**Modal Persistence and Modal Travel[[1]](#footnote-1)**

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**Abstract**

We argue that there is an interesting modal analogue of temporal persistence, namely modal persistence, and an interesting modal analogue of time travel, namely modal travel. We explicate each of these notions and then argue that there are plausible conditions under which some ordinary objects modally persist. We go on to consider whether it is plausible that any modally persistent objects also modally travel.

**1. Introduction**

Let us consider, first, some features of objects that exist at and along the temporal dimension. Most of us assume that ordinary objects persist through time. In what follows we assume that there exist three-dimensional time-bound and world-bound objects we call *slices,* and that for any arbitrary set of these actual slices there exists something that is composed of those slices. That is, we assume that composition is unrestricted across time. We will say that an object is *temporally extended* iff it is composed of slices, at least some of which exist at different times.

Given a common view about persistence, not all temporally extended objects persist. For on many accounts of persistence an object persists iff (a) the object is temporally extended and (b) all of that object’s slices—its instantaneous temporal parts—are appropriately related *viz*. by some gen-identity relation (i.e. a similarity-cum-causal relation). If so, then the set of persisting objects is a proper subset of the set of temporally extended objects.[[2]](#footnote-2) We will call temporally extended objects that do not persist *merely temporally extended.*

It is common to suppose that the objects that are the referents of our ordinary language terms always (or at least typically) are not *merely* temporally extended: they also persist. Furthermore, assuming that time travel is possible, it is persisting objects that travel in time; merely temporally extended objects do not *travel* in time. With respect to the temporal dimension these assumptions are, though not universal, accepted by many.

Consider, now, the modal dimension. In what follows we assume that, for any arbitrary set of slices that exist at different times and worlds, there exists something that is composed of those slices. That is, we assume cross-world unrestricted mereological composition.[[3]](#footnote-3) By analogy with time, there is a fairly straightforward modal analogue of temporal extension: modal extension. We will say that an object is *modally extended* iff it is composed of slices, at least some of which exist at different possible worlds.[[4]](#footnote-4)

 So far, though not uncontroversial, each of these assumptions has been defended by some philosopher or other. Now we get to the controversial issues. Is there a modal analogue of persistence, what we will call *modal persistence?* If so, is there a modal analogue of time travel, namely, *modal travel*? In this paper we attempt to spell out what modal persistence and modal travel amount to, and to argue that some objects are modally persistent. We then consider whether any modal persistents are also modal travellers. We begin, in the following section, by setting out an account of modal persistence before, in section 3, offering an account of modal travel. Then in sections 4 and 5 we present some cases—intuition pumps if you will—designed to test whether or not we should think that there are objects that are either modally persistent or which modally travel. Our conclusion will be that the existence of modal travellers is not as far-fetched as it may at first seem.

**2. Modal Persistence**

Objects that *temporally* persist are a proper subset of the temporally extended objects. They are objects whose slices are connected directly, or via the ancestral, of some interesting relation or set of relations: those that constitute gen-identity. By parity, if there are objects that *modally* persist they will be a proper subset of the modally extended objects, namely those objects whose slices are connected via some interesting relation or set of relations. The question then arises, first, as to what those relations might be, and second, whether there are any modally extended objects that modally persist.

 One might reason as follows. One of the relations that, of necessity, partially constitutes gen-identity is causal connectedness. Thus slices of temporally persisting objects must, *inter alia*, be appropriately causally connected.[[5]](#footnote-5) Whatever relations are essential to temporal persistence are essential to modal persistence. But since slices in different worlds cannot be causally connected, it follows that there are no modally persisting objects. We think, however, that this reasoning is far too quick. First, it is not obvious that causal connectedness is necessary for temporal persistence. And even if causal connectedness is necessary for temporal persistence, it does not follow that it is necessary for modal persistence.

Assuming that, typically, ordinary objects are four-dimensional objects with counterparts in other possible worlds, one way to ask whether there are any modal persistents is to ask whether any of the modally extended objects are ordinary objects. That is, do any of our ordinary language terms refer to modally extended objects? Or: is there any slice, *s*, that is a part of an object picked out by an ordinary language term, *T*, such that *s*, picked out under that description, has a continuer slice in some other possible world. We take it that if the answer to this question is ‘yes’, then we have reason to think that some modally extended objects are modally persistent.

Before we proceed a clarification is in order. Consider some actual slice, *s*, *de re.* Even limiting ourselves to talk of temporal persistence we take it that there is no fact of the matter as to whether *s* has a continuer slice. *s* is part of infinitely many objects, some of which have no slices that exist after *s* and some of which do have slices that exist after *s*. The question “does *s* have a continuer?” thus has no determinate answer. Instead, we want to ask “does *s* have an X-continuer?” where ‘X’ picks out a kind of object, or, if you prefer, ‘X’ picks out a temporal counterpart or modal counterpart relation. Thus we can profitably ask whether, for instance, *s* has a person-continuer. It is natural to suppose that *s* has a person-continuer iff there is some object, O, which is a person, such that *s* is a part of O, and there is some slice, *s*\*, that exists later than *s*, such that *s*\* is part of O.[[6]](#footnote-6) However, the locution ‘later than s’ cannot be read solely as a temporal relation if we are interested in modal persistence, since at least some slices of modally extended objects are not temporally related.

Thus it will be useful for us to introduce the idea of an object’s ‘personal-time’. Here we intend the notion in a similar way to Lewis (1976). We take talk about the personal-time of some object, O, to be a loose way of talking about a relation, *R*, that generates a total order on a set of slices whose members compose O. We call this ordering a *personal-ordering.* Just what relation *R* is will depend on what kind of object O is. But we should flag that we do not assume that all relevant *R*-relations are causal. Then talk of slices being earlier, or later, than one another is talk of the personal-ordering of those slices relative to some object of which those slices are parts. In particular we can say that a slice, *s,* of O is later than *s*\* of O iff *s* occurs earlier in the person-ordering of O’s slices than does *s*\*. Thus for any object, O, whose slices can be personally-ordered, slice *s* has an O-continuer, *s*\*, iff *s* and *s*\* are parts of O and *s*\* is later in the person-ordering of O than is *s*.

 We can now recast our question about modal persistence into the question: “Are there any slices that have an N-continuer in another possible world?” where ‘N’ is filled in with some ordinary sortal term such as person, toaster, dog or aardwolf. Since we are all familiar with persons, and not so familiar with aardwolves, let us focus on these. Consider an actual slice, *s*. If we assume unrestricted composition across worlds it follows that *s* is part of many modally extended objects. But if *s* has a person-continuer in some non-actual world, *w*, then not only are there merely modally extended objects there are, according to us, also modally persistent objects: persons. On the other hand, if *s* has no person-continuers in any non-actual world, but has person-counterparts in non-actual worlds that have person-continuers, then *s* has *merely possible continuers* in those worlds.

 The distinction between person-continuers and merely possible person-continuers is important. To say that *s*\* is a person-continuer of *s* is to say that (i) *s* and *s*\* are parts of a person, O, and (ii) *s*\* is later in the person-ordering of O than is *s*. Person-continuers are the truthmakers for claims about what a person does. If it is true, of *s*, that *s* wears a yellow skirt tomorrow, then that is because *s* has a person-continuer, *s*\*, that wears a yellow skirt. Merely possible person-continuers, on the other hand, are the truthmakers for claims about what a person possibly but not actually does. If it is true, of *s*, that *s* could have worn a brown jumper tomorrow rather than a black jumper, this will be because (a) *s*’s person-continuer wears a black jumper and (b) *s* has a merely possible person-continuer that wears a brown jumper. To say that *s\** is a merely possible person-continuer of *s* is to say that *s*\* is a person-continuer of a person-counterpart of *s*. While it is uncontroversial that actual person stages have merely possible person-continuers, what is controversial is whether any have person-continuers existing at other possible worlds. If they do, such persons are modally persistent.

**3. Modal Travel**

Let us suppose for a moment that there are modal persistents and ask what it would take for there to be modal travel. Time travel occurs when the personal-time of an object comes apart from real time. More carefully, we can say that the personal-time of O and real time *match*, iff when we order the set of slices, S, that compose O, via the personal-ordering relation we generate an ordered set, S\*, and when we order those same slices via the temporal relations of later-then and earlier-than, we generate the same ordered set, S\*. On the other hand, the personal time of O and real time fail to match iff when we order the set of slices, S, that compose O, via the personal-ordering relation we generate an ordered set, S\*, and when we order those same slices via the temporal relations of later-then and earlier-than, we generate a distinct ordered set, S’. If the personal-time of O fails to match real time then O is a time traveller.

 By parity, we can identify modal travel with those cases of modal persistence where the personal-time of an object fails to match the real modal order. The problem immediately lies in the notion of a modal order. Insofar as worlds can be ordered by a modal relation the way times can be ordered by a temporal relation, the most usual candidate to produce that ordering (or at least to produce a partial ordering) is that of similarity. Indeed, for the purposes of spelling out modal travel we cannot think of another, better, relation to play the modal analogue of a temporal ordering. So let us suppose that there is a unique best way to partially order modal space in terms of a similarity metric. Call this the *modal ordering*.

 Given this we can say that an object, O, modally travels iff the personal time of O and the modal order fail to match. More specifically, O modally travels iff when we order the set of slices, S, that compose O via the personal-ordering relation we generate an ordered set, S\*, and when we order those same slices via the modal ordering relation we generate a distinct ordered set, S’. Suppose O has a slice *s* actual world and a continuer-slice *s*\* in a non-actual world. For the personal time of O to matchthe modal ordering O's ‘next’ stage must be located at the closest possible world to the actual world, and the next stage after that must be located at the next closest possible world, and so on. If at any point O ‘jumps’ worlds by having its next stage in a world that is not the next closest world, then O modally travels.

 Given such a modal ordering, we can see why modal travel, thus defined, is an analogue of time travel.[[7]](#footnote-7) For an object time travels just in case instead of its worldline being a straight line through time, instead its worldline jumps around (or changes direction). Likewise, an object modally travels just in case instead of its worldline being a straight line through modal space (so that the object moves from one world to the next most similar world) instead its worldline jumps around in modal space. As with time travel and persistence, both modal travel and modal persistence involve travel. Yet in neither the temporal nor the modal case does any individual slice go anywhere. Both temporal or modal persistence occurs in virtue of a slice having continuers located at a certain place: a time or a world. A slice counts as having travelling N-continuers just in case it has N-continuers, and the order of the slices that compose N comes apart from the temporal or the modal ordering of those slices.

 None of this, of course, shows that there *are* any modal persistents or modal travellers. In what follows we consider some cases to try and determine whether it is plausible that there are cases of modal persistence, and, if there are such cases, whether it is plausible that there are also cases of modal travel.

**4. Modal Persistents**

In what follows we introduce the first of two toy cases designed to test intuitions about the presence, or absence, of modal persistence. Since we are interested in trying to find instances of modal persistence if there are any, we focus on cases that we think are, most plausibly, cases of modal persistence (if anything is). We focus on a case in which the relevant objects are persons and we will use the term ‘stage’ to pick out short-lived sets of slices.[[8]](#footnote-8)

*Case 1:* In the actual world, *w*, a stage, *s*, of a person, J, is walking down the street at time *t* when a highly improbable chancy quantum event causes all the particles that compose *s* to suddenly disperse such that after *t*, there exists no slice of Jin the actual world. In a possible world, *w*\*, a highly improbable chancy event brings a set of particles together to compose something, *s*\*, that is a near psychological and physical duplicate of *s*, differing only in that *s*\* has an additional moment of experiences and memories.

There is *some* modally extended object that has *s* and *s*\* as parts. Our question is whether *s* and *s*\* are stages of a single person, J, or, alternatively, whether *s*\* is a *person*-continuer of *s* or merely a person-continuer of a counterpart of *s*.

 Before answering this question a clarification is in order regarding our methodology. Compare Case 1 to Case 1\* below.

*Case 1\**: A stage, *s*, of a person, J, is walking down the street at a time, *t*, when a highly probable chancy quantum event causes all of the particles that compose her to suddenly disperse. Although it is not actually so, it is possible that another highly improbable chancy event might have brought all those particles together to compose something, *s*\*, that is a near psychological and physical duplicate of *s,* differing only in that *s*\* has an additional moment of experiences and memories.

One might think that Case 1\* provides a more natural description of the same events described in Case 1. Perhaps this is true; however, Case 1\* is ambiguous in a way that Case 1 is not. On a natural reading Case 1\* at best says that Jhas a counterpart stage at *w*\*. According to the view we are assuming an object has its modal properties in virtue of having counterparts with those properties. The statement “*s* possibly but not actually has a person-continuer” is naturally read as saying that *s* does not have a person-continuer but has a counterpart which does. But to have a counterpart in another possible world which persists is not to modally persist. For a counterpart stage is not a continuer (at least not necessarily). Case 1 does not rule out modal persistence in this way. It allows that *s*\*be either a person-continuer *or* a counterpart stage of *s*. And if *s*\* is a person-continuer of *s* then J is modally persists.

 Case 1\* also raises the question: if J modally persists does she *actually* modally persist or does she *possibly* modally persist? But this question makes little or no sense. Modal persistence is not something that happens *within* worlds but rather *between* them. For these reasons we believe that modal persistence and travel must be discussed using amodal language like that used in Case 1. With this in mind let us move on.

Those who think that for any two slices, those slices are parts of the same person only if those slices are appropriately causally connected will not find themselves disposed to think that *s*\* is a person-continuer of *s*. There are, however, views of personal-identity that hold that personal-identity is best thought of as a role that can be realised by different relations, some of which may not be causal.[[9]](#footnote-9) Without going into the details of any particular view of personal-identity, there are many very flexible accounts that could in principle accommodate the modal persistence of persons. For instance, although one might think that causal connections are typically present between person-stages, on might hold that in the absence of such connections a high degree of similarity between stages will do. Consider the temporal analogue of Case 1:

*TEMP 1*: A stage *s'* of a person P is walking down the street at a time, *t*, when a highly probable chancy quantum event causes all of the particles that compose her to suddenly disperse. A moment later a highly improbable chancy event brings a set of particles together to compose something, *s''*, that is a near psychological and physical duplicate of *s'*, differencing only in that *s''* has an additional moment of experiences and memories.

No appropriate causal connections obtain between *s'* and *s''*. Equally, no appropriate causal connections obtain between *s* and any person-slice that is a candidate to be a continuer of *s'*. So either *s'* has no person-continuers, or *s''* is its continuer. One might have the following intuition in such a case: were there any causally connected stages to *s*', then those would be its continuer stages. But in the absence of such stages a very high degree of similarity is enough. That is, one might think that *s''* is a good enough deserver to count as being a continuer stage of *s'* given the lack of any better candidates. If one had such a view in the temporal case, it seems likely one should also have that view with respect to Case 1. For that is a case in which there is no person-stage that is appropriately causally connected to *s*, but in which there is a stage, *s*\*, which is very similar to *s*.

 If one shares this intuition then one thinks that there are modally persistent objects. Of course, since there are very many worlds with (near) psychological and physical duplicates of *s* at *t*, one might worry that on further reflection our intuitions tell us that *s*\* is not a person-continuer of *s*. After all, if *s*\* is a person-continuer of *s*, then surely so too is *s*\*\*, a duplicate of *s*\* that exists in *w*\*\*, and so on. If so, then one is committed to thinking that *s* has infinitely many person-continuers: the quantum event that disrupted *s* in the actual world has, in effect, caused the person of which it is a part, J, to undergo massive fission. And if that seems implausible then, one might suppose, this tells us that *none* of *s*\*, *s*\*\* or any other duplicate, is a person-continuer of *s*.

 It seems to us, however, that the all-or-nothing approach can be avoided. While it is true that the intrinsic similarity of the relevant slice(s) is important, it does not follow that no other factors are important. Of the set of worlds containing intrinsic duplicates of *s* at *t*, many worlds will be utterly dissimilar to the actual world. We think it plausible that one constraint on the personal-identity relation in cases where there are no appropriately causally connected person-stages is that both similarity of persons-stage and overall similarity of the world in question matter. Thus, we think, of the person-slices that are the most similar to *s* at *t*, the only candidates to be continuers of *s* are those slices that exist in worlds that are the most similar to the actual world. There may be no uniquely most similar world to the actual world that contains a duplicate of *s* at *t*. Then the modal case would look like the following temporal analogue:

At *t* there is a person-slice, *s*, and a quantum event causes the matter that composes *s* to dissipate. At a moment after *t* there is a set of times, *t*1…*t*n such that each of these times is later than *t*, and none of these times bears any temporal relationship to each other. Somewhat different events occur at each of these times, but each time is equally similar to the times earlier than it. At each of these times there exists a near physical and psychological duplicate of *s* at *t*.

In a way this is a story in which time itself splits such that there are many instances that bear temporal relations to other earlier instances, but not to one another. We could think of this as the world itself fissioning, temporally. If one is inclined to think that each of the duplicates of *s* at each of those times is a person-continuer of *s*, then one will likely also be disposed to say that all of the duplicates of *s* that exist at equally close worlds, are person-continuers of *s*.

Call the personal identity relation that captures these intuitions '*R*1'*.**R*1 privileges causally connected stages where they exist, but only insofar as these are not greatly more dissimilar physically and psychologically than some causally unconnected stage or stages.

 We are more than happy to admit that not everyone will share these intuitions. Not everyone will think that *R*1 is a correct characterisation of the personal-identity relation. Nevertheless, we think that the overall judgements of some will be captured by a relation like *R*1. Moreover, as long as the rest of us find it conceivable that *R*1 is the correct characterisation of the personal-identity relation, then we can also see how it could be, epistemically speaking, that there is modal persistence (even if in fact we think there is not). Thus we can understand why one might think that Case 1 is an instance of modal persistence. Holding fixed for the moment that this is a case of modal persistence, we can now ask whether it is also a case of modal travel. We turn to this in the following section, where we also introduce a second toy case to further test our intuitions.

**5. Modal Travellers**

Suppose that J is modally persistent person. Is J a modal traveller? Recall that a modally persistent object is a modal traveller just in case the personal-ordering of its slices fails to match the modal ordering of its slices. Roughly, a modally persistent object is a modal traveller if at some point in time it ‘jumps’ to a world which is not extremely similar to the last world that it inhabited. In Case 1 the cause of the dissipation of all of the matter composing *s* is an unlikely quantum event. Let us assume that the modal order of worlds is delivered, in part, by a similarity metric and that that metric prioritises sameness of laws of nature over sameness of matters of particular fact.[[10]](#footnote-10) Then we know that the closest worlds to the actual world are ones that share the same laws. Of those, the closest still are those that are most similar in matters of fact. Since there are worlds that share the same laws as the actual world in which the relevant quantum event does occur (as it does actually) we should expect these worlds to be closer than are the worlds with the same laws, in which the quantum event does *not* occur. But the closest worlds—those with the same laws in which the quantum event does occur—will be worlds in which there is no near duplicate of *s*. Worlds with the same laws in which the quantum event does not occur will be worlds in which there is a near duplicate of *s*. That means that the person-continuer of *s*, *s*\*, will not be located in the closest world. And that makes J a modal traveller. Intuitively, this is modal travel because J effectively gets to another world (by having a person-stage there) and does so without modally persisting through other, closer, worlds. However, this is modal travel in the same way that travelling back in time by two minutes is time travel. It is time/modal travel, but the traveller really hasn’t gone very far along the temporal or modal dimension. Moreover, such travel is only interesting if there is an interesting, robust, sense in which there is a modal order. We leave consideration of that issue to the reader.

 To get a sense of some more interesting cases of modal travel, then, let us turn to another toy case.

*Case 2:* In the actual world, *w*, a stage, *s*, of a person, M, is abducted by an evil genius on Sunday morning. Throughout Sunday, in *w*, a stage, *s*c, that is causally connected to *s* lies in a deep coma as a result of the evil genius’ actions. On Sunday morning in a possible world, *w*\*, there exists a stage, *s*\*, that is a near psychological and physical duplicate of *s* except that throughout Sunday *s*\* experiences some events, and forms some memories in addition to the experiences and memories that are duplicates of those of *s.* *s*\* goes to sleep on Sunday evening. On Monday morning *s*c is brought out of its coma by the evil genius. An unlikely quantum event instantaneously changes the distribution of matter in the brain of *s*c so that the stage immediately causally downstream of it, *s*a, is a near psychological duplicate of *s*\*. Consequently, *s*a has memories which are qualitative duplicates of *s*\*’s memories.

Of which stages is the person, M, composed? One possibility is that M is composed entirely of actual stages (*s*, *s*c,and *s*a). M is kidnapped, kept in a coma, and then has massive memory disruption before awakening. Another possibility is that M is composed of some non-actual stages. Indeed, if one is inclined to think that J is modally persistent, and to think that *R*1 (or something like it) captures our intuitive judgements about the persona-identity relation, then one ought also to be inclined to say that M is modally persistent. For there is a significant similarity gap between *s*c and *s*a such that *s*\* is appreciably more similar to *s*c than is *s*a. Thus if *R*1 is the relation that unites person-stages then *s*\* is a person-continuer of *s* and M is a modally persistent person. Not only that, but M is a modal traveller. For the world in which *s*\* exists is clearly some distance from the actual world: it is a world in which no kidnapping occurred. M modally travels by, effectively, ‘jumping’ across all of the worlds in which the counterparts of *s* are kidnapped, and ‘landing’ in a world in which there is a person-continuer of *s* that is not kidnapped.

 If *R*1 captures our judgements about personal-identity then it follows that the person-stages that are appropriately causally connected to *s*\* in *w*\* are person-continuers of *s*. For *R*1 privileges causal relations above mere similarity. Thus given *R*1, the person M is composed of *s*, *s*\*, and then the person-stages that are appropriately similar and causally related to *s*\* in *w*\*. M does not, then, ever return to the actual world: *s*a is not a stage of M. One might, however, be inclined to think that M returns to the actual world and is therefore composed of *s, s*c, *s*\*, and *s*a (in that order). But how could this be given that *s*\* has stages which are both appropriately causally connected and relevantly similar? That is, how could a stage in *w* be a person-continuer of *s*\* given that *s*\* clearly has person continuers in *w*\*? The answer is that *s*\*’s person-continuers in *w\** need not also be person-continuers of *s*. There is a person, M, composed of *s*, *s*c *s*\*, and *s*a who is a modal traveller. And there is some *other* person, M\*, composed of *s*\* and the person-continuers of *s*\* in *w*\*. *s*\* is therefore part of two different persons. This flexible view of personal identity relations—namely that different stages will have different sets of continuers—is not a new idea[[11]](#footnote-11) and seems plausible in this context.

 Clearly, *R*1 cannot capture this intuition. For *R*1 says that for a stage to be a person-continuer of *s*\* it must be both relevantly similar and causally connected in the right way. We have been supposing that there is such a stage in *w*\*: thus, this stage is the person-continuer of *s*\*. (That is, this stage is the next stage of M following *s*\*.) Instead, what we want is a relation that favours actual causal relations over merely possible causal relations. Or perhaps better, we want the (relevant) causal relations that obtain between a stage, *s*1, in a world, *w*1, and appropriately connected stages in *w*1 to trump the (relevant) causal relations that obtain between an N-continuer of *s*, *s*2, in a world *w*2 and stages in that world. Call this relation ‘*R*2’. We want *R*2 to say that *s*\* is a person-continuer of *s*c, as per *R*1, but deny that all person-continuers of *s*\* are also person-continuers of *s*. Intuitively, if a person-stage, *s,* has appropriately causally connected stages, then those are person-continuers of *s* even if an immediate person-continuer of *s*, *s*\*, also has (different) appropriately causally connected stages that are, therefore, person-continuers of *s*\*, provided that the appropriated causally connected stages are relevantly similar to *s\**. Thus, there may be a person composed of the stages *s, s*c*, s\** and *s*a despite the fact that *s*\* has person-continuers in *w*\* which do not include *s*a. (After all, *s*a is in *w* not *w*\*.)

 If we want to know which stages are person-continuers of *s* (as opposed to person-continuers of *s*\*) then *R*2 tells us to include, first, all of the appropriately causally connected and relevantly similar stages, and then to include the stages that are not appropriately connected but are relevantly similar (such as *s*\*) where there is no appropriately connected relevantly similar stage. It then tells us to consider all of the stages that are relevantly similar to that stage—namely *s*\*—and if one of those stages is appropriately causally connected to *s* then it is *s*’s person-continuer. If no such stage exists, then the person-continuers of *s*\* will also be the person continuers of *s*. The idea is that in order to find out what the next stage of M after *s*\* is we need to determine what *s*’s (indirect) person-continuer are, and notwhat *s*\*’s person-continuers are. Thus, although (relevant) similarity is assessed relative to *s*\*, (appropriate) causal connectedness is evaluated relative to *s*. Under *R*1, on the other hand, similarity and causal connectedness are both evaluated relative to *s*\*. This feature of *R*2 is what allows it to accommodate the intuition that M returns to the actual world on Monday morning.

 Finally, note that if *R*2 correctly captures our judgements about personal-identity then this is a somewhat more interesting case of modal travel. For although M does not meet herself since *s* and *s*c exist at different times, this is the modal analogue of travelling back and meeting your younger self: it is travelling back to the same world at which a person-ancestor exists.[[12]](#footnote-12) If time travel is added then we may have a case in which the modal traveller returns from a non-actual world to meet her younger self.

**6. Conclusion**

We have argued that there are interesting modal analogues of both persistence and time travel. Modal persistence (as we have defined it) occurs whenever an object has a continuer in another possible world. Modal travel occurs whenever a modally persistent object ‘skips over’ nearby possible worlds to get to more distant ones.

 Are there any such objects? We don't claim to know, but we don’t think it is implausible. Certainly modally persistent objects, and even modal travellers, need not be as strange as they may at first seem. In fact, we have argued that there may well be people whose views on personal identity commit them to belief in modal travel. If the intuitions of such people about cases like Case 1 and Case 2 are correct then modal travel is not just an epistemic possibility—modal travel is something that occurs. Thus, for all we know, some objects—persons even—may travel between possible worlds. In fact, for all we know, some *actual* persons may be modal travellers.

**References**

Braddon-Mitchell, D. and Miller, K. (2004). ‘How to be a Conventional Person’ *The Monist* 87(4): 457-474.

Braddon-Mitchell, D and West, C. (2001). “Temporal Phase Pluralism.” *Philosophy and Phenomenological Research* 62(1): pp 1-25**.**

Lewis, D. (1976). “The Paradoxes of Time Travel” *American Philosophical Quarterly* 13: 145-152.

Lewis, D. (1979). “Counterfactual Dependence and Time's Arrow” *Nous* 13(4): 455-476.

Miller, K. (2009). “Deciphering Personal-identity Conventionalism” Special Issue *Rivista di Estetica “Convenzioni”* edited by Elena Casetta and Achille Varzi 44:2 59-85.

Rini, A.A. and M.J. Cresswell (2012). *The World-Time Parallel: Tense and Modality in Logic and Metaphysics*, Cambridge University Press.

Robinson, D. (2004). “Failing to agree or failing to disagree? Personal Identity Quasi-Relativism” *The Monist* 87(4): 512-536.

Weatherson, B. (unpublished ms). “Stages, Worms, Slices and Lumps”. http://brian.weatherson.org/swsl.pdf

1. Published in *Ratio,* 28(3): 241–255 (2015). [↑](#footnote-ref-1)
2. Even those who think that no temporally extended object persists—such as stage theorists—think that it is the existence of slices at different times, related by some gen-identity relation, that makes true claims about what an object did do in the past, or will do in the future in virtue of said slices being temporal counterparts of the object in question. [↑](#footnote-ref-2)
3. This ontological view is sometimes known as *five-dimensionalism*. Five-dimensionalism, however, is also typically held to involve semantic claims, in particular the claim that ordinary objects, i.e. the objects that are picked out by our ordinary terms, are five-dimensional (see Weatherson ms). We do not assume a five-dimensionalist semantics.. Instead, we adopt a perdurantist semantics combined with a five-dimensionalist ontology. [↑](#footnote-ref-3)
4. Thus some, but not all, modally extended objects are also temporally extended. [↑](#footnote-ref-4)
5. We will say that *x* and *y* are appropriately causally connected if either (a) *x* causes *y* or *y* causes *x* or (b) there is a chain of causation linking *x* and *y*. We will say that *x* and *y* are directly causally connected if *x* causes *y* or *y* causes *x*. [↑](#footnote-ref-5)
6. Again, we assume a perdurantist semantics. Thus, if O is a person, O has its modal properties not in virtue of having parts in other possible worlds, but in virtue of having counterparts in other possible worlds. [↑](#footnote-ref-6)
7. We do not claim it is the only analogue. There in fact seem to us to be other phenomena which could also naturally be called “modal analogues” of persistence and time travel. [↑](#footnote-ref-7)
8. These cases are inspired by a case discussed by Rini and Cresswell in their 2012 (pp. 110-111). [↑](#footnote-ref-8)
9. An example of this is *conventionalism* about personal identity. Conventionalists include, *inter alia,* Braddon-Mitchell and West (2001); Braddon-Mitchell and Miller (2004) Miller (2009) and Robinson (2004). [↑](#footnote-ref-9)
10. As in, for example, Lewis (1979) . [↑](#footnote-ref-10)
11. See for instance Braddon-Mitchell and West (2001). [↑](#footnote-ref-11)
12. Again, this is not to say that this is the only modal analogue of travelling back in time and meeting one's younger self. For instance, travelling to a possible world in which one's counterpart exists, and meeting them, also seems to be analogous to time travel. We take it that there are different analogies to be drawn here, each of which may be of interest. [↑](#footnote-ref-12)