a person stage only if they are all contiguous; parroting this, we can say that a collection of particles constitutes a person *at t* only if they are all contiguous *at t*. For any property or relation mentioned by the temporal part theorist, we can use the time-relative correlates to translate out of the temporal part theorist's four-dimensional jargon.

In a similar way we can handle the conditions for being a person *over time*: we can say that a collection *c* of particles that constitutes a person at time *t*, and a collection *c'* of particles that constitutes a person at *t'* constitute identical persons just in case *c* at *t* and *c'* at *t'* satisfy the conditions specified in the I-relation. For example, perhaps the temporal part theorist requires persons to be made up of person stages bearing certain causal relations between them. Likewise,

⁵⁶ Cf. Lewis, "Rearrangement of Particles," p. 71.

we can require that those same causal relations obtain between c at t and c' at t' (or between the properties instantiated by c at t and the properties instantiated by c' at t'). Thus, we can specify the conditions for being a person that are parallel to those offered by the temporal part theorist but without committing to any momentary objects such as person stages or particle stages.

Spelling out the truth conditions for sameness and for personal identity, we thereby show how the claims of common sense about fission cases are in fact consistent. Spelling these out in metaphysically neutral terms, we show that this resolution does not commit us to temporal parts.

3.2. Keeping *Entirely* Neutral

If the argument presented is correct, the resolution of the paradox of fission does not require temporal parts and so can be embraced by perdurantist and endurantist alike. In fact, a variety of metaphysical underpinnings can be accommodated equally well. Views that countenance the same ordinary objects with the same spatio-temporal profiles will, ipso facto, allow the same resolution. By briefly examining one metaphysical view that doesn't meet this criterion, though, I think we can see that something similar will also work with yet other metaphysical views. The general idea is that while the truth conditions I have been endorsing are incompatible with various radical metaphysical views, those who defend such views already need a story to tell to accommodate their views with everyday talk, and that same story can, in some cases, allow us to adjust the truth conditions accordingly.

To illustrate, consider then the nihilist, who believes in simples but not in complex objects and, a fortiori, not in coinciding macrophysical objects. The nihilist will have to say something about the relation between nihilism and everyday talk. Perhaps she will offer some paraphrase story such that everyday talk of statues, for example, is literally true, though expressing propositions about statue-wise collections of simples. Or perhaps she will offer a story about implicatures such that what we say (e.g., that there are statues) is literally false though what we convey (e.g., that there are statue-wise collections of simples) is true. Or perhaps she thinks even this sort of justification of everyday talk isn't available, in which case

she will provide an error theory explaining why we erroneously say the things we commonly do about statues whenever there are statue-wise arrangements of simples. In any case, if nihilism is right, then there must be some explanation of why we say what we do whenever there are certain arrangements of simples.

We even know, at least in outline, what shape this story will take, for it will be modeled on what others call the synchronic and diachronic ‘identity conditions’ for the various sorts of objects — though the nihilist will deny that these are, strictly speaking, *identity* conditions since there are no such objects to be identical across space and time. The standard view is that synchronic identity conditions spell out what is required for objects to occupy a spatial region at a time and diachronic identity conditions spell out what is required for those objects to span times. The identity conditions specify, in terms of a lower level description of the distribution of matter and property instantiations across space and time, where and when an object of kind K exists. For example, given the actual distribution across space and time of the various bits of matter and the properties instantiated by that matter, the identity conditions for persons will specify that a person came into existence in San Francisco on May 31st, and that that same person sits now at this very computer typing. These conditions may well be wrong by the nihilist’s lights, for they talk about objects such as people and computers, but they at least specify the conditions, in terms of arrangements of matter, when we *say* there are objects. In this way the nihilist will be able to explain everyday claims about objects, both claims about which objects there are and claims about what these objects *did* do, *are* doing, or *will* do.

Claims about fission and time travel, however, are not so easily accommodated. The problem is that with cases of fission the nihilist will find, much as the temporal parts theorist finds, that leading up to the time of fission there is a sequence of states with simples arranged person-wise at a time, after the time of fission there are two sequences of states with simples arranged person-wise at a time, and yet — if I am correct — each of the future sequences satisfies the normal diachronic conditions for being considered ‘the same person’ as that composed of the initial sequence of states. Thus, even after reconciling most claims about

persons with the nihilist ontology, the nihilist faces an *additional* puzzle. Normally people make claims that conform to the transitivity of identity, but here it appears they don't.

The resolution of the puzzle, as I have argued, is to recognize the temporal relativity of natural language quantifiers, which in turn removes the perception that our talk conflicts with the transitivity of identity. This explains why we say there is one person prior to fission, two people afterwards, and yet no births or deaths. The nihilist tells a story — of whatever sort she wishes — that bridges the person-wise arrangements of simples to our talk of persons. But once we consider cases where one person becomes two, then we need an additional piece of the puzzle, that involving a proper understanding of our natural language quantifiers. Thus, while the resolution of the paradox of fission being defended will no doubt conflict with many metaphysical views, it appears that there are quite a few with which it is compatible.

Consider next someone who holds that at least some ordinary objects exist, but never coinciding objects. He too will have some explanation of everyday talk of everyday objects, especially objects such as statues and the pieces of copper of which they're constituted, where there is reason to say multiple objects coincide. Using a paraphrase strategy or a theory of implicature or an error theory, he too will explain why people say the things they do about material objects. If he says the statue really exists but not the longer-living piece of copper of which it is made, he will have some explanation of why people talk as if there is an object with the diachronic identity conditions for pieces of copper. If he says the piece of copper really exists but not the statue, he will have some explanation of why people talk as if there is an object with the diachronic identity conditions for statues. But once he explains why we talk as if the other object, he still leaves us with the puzzle of why, even though we say the statue and the piece both exist, we say there is only one object. For this we again need the temporal relativity of natural language quantifiers.

Dominant kind theorists, for example, deny that there are ever two coinciding objects, a freshly formed statue and a long-lived piece of copper. Rather, only one object exists, that with

the persistence conditions of the kind that ‘dominates’. Statues are dominant over pieces, so only the newly created object exists. According to Burke, this object is both a statue and a piece, but the cylindrical piece of copper from which the artist formed the statue was a numerically distinct piece that ceased to exist when the statue was formed.⁵⁷ Because this flies in the face of common sense, Burke explains why people mistakenly think that the piece before us was in the garage last week. Whether or not his explanation succeeds, there is something else that he leaves unexplained. As mentioned, he does explain why people mistakenly think that there is a piece before us that was in the garage last week. He does not, and need not, explain why people think that right now only one object is before us, since this piece of common sense is, according to Burke, correct. But he leaves unexplained why the same person will so blithely think *both* of these thoughts. If people think this piece existed last week and yet think this statue did not, then why are they not puzzled by their thought that there is only one object here? The explanation, I suggest, is that natural language quantifiers are temporally relative.

Thus, an ontology based upon dominant kinds is compatible with the temporal relativity of natural language quantifiers⁵⁸ — in fact, this bit of semantics resolves a puzzle that dominant kinds theorists fail to address. Can a dominant kinds theorist go further and embrace branching persons as well? Here the answer is not so straightforward. Assuming that the dominant kinds theorist denies not only coinciding objects of different sorts but also coinciding objects of the same sort, and since the truth-maker for claims about objects of kind *k* is that very object, this makes it difficult (though not impossible) to apply the resolution being touted here. Thus, the ‘semantic resolution’ under discussion is by no means *entirely* independent of the underlying

⁵⁷ See “Preserving the Principle of One Object to a Place”.

⁵⁸ There is some tension between a dominant kinds view and the view that natural language quantifiers are temporally relative that may not be obvious. For what typically *motivates* the dominant kinds theorist is the desire to come up with a metaphysical picture which will preserve the common sense denial of coincidence. But if natural language quantifiers are temporally relative, this already explains why (material) coincidence is impossible — if two objects have all the same parts at a time then ipso facto the ‘two’ are in fact one — thereby removing the main motivation for a dominant kinds approach.

ontology. More importantly, by going on to countenance branching persons, the dominant kinds theorist can accept the resolution of the paradox of fission being advocated.

We have briefly considered two metaphysical views that *do not* countenance coinciding material objects. We've seen that the semantic resolution of the paradox of fission being touted here is compatible with both. Thus, even the commitment to coinciding objects is not integral to the resolution.

Summary

Having sketched the semantics for our natural language quantifiers, we have seen that there is an interpretation of our words upon which the paradox of fission dissolves. We can, as it were, say what we like. Only one person entered the duplication chamber, viz., Adam;⁵⁹ Adam survived the fission; and yet Cain and Abel, both of whom *were* Adam, now *are* two different people. The semantics of our quantifiers and of our talk of persons shows that such pre-theoretic claims can be consistent after all. Best of all, contrary to standard solutions appealing to some preferred ontology, the resolution we have been exploring does not require a particular metaphysic, for we can spell out the semantics of our quantifiers and even spell out the identity conditions for persons, all the while remaining neutral on any questions concerning underlying ontology.⁶⁰

⁵⁹ Imagine Cain saying, "I was the only person to enter the duplication center," to which Abel responds, "No, because I too was there!" Cain's statement is ambiguous as intuition requires. On one reading he is truly saying that there *was* only one person who entered the center, and that person *is* he. On the other reading, to which Abel may appropriately object, he is falsely saying that there currently *is* only one person who entered the center, and that person is he. That is, we have a simple scope ambiguity, with either the quantifier over times or the quantifier over people (at a time) taking wide scope.

⁶⁰ Many thanks to David Christensen, Troy Cross, Matti Eklund, Kit Fine, Hilary Kornblith, Tim Maudlin, Brian McLaughlin, Martin Montminy, Ernest Sosa, and an anonymous referee for reading drafts and supplying many useful comments.

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