

# Persistence: a matter of identity?

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When it's all over, will I myself—the very same person now thinking these thoughts and writing these words—still exist? Will any one of those who do exist afterwards be me? In other words, *what matters in survival is identity*—identity between the I who exists now and the surviving I who will, I hope, still exist then.

David Lewis (1983:56)

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## Abstract

How do objects persist? What does it mean to persist? We do perhaps all have an intuitive understanding of what it means for an object to persist. An answer like “an object that persists exists both in the past and the future” or “a persisting object lasts for a period of time” might immediately come to mind. But the details of persistence become more obscure when we dive into a closer study of persistence and its connected concepts. How can an object that persists through a change of properties be the same identical object before and after this change? Change implies that the object has different properties at different times, which seems to be inconsistent with the concept of identity. In this essay, I will explore the apparent problems with combining persistence with identity and change. The essay will examine solutions from the doctrines of *three dimensionalism* and *four dimensionalism*. My main focus is on the latter doctrine, and specifically on David Lewis’ version called *perdurantism*, and Theodore Sider’s version called *the stage theory*. Sider introduces a rather unorthodox view of persistence which employs a temporal counterpart theory to analyse persistence statements. This theory will be extensively explored and discussed. My claim is that this analysis, though it is unorthodox, is still the best understanding of how things persist. However, its details are not fully accounted for by Sider, and I will propose some adjustments.

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## Introduction

How do objects persist? What does it mean for an object to persist? What is the best way to analyse persistence statements? We experience persisting objects on an everyday basis, and we do perhaps all have an intuitive understanding of what it means for an object to persist. An answer like “an object that persists exists both in the past and the future” or “a persisting object lasts for a period of time” might immediately come to mind. These intuitions are an important starting point for a philosophical study of persistence. As a discipline which utilises conceptual analysis as a main method, such intuitions give the guidelines for what explanations will be accepted. If a philosophical explanation of a concept deviates too far from the common intuitions of that concept, then it is likely that very few will accept it.

In the case of persisting objects, the common intuitions guide us in the direction of ‘sameness’ or ‘identity’ of the object through the time that it lasts. This is to say that we think that a persisting object is one and the same identical object at all points during the time that it lasts. The problem with this thought is that it does not seem to comply with change: An object that changes is not the same – it is not identical – before and after change, even though we would not hesitate to say that it has persisted through the change. An objection to this formulation may be that there are two different ways of using the words ‘same’ and ‘identity’ in the formulation. The object may not be exactly similar looking before change and after change, but it is self-identical nonetheless. The first use of ‘same’ refers to the properties of the object, while the second use tells us the number of objects present: one. The important sense of ‘same’ is the latter: self-identity, or just ‘identity’. But to think that identity is not connected to the first sense of ‘same’ is a mistake. There is a widely accepted condition of identity, which claims that to be identical (meaning self-identity, i.e. only one object) is to instantiate all of the same properties. So if  $x$  is identical to  $y$ , then  $x$  and  $y$  instantiate all of the same properties.<sup>1</sup> This is to say that identity implies complete similarity, which is the first sense of ‘same’.

So how can the persisting object before change be identical with the object after change? Does this incompatibility imply that objects cannot persist through change? If this is the case, there will be very few persisting objects, since change is such a common occurrence. But would there really be any change if nothing persisted through it? Would there not in fact just

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<sup>1</sup> This principle is attributed to Leibniz. I will introduce and discuss it further in chapter 1, section 1.1.

be multiple different objects at different times, which all instantiate incompatible properties from each other?

I will start with the assumption that there are persisting objects, that they do change, and persistence is a matter of identity. With these assumptions, I will formulate an argument that leads to a contradiction. I will call this argument *the problem of persistence through change*. The rest of the essay will explore different attempts at solving this problem, focusing heavily on David Lewis's and Theodore Sider's versions *four dimensionalism*.<sup>2</sup> My conclusion is that the best analysis of persistence is in fact one which deviates slightly from the intuition that persistence is a matter of identity. The suggested relation which accounts for persistence is one called the *temporal counterpart relation*.<sup>3</sup>

### The structure of the essay

The first chapter of this essay explores briefly the components of persistence mentioned earlier: identity, change and of course persistence itself. Based on the finds here, I will formulate a simple argument which ends in a contradiction between the components. I will call this the 'identity through change'-argument, and refer to it as the ITC-argument. This argument must be adjusted somehow to save persistence.

I will examine both three- and four dimensionalist solutions to the ITC-argument. Chapter 2 will explore three versions of three dimensionalism: E.J. Lowe's *endurantism*, Sally Haslanger's *adverbialism* as well as a temporal version of adverbialism. Over all, my view is that the three dimensionalist theories fail at giving a complete theory which is consistent with every aspect of persistence and the related areas connected to persistence. I will therefore move on to the four dimensionalist theories in chapter 3.

In the third chapter I will examine both Lewis' version of four dimensionalism, *perdurantism*, and Sider's version, *the stage theory*. My position is that the stage theory gives a more all-round consistent and virtuous analysis of persistence, but it does have a rather unorthodox view of how objects persist. Sider discards identity and introduces the temporal counterpart relation in its place. This relation will be examined closely and discussed in chapter 4.

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<sup>2</sup> Four dimensionalism is introduced in chapter 1, section 1.6, and explored further in chapter 3, 4 and 5.

<sup>3</sup> The temporal counterpart relation is introduced and examined in chapter 4.

The discussions of perdurantism, the stage theory and the temporal counterpart theory will be of a very comparing character. I will also keep the intuitions about persistence from chapter 1 in mind, but it seems that we must stray slightly from them nonetheless when accepting the stage theory.

The concluding chapter will first examine the implications that the differences between perdurantism and the stage theory have for their understanding of counting objects. Although it is a close race between the two theories throughout the discussions in this essay, my claim is that the stage theory is over all better at explaining many of the connecting concepts and is able to answer some puzzling cases that perdurantism is not. In the end, perdurantism has too many strange implications, so my suggestion is to conclude with the stage theory.

#### Some comments on reference

When referring to articles in the *Stanford Encyclopedia of Philosophy*, I will use the section numbers as if they were page numbers.

Sider's articles can all be found on his webpage, [www.tedsider.org](http://www.tedsider.org), and I refer to the page numbers he uses in these documents rather than the page numbers in the journals in which they were published.

## Chapter 1

### **The problem of identity through change**

In this first chapter of the essay, I will introduce the problem of how objects persist through change. This problem consists of three parts: an everyday understanding of persistence, Leibniz' Law (from now on 'LL'), and change. The common conception of persistence is that that objects persist by being the same object through time and change. The computer I am currently using, e.g., is a persisting object, because it existed yesterday and the day before that as well. This is to say that the computer is identical to the one I used yesterday. The problem with this understanding of persistence arises from the fact that LL, which is a widely accepted condition of identity, seems inconsistent with *intrinsic change*. Intrinsic change is a change in an object's intrinsic properties. I will go deeper into what I take intrinsicality to be in section 1.3 of this chapter. For now, however, I will simply describe 'intrinsic properties' as properties that an object can have independently of any other object external to itself. So, if there was nothing else in the universe, the object would still instantiate its intrinsic properties, like for instance shape or mass, while *extrinsic* properties such as 'being to the left of', would not be instantiated any longer. That an object has undergone change in its intrinsic properties means that it had some intrinsic property at one time, and at some later time it does not have this property. This means that the properties the object has before change is incompatible with the properties it has afterwards. LL claims that nothing has a property that it does not have, simply speaking. However, change implies exactly the opposite: to have incompatible properties. Hence, there is a problem combining identity and change.

In the following chapter, I will introduce the three parts of the problem of how things persist. These three are LL, persistence, and change. I will also explicate the notion of intrinsicality that Lewis uses, which will be important in the understanding of change, and later on also Lewis' arguments against three dimensionalism. I will continue by formalising a simple argument – the 'identity through change'-argument, shortened 'the ITC-argument' – which makes the problem of persistence explicit. The ITC-argument shows that persistence needs further elaboration, and this is what the three- and four dimensionalists purport to give. The last two sections of this first chapter will consist of an introduction to the two types of theories

that I will consider in order to solve the problem of persistence. These two are three dimensionalism and four dimensionalism.

### 1.1 Identity and Leibniz' Law

As I mentioned in the introduction to this chapter, it is likely that a common everyday view of persistence is that things stay identical throughout the time of persistence and also through any potential change. By this I mean that when something has persisted through a change, then the thing that persists and undergoes the change is the same identical object before and after the change. This is the common platitude about persistence, according to Lewis (1983:56). Therefore, I am going to introduce a widely held condition on identity: LL.

There is some discussion on whether LL should be understood as a composition of Leibniz' two principles of indiscernibility, or whether only one of them is a condition on identity. The two principles I am referring to state respectively that i) *two things that share all their properties with each other, are identical* (the identity of indiscernibles), and ii) *two things that are identical share all their properties with each other* (the indiscernibility of identicals) (Look 2014:3.5). Formalised, the two principles look like this:

- i)  $\forall F(Fx \leftrightarrow Fy) \rightarrow x = y$
- ii)  $x = y \rightarrow \forall F(Fx \leftrightarrow Fy)$

The formalisations make it easy to see that, if we combine these two principles, there would be a biconditional between the identity component ( $x = y$ ) and the indiscernibility component [ $\forall F(Fx \leftrightarrow Fy)$ ]:  $\forall F(Fx \leftrightarrow Fy) \leftrightarrow x = y$ . The disagreement about what should be included in LL, is whether there should be a biconditional between the identity and the indiscernibility component, or just a conditional from identity to indiscernibility (Look 2014:3.5). The principle of identity of indiscernibility is more controversial as a condition on identity. Therefore, in this essay I will only refer to the principle of indiscernibility of identicals as LL:  $x = y \rightarrow \forall F(Fx \leftrightarrow Fy)$ .<sup>4</sup>

Before I move on to the next components of the problem of identity through change, I want to say a few words about the difference between *qualitative* identity and *numerical* identity. Sometimes we say that two things are identical when we mean that they look and feel so

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<sup>4</sup> Even though Brandon Look, among others, might feel very strongly against the referring of 'LL' to only one of the principles (Look 2014:3.5).

similar that we cannot notice any differentiate between them. This way of using the word ‘identity’ is called ‘qualitative identity’ and it is in reality a type of *similarity* rather than strict identity. Things that are qualitatively identical share their qualitative properties with each other, but they are separate objects nonetheless (Noonan & Curtis 2014:1). Qualitative properties are properties such as colour, size, and so on. Opposite these properties are quantitative properties such as ‘occupying a specific point in space at a specific point in time’. While qualitative identity is a relation that can hold between two separate objects, numerical identity ensures that there really is just one object. Figure 1 shows two numerically different objects that are qualitatively identical:

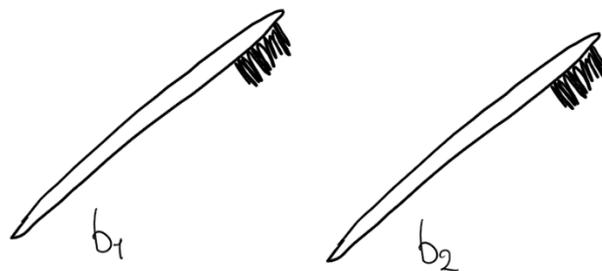


fig.1

By examining  $b_1$  and  $b_2$  alone, we would never be able to distinguish between them. However, when we see them side by side we realise that they are numerically different: they occupy different points in space. So, they do after all differ in some of their properties. Their quantitative properties differ, while their qualitative properties are the same.

Numerical identity is the type of identity relation that is relevant for the rest of this text. This is the relation that we commonly think holds between an object before and after change. An example that will pop up again and again is a banana that is green at one time and then yellow at a later time. When we say that the green and the yellow banana is the same banana having persisted through a change of colour, we are saying that the green and the yellow banana are numerically identical. They are really just one object, not two. On an everyday view then, persisting through change is a matter of numerical identity. To assure numerical identity and not just qualitative identity, LL must include quantitative properties like the spatio-temporal location of a given object, under indiscernibility [ $\forall F(Fx \leftrightarrow Fy)$ ]. Without including these properties, we are only assured qualitative identity, because two separate objects can share all their qualitative properties without sharing quantitative properties. When including quantitative properties, LL is a condition on numerical identity, and so it will be included in

the ITC-argument. Whenever I use any form of the word ‘identity’ from here on, I will mean numerical identity unless otherwise stated.

The next section explores persistence: the intuitions we have, Lewis’ definition and its connection with the identity-relation I have just described. The findings here will be set as an assumption of what persistence is and how we should understand persistence in the ITC-argument. The rest of the essay will then explore whether this assumption is right.

## 1.2 Persistence

The definition of ‘persistence’ which most of the philosophers that I will mention in this essay adhere to is a definition that Lewis introduces in *On the Plurality of Worlds* (1986). This definition says that “[...] something *persists* iff, somehow or other, it exists at various times” (Lewis 1986:202). How something can exist at multiple times is explained differently by three dimensionalists and four dimensionalists. This is the main topic of the rest of the chapters in this essay. ‘Persistence’ as defined by Lewis, will be the neutral word for existing at multiple times.<sup>5</sup>

As mentioned briefly in the previous section, Lewis claims that it is a common platitude that persistence is a matter of identity: “[a] platitude that cannot credibly be denied: what matters is identity between myself, existing now, and myself, still existing in the future.” (Lewis 1983:56). If the common conception of persistence is that it is a matter of identity, then this analysis of persistence must hold: Say that ‘*a*’ and ‘*b*’ denote one and the same persisting object, but ‘*a*’ is that object at a time  $t_1$ , and ‘*b*’ is that same object, but at a later time  $t_2$ . Since they denote the same object, albeit at different times throughout its persistence period, *a* and *b* are identical. Now, say that the object undergoes change sometime between  $t_1$  and  $t_2$ . Given this analysis, for an object to persist through change, is for the object before change to be identical to the object after change. Here is an example of such an occurrence: Consider a room with nothing but an inflated ball in it. At some point, somehow, the ball deflates. I could for example come into the room and stab it with something sharp and then leave the room again. The room now has only a deflated ball in it. It is the same ball as before I stabbed it, only now it is deflated. The inflated ball is identical to the deflated ball, so it has persisted through change. Few would say that there arises a new object after change has occurred. If

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<sup>5</sup> The neutrality of ‘persistence’ is a convention set by Lewis in *On the Plurality of Worlds* (1986:202) and it has been quite consistently used like this since. See for instance Lowe (1987); Haslanger (1989); Sider (1997).

this were case, there would in reality have been two non-identical balls in the room the past few minutes; one inflated and one deflated. This is an implausible view because we experience persisting objects all the time, and persistence has implications for many sides of our lives. In fact I myself am a persisting object. Instead of denying persistence, we want to find some other solution. So I will assume that things do in fact persist over time and change. Due to the common platitude of persistence as being a matter of identity, persistence will be represented in the ITC-argument by the identity relation:  $a = b$ .

The following section will be a short interlude before continuing on to the last component of the ITC-argument – change. To understand change it is important to understand the difference between intrinsic and extrinsic properties. This will also be an important distinction in discussions of three dimensionalism in the next chapter, as well as the four dimensionalist theories in chapter 4. I will therefore include a section about intrinsic and extrinsic properties before continue with a section about change.

### 1.3 Intrinsic and extrinsic properties

Extrinsic properties can be said to be properties that an object has in relation to separate (external) objects, while intrinsic properties are properties which an object has completely independently of the world around it. Lewis describes intrinsic properties as those properties that things have in virtue of the way the things are themselves (Lewis 1986:61). Examples of intrinsic properties are mass and shape, while examples of extrinsic properties are ‘being a brother’ and ‘underneath of’. There is an extensive debate on what should be included as intrinsic properties. Just to mention one example, Brian Ellis argues that shapes might not all be intrinsic. Some objects have their shape partially because of some external force acting on them, and so the shape is not intrinsic (Weatherson & Marshall 2014:2). My focus in this essay will be on Lewis’ way of defining intrinsic properties, and I will employ Sider’s construal of this (see Sider 1996b). This is the most relevant definition for my article, and is important for not misunderstanding Lewis’ and Sider’s theories of four dimensionalism. To be sure, I will assume that shape, mass and colour are intrinsic properties. So, these are the types of properties I will use as intrinsic properties in my examples.

Based on Lewis’ description of intrinsicity, one way to test whether a property is intrinsic is to ask whether an object would instantiate that property if the object were isolated in a world of its own. So, if nothing other than this object existed, and the object then stood in no relation

to anything external to it, would it still instantiate the property? If so, then the property is an intrinsic property. The mass of an object would still be a property of that object even if the rest of the world – past, present and future – was rearranged in every way, or even completely exterminated. Being a brother, however, depends on how things outside of the object are, and so is an extrinsic property.

To elaborate on intrinsicity, Lewis claims that an intrinsic property never differs between duplicates (ibid:62). About duplicates Lewis writes

... two things are *duplicates* iff (1) they have exactly the same perfectly natural properties, and (2) their parts can be put into correspondence in such a way that corresponding parts have exactly the same perfectly natural properties, and stand in the same perfectly natural relations. (Lewis 1986:61)

Given Lewis' theory of modal realism, which says in short that all possible worlds are as real as the actual world, 'duplicates' can mean also non-actual things, i.e. also possible individuals are included as they are as real and concrete as the individuals of our own world (Sider 1996b:1).<sup>6</sup> All these individuals have their properties absolutely, rather than relationally, due to being world-bound (ibid.). So a possible individual, *a*, at possible world  $w_1$ , simply has the property 'is green' in this world. This does not have to be analysed in terms of *a*'s relation to the actual world or any other possible world. This is important for Lewis, as a relational view of every property instantiation would imply that every property is an extrinsic property, according to his understanding of intrinsicity. To deny the existence of intrinsic properties leads to the strange position that there is no tangible thing that is left of the object when all its external relations are gone. This is to say that there really is no object in itself, only when an object is related to other things, does it have properties. This is elaborated on in Lewis' argument from temporary intrinsics in chapter 2, section 2.1.

Based on Lewis' description of intrinsicity and his modal realist background, Sider formulates a definition that he thinks suits Lewis' position:

- (I) Property P is intrinsic iff for any possible objects *x* and *y*, if *x* and *y* are duplicates then *x* has P iff *y* has P (Sider 1996b:2).

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<sup>6</sup> I am using Lewis' vocabulary and am referring to the world that we live in and all the individuals in it as 'actual'. To us, all the other possible worlds are non-actual. But of course to each of them respectively, they are themselves the actual world. 'Actual' is an indexical like 'I': it always applies only to the thing that utters it. In the case of 'actual' it applies only to the world (and the individuals in it) of the individuals who utter it (Lewis 1986:92–3). For a full introduction to modal realism, see Lewis' *On the Plurality of Worlds* (1986).

Michael Dunn poses a difference between a metaphysical criterion of intrinsic properties and a syntactical one, and shows that these two do not always yield the same result when applied to properties. The metaphysical criterion says that a property that is intrinsic is instantiated just by virtue of the object that instantiates it, itself. The syntactical criterion on the other hand, says that an intrinsic property is a non-relational property (Sider 1996b:2–3).

The example that is given by Dunn is a situation where an event *a* causes *b* in virtue of how *a* itself is, which makes the property ‘causing *b*’ intrinsic on the metaphysical criterion. But since the situation is relational – *a* has the property ‘causing *b*’ partially in virtue of its relation to *b* – the syntactical criterion renders ‘causing *b*’ extrinsic (Sider 1996b:3). Sider argues that this is a faulty analysis of intrinsicity, and that the two criteria do not actually yield contradicting results. He claims that the locution “by virtue of itself” in the metaphysical criterion would on Lewis’ understanding of intrinsicity have a strong modal aspect to it (ibid.). So the situations in question must be analysed modally as well. Take the case of *a* causing *b* again: say that *a* causes *b* in virtue solely of *a* itself. It is not enough just to examine the causation scenario in its own possible world. We also have to consider it modally: there is a possible world where an event just like *a* occurs, but *b* does not (ibid:4). Therefore, ‘causing *b*’ is extrinsic on the metaphysical criterion as well.

What about temporal properties such as ‘*having been a brother*’ or ‘*will be round*’? These are properties that an object instantiates at a time *t* earlier or later than the time of the instantiation of the non-temporal (or *tenseless*) version of it. In effect, the non-temporal version of a property would be any property that is instantiates at the present. In the case of the temporal property ‘*having been a brother*’, the non-temporal version of the property is ‘*being a brother*’.

If intrinsic properties are defined as being those properties which an object would have not only despite a total rearrangement or extermination of all external objects at the present moment, but also despite a total rearrangement or extermination of all history, then some interesting points concerning temporal properties arises. It seems to me that temporal constructions of both extrinsic and intrinsic properties come out as extrinsic properties given the cited definition of intrinsicity. Have a look at a temporal property constructed from an intrinsic property: ‘*Having been bent*’ is a temporal version of the non-temporal intrinsic property ‘*being bent*’. An object that is bent is so independently of the world around it; in fact everything could be exterminated without it making any difference in the bentness of the

object. Being bent then is intrinsic. However, ‘having been bent’ would arguably be a non-intrinsic property, given this same definition of intrinsicity. It is true that an object  $a$  instantiates ‘having been bent’ at a time  $t_2$  iff  $a$  instantiates ‘being bent’ at some time  $t_1$ , where  $t_1 < t_2$ .<sup>7</sup> However, if the whole history up to  $t_2$  is erased, then there is no longer any time earlier than  $t_2$  at which the object  $a$  instantiates the non-temporal property ‘being bent’. In this case ‘having been bent’ is not true of  $a$  at  $t_2$ , because there is no time earlier than  $t_2$  at which  $a$  instantiates ‘being bent’. The temporal properties are dependent on there being something external – the object and its properties *at a different time* – and so they cannot be intrinsic, according to our definition.

This rather interesting take on temporal properties will play a role in my discussion of perdurantism and the stage theory in chapter 3. The following is a section on the third component which will be a part of the ITC-argument: change. I will elaborate on what it means for objects to change, and discuss what the differences are between changes in an object’s extrinsic properties and its intrinsic properties.

#### 1.4 Change

An obvious description of change is that change in an object consists in the instantiation of incompatible properties of that object at different times. But this description needs some further explication. In this section, I will go over and accentuate four elements of change according to the description just given. Lastly, I will propose a neutral definition of ‘change’.

The first element I want to emphasize is that there is an instantiation of incompatible properties. Consider this example: A banana that is green on Monday and yellow five days later, on Friday, has undergone change. This is because it instantiates incompatible properties at different times, following my description from earlier. The second element is closely related to the first. The particular properties that differ in the object before and after change should be intrinsic properties. Change in an object’s external properties is not necessarily a real change in that object (Mortensen 2015:2&5). Consider this example: If Mary’s downstairs neighbour Paul moves out, she is no longer his neighbour. This means that Mary now instantiates the property ‘not Paul’s neighbour’ although she earlier instantiated the property ‘Paul’s neighbour’. So, according to the description of change from earlier, Mary has

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<sup>7</sup> ‘ $<$ ’ is the ‘earlier than’-relation. ‘ $t_1 < t_2$ ’ reads “ $t_1$  is earlier than  $t_2$ ”.

undergone change; she instantiates some property at an earlier time, and an incompatible property at a later time. This example suits the description of change in an object which I gave in the beginning of this section, but it does not seem to account for a real change in Mary herself. It may not even affect her in any way at all that she is no longer Paul's neighbour. All her intrinsic properties are exactly the same after Paul moves out. Should some of Mary's intrinsic properties be exchanged with others, on the other hand, then Mary herself would undergo real change. Remember the proposed method to decide whether a property is intrinsic or not, from the last section: Intrinsic properties are properties which an object would have even if everything else in the universe ceased to exist. If we isolate Mary like this, and every one of the properties that were left are her intrinsic properties, then what we have left is in fact all that is Mary. If any of her intrinsic properties should be switched out, it is easy to understand that Mary has really changed. In this isolation example, all that is Mary is now slightly different from all that she was before the change.

Although the scenario of change in extrinsic properties does exemplify a change in the world, it does not exemplify a real change in Mary. If we think of the whole universe as one object, then any extrinsic change for Mary – now nothing more than a part of the object in question – is an intrinsic change in the universe. The universe as an object is already isolated: it is all that exists. However, in this essay my domain for change will be ordinary objects like Mary or cars.<sup>8</sup> The type of change that I am going to focus on in this essay will therefore be *intrinsic change*, where the change is intrinsic because it concerns intrinsic properties of these ordinary objects. From here on, I will mean 'intrinsic change' by 'change' unless otherwise stated.

The third element I want to emphasize is that the banana on Monday and the banana on Friday are the same banana. A situation concerning two different bananas instantiating differing properties does not suggest that change is occurring or has occurred. The bananas mentioned must be identical to be considered a case of change. Lastly, there is also a time aspect to change: The banana's instantiation of green and of yellow for instance, happens at different times. It is never the case that a banana is both green and yellow at the same place and at the same time. In fact, this is logically impossible. However, it seems also problematic to explain how the same thing can instantiate incompatible properties at different times. As LL tells us, if *a* and *b* are in fact one and the same – if they are identical – then they share all their properties. In this case, if the banana on Monday is identical to the banana on Friday, then

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<sup>8</sup> In the exploration of four dimensionalism and the discussions between Lewis' and Sider's version of it, I will write more about ordinary objects.

they must instantiate all the same properties. However, this is not the case when change occurs. It is very common that things instantiate differing properties at different times. The time aspect then needs some elaboration.

In the spirit of Lewis' neutral definition of persistence, I would like to suggest a neutral definition of change, or rather a description of change, with which the different suggested definitions must fit. Let us say that something changes iff, somehow or other, it has incompatible intrinsic properties at two different times. This description opens up for further theories of how things can have incompatible properties at different times. These explanations will be closely connected with the explanation of persistence, because the description of change that I have suggested implies persistence (as defined by Lewis). For something to have different properties at different times implies that this thing has persisted; it must exist at the time of the first instantiation as well as at the time of the incompatible instantiation.

In the ITC-argument, change will be represented with a formalisation showing the same thing instantiating inconsistent properties:  $Fa \wedge \sim Fa$ . I will not introduce the time aspect into the formalisation of change until the next chapters, when I explore the solutions to the problem. Anyway, just including a time component into the formalisation does not solve the problem of how things persist over change. This is because the persistence-component still has not been fully explained, and how a thing can have incompatible properties at two different times is linked with persistence in virtue of the time-component, as explained earlier. Again, Lewis' definition of persistence says nothing about how something can exist at more than two times. This is where three- and four dimensionalism purports to give additional explanation. Their theories of how things persist will have implications for their theories of what change is and how things change. In this essay, I will discuss only the different theories of how things persist.

In the following section, I will combine the three components of the problem of identity through change, and formalise the so called ITC-argument.

### 1.5 The ITC-argument

The time has come to fully acknowledge the predicated inconsistency between LL, persistence and change. If things persist through change, and change means that an object has some intrinsic property before change which is incompatible with some of the properties it has after change, then it seems that LL does not hold. Either this or, if LL does hold, then

there are no things which persist through change. To see this clearer, consider the example of a changing banana again. ‘*a*’ is the yellow banana at  $t_1$ , and ‘*b*’ is the same banana at a later time  $t_2$ , but at  $t_2$  it is green. By LL, since  $a = b$ , *a* and *b* have to instantiate all the same properties. However, this is not the case in our example. So LL does not hold. Conversely, if we insist that LL does hold, then the green banana *a* and the yellow banana *b* are not identical, because *a* and *b* do not instantiate all the same properties. *a* exists at an earlier time and *b* exists at a later time, but they are not identical, so they are not an object that has persisted through the change.

The first position – denying LL – seems flawed because LL is more or less uncontroversial. The identity relation is really always self-identity, and the subject shares all its properties with itself. Equivalently: the subject does not have any properties which it does not have.

Formulated, these two propositions look like this:

$$\begin{aligned} \text{LL} \quad & \forall x \forall y (x = y \rightarrow \forall F (Fx \leftrightarrow Fy)) \\ \text{LL}^* \quad & \sim \exists x \exists y (x = y \wedge \exists F (Fx \wedge \sim Fy)) \end{aligned}$$

The latter formalisation is a tautology given the principle of non-contradiction. Since it is equivalent with the former, the former is also a tautology. We must therefore accept LL.

The second position – denying persistence – is also quite absurd. Imagine coming home from work one day and finding that your house has disappeared! Your house is white, but where your house stood there is now a red house. What has happened is that your sly and efficient neighbour waited until you left for work, then painted the house red and is now claiming it for herself. By LL, since your house is white, and this house is red, the red house is not identical to your house. We definitely want to say that the house has persisted through the change. This must mean that the white house is identical to the red house, but LL will not allow it. We should accept LL as I have argued, but common sense demands that we also maintain that objects persist. This then, is the problem of identity through change:

When an object has undergone change, it has some intrinsic properties at a time  $t_1$  prior to the change, and some other intrinsic properties at a time  $t_2$  after the change. So, if an object *x* has the intrinsic property *F* at  $t_1$  and  $\sim F$  at the later time  $t_2$ , then it has undergone change. Take a banana as an example: one and the same banana can be completely green on Monday and completely yellow on Friday. The banana has undergone change because it has one property on Monday and a different, incompatible property on Friday. Alternatively, the banana has the

property  $F$  (green) on Monday, but on Friday it has the property  $\sim F$ . In the case of change, since the banana does not in fact have all the same properties in common with itself (at all times), it is not in agreement with the principle of LL to say that the banana as it is on Monday is identical with the banana as it is on Friday. Given that LL holds, the banana cannot be identical to itself after the change.

Here is a simple formalisation of the ‘identity through change’-argument (the ITC-argument):

- |     |  |                       |
|-----|--|-----------------------|
| 1.  | $a = b$  | [premise]             |
| 2.  | $a = b \rightarrow (\forall F)(Fa \leftrightarrow Fb)$ | [LL]                  |
| 3.  | $Fa \wedge \sim Fb$                                    | [premise]             |
| So, |  |                       |
| 4.  | $a \neq b !$   | [2, 3; Modus tollens] |

Let us use the example of a banana that changes colour from green to yellow again: ‘ $a$ ’ and ‘ $b$ ’ denote the banana on Monday and the banana on Friday respectively, and  $F$  is the property of being green all over. As urged for earlier, the ITC-argument contains as premise LL, persistence understood as identity, and change understood as something’s instantiating incompatible properties. Together with premise 3 – representing change – premise 1 then represents persistence through change. Lastly, premise 2 introduces LL as a condition of identity. The argument ends in a contradiction stating that since  $a$  and  $b$  do not have all the same properties, they cannot be identical. But  $a$  and  $b$  is one and the same banana, which is established in premise 1. This is the simple argument that I will revise to fit the different three dimensionalist theories and the four dimensionalist theories.

As mentioned, it would be a problem if things never persist through change, as suggested earlier with the example of your sly neighbour. And we should not discard LL either, as it seems to be a tautology. Instead of giving up LL or announcing that nothing ever persists through change, the way to go has usually been to consider the role that time plays in this puzzle. This is where three- and four dimensionalism enter the picture. These are theories about time, which focus on explaining how things persist. In the remainder of this chapter, will give a general presentation of these two doctrines, starting with a four dimensionalism, and concluding this chapter with three dimensionalism.

## 1.6 Four dimensionalism

Four dimensionalism is a theory about time with the basic idea that objects have *temporal parts*. The analogies of spatial parts and events are often presented to help explain what temporal parts are. The spatial analogy likens temporal parts to regular spatial parts. It says that, just as an object has different spatial parts located at different points in space, it has also different temporal parts located at different points in time. A bicycle e.g., will have a tyre as one spatial part, and a seat as another spatial part. It has these parts at the same time, but imagine an object that has two different physical parts – like a seat or a tyre – at two different times. Let us say that the seat is located at time  $t_1$  and the tyre is located at time  $t_2$ , where  $t_1 < t_2$ , and they are both parts of the same object; the bicycle. The second analogy is the event analogy. It likens temporal parts to non-physical temporal parts of events: An event has a beginning, a middle and an end. Similarly, an object can also have a beginning, middle and end; however, as opposed to the temporal parts of events, the temporal parts of objects are physically extended in time. So, temporal parts as described by the four dimensionalists are something in between spatial parts and non-physical temporal parts: they are physical, just like spatial parts, and they are located at different times, just like the non-physical temporal parts of events.

Sider gives a definition of temporal parts:

$x$  is an *instantaneous temporal part* of  $y$  at an instant  $t$   $\text{=df}$  i)  $x$  exists at, but only at  $t$ , ii)  $x$  is part of  $y$  at  $t$ , and iii)  $x$  overlaps at  $t$  everything that is part of  $y$  at  $t$  (Sider 1997:8).

According to Sider, for any way of dividing the *lifespan* of an object  $x$  – i.e. the complete time of  $x$ 's existence – into separate intervals of time, there is a corresponding way of dividing  $x$  into temporal parts which are confined to those intervals of time (Sider 1997:7). So, “[...] each spatiotemporal object has a temporal part at every moment at which it exists.” (Sider 2001:59). This means that every object has a temporal part at all times at which they exist.

Temporal parts can be either instantaneous or non-instantaneous, i.e. there can be both temporal parts that occupy merely one instant of time and temporal parts which last over multiple instants of time. The non-instantaneous temporal parts can be divided into smaller parts, all the way down to the smallest intervals of time; the instants. Or, given the principle

of *density*, they can be divided infinitely into smaller parts.<sup>9</sup> For the rest of this essay, I will mean instantaneous temporal parts when talking about temporal parts, unless otherwise stated. There is a point in making a distinction between instantaneous temporal parts and aggregates of instantaneous temporal parts. This is central in the discussion between the two versions of four dimensionalism that I will present in the following section: the perdurance view and the stage view. These two versions will be presented in chapter 3, and further discussed in chapter 4 and 5. The following section will be a short presentation of the four dimensionalists biggest contestant doctrine: three dimensionalism.

### 1.7 Three Dimensionalism

At this point, the simplest way to state three dimensionalism is to say that, contrary to four dimensionalists, three dimensionalists do not believe in temporal parts. At first – and perhaps also the second – sight, temporal parts might seem mysterious and bizarre. So the idea that they do not exist might be more inviting. But a deeper attempt at explaining the three dimensionalist theory also reveals some puzzling aspects. First an attempt at explaining what it means for an object not to have temporal parts. Since objects do not have different parts at different times, one is led to the idea that they are wholly present at each point in their lifespan: That every part of the object is present at all times that the object exists.<sup>10</sup> However, the expression ‘wholly present’ is quite unclear. Sider complains that the claim that every part of an object is present at the time that object exists is trivial: an object at time  $t_1$  consists of every part which it consists of at  $t_1$ , and that same object at a later time  $t_2$  consists of every part which it consists of at  $t_2$ . There is nothing informative or uniquely three dimensionalist about this statement (Sider 2001:64). If the claim is rather that every part of the object at every point in time of the object’s lifespan is present at every point in time of its lifespan, the theory would deny the possibility of gaining and losing parts (ibid.).

Given the mentioned problems with defining the three dimensional theory, I will suggest an analogy which might at least give an intuitive understanding of their position. Objects are three dimensional, they are fully extended in the three spatial dimensions, and merely travel through the fourth – time. Picture a fish swimming in a straight line through the water. The

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<sup>9</sup> Density is a property which could hold for the ‘earlier than’ relation. This property says that for any point in time  $u$  and any point in time  $v$ , where  $u \neq v$  and  $u < v$ , there is some point in time  $w$ , such that  $u < w$  and  $w < v$  (Burgess, 2009:27). I.e., there is no smallest interval of time.

<sup>10</sup> For articles that use and discuss the formulation ‘wholly present’ when describing three dimensionalism, see for instance Lewis 1988; Lowe 1987; Sider 2001.

fish is the complete three dimensional object, and the water represents time. The water is not a part of the fish and the fish is not part of the water; rather the water is a medium through which the fish moves. Likewise with all objects: they are extended in the three spatial dimensions and travel through the medium of time. This seems to suits the everyday view of how objects and time work, but there are still some obscure and peculiar entailments by this position.

In the next chapter, I will present three different three dimensional theories and suggest how they would purport to modify the ITC-argument in order to avoid the contradiction which it concludes with. The first position is E.J. Lowe's endurantism, the second is Sally Haslanger's adverbialism, and the third is a temporal version of adverbialism. All three will be argued against, and I will move on to the four dimensionalism in chapter 3.

## Chapter 2

### Three dimensionalism

‘Endurantism’ and ‘three dimensionalism’ seem often to be used interchangeably: they refer to the overall idea that objects do not persist by having temporal parts. But in this essay, I will make a distinction between these two. ‘Three dimensionalism’ will be used as an umbrella term for the theories that deny persistence by having temporal parts, while ‘endurance’ will refer to a particular type of three dimensionalism.

As mentioned in the previous chapter, three dimensionalism denies the existence of temporal parts as they are understood by the four dimensionalists. This is to say that they do not believe that there are different physical parts of objects placed at different points in time, not that they do not believe that there cannot exist any objects which last only instantaneously (Sider 2001:64). These instantaneous objects would be temporal parts of themselves, and so would in fact suit the definition of temporal parts given in the previous chapter. However, on the three dimensional picture, all objects are three dimensional, meaning that their full physical extension is in the three spatial dimensions. Not like the four dimensionalists claim: that objects are also physically extended in a fourth direction that is the time dimension. An object which exists only instantaneously, though it might be called a temporal part by the three dimensionalists, is still a three dimensional object, however it does not *endure* (McCall & Lowe 2006:572).

McCall & Lowe sets out to give a more informative explanation of three dimensionalism than what is given in Lewis’ suggested definition that things endure by “[...] being wholly present at more than one time.” (Lewis 1986:202). ‘Endure’ is the term that Lewis suggests for the three dimensionalist explanation of persistence. So, on the three dimensionalist view, objects persist by enduring. However, McCall & Lowe suggest redefining endurance in a way that is not as unclear as Lewis’ formulation. Their preferred definition is that an object endures iff it exists at more than one time (McCall & Lowe 2006:571–2). So, to endure is to persist.

According to them, this is the only way to persist anyway, since the four dimensionalist temporal parts are rigid in their temporal location, and exist at only one instant. Therefore, nothing exists at multiple times, on the four dimensional account, since the definition of

persistence is for an object to exist at various times (ibid:572). Furthermore, ‘continuous endurance’ is for an object to exist at a time  $t_1$  and at a later time  $t_2$ , and at every time between them (ibid:572).

The problem for the three dimensionalists then is to explain how three dimensional objects can instantiate inconsistent properties before and after change, and still be the same, self-identical persisting object. This is done by introducing the time aspect to the picture and arguing that since the incompatible properties are instantiated at different points in time, there is no contradiction between identity and change during persistence. In this chapter, I will present three different three dimensionalist solutions to the problem of identity through change represented by the ITC-argument. They elaborate on how the time aspect saves the ITC-argument from concluding with a contradiction. These three theories are Lowe’s endurantism, Haslanger’s adverbialism, plus a temporal version which is quite similar to the adverbial solution. They will be introduced and discussed one after another, starting with endurantism. I will suggest which adjustments they would do to the ITC-argument based on their theories of how things persist, and then examine and evaluate the solutions respectively after each attempted solution is presented.

## 2.1 The endurantist solution

As a three dimensionalist theory, endurantism claims that only three dimensional objects exist, and that they persist not by having temporal parts. According to Lowe, the notion of temporal parts is not applicable to ordinary objects such as apples or houses; rather it is applicable only to events or processes (Lowe 1987:152). The way that three dimensional objects persist is merely by existing at more than one time, according to McCall & Lowe (2006:571–2). But this definition is really just Lewis’ definition for the neutral word ‘persistence’, which does not tell us anything informative about how things persist. It seems that Lowe’s position is that there need not be any other definition of persistence beyond this, because the four dimensionalist attempt at explaining persistence by introducing temporal parts actually diverges from persistence. There are no things which exist at various times, when the temporal parts exist rigidly at their points in time. Nonetheless, in order to keep an objective distance between the three- and four dimensionalist theories, I will still differentiate between ‘persistence’ as a neutral word and ‘endurance’ as Lowe’s three dimensionalist version of persistence.

McCall & Lowe do provide a distinctive, two part definition of ‘endurance’ which I will use as a starting point for understanding endurantism:

An object *endures* iff (i) it lacks temporal parts, and (ii) it exists at more than one time. (McCall & Lowe 2009:278)

Let us now summarise the information we have so far about endurantist position. Firstly, all objects have their full physical extension in the three spatial dimensions. Therefore, objects do not have temporal parts which at all times exist physically at their respective points in time. Secondly, these three dimensional objects can both persist, as in ‘exist at various different times’, as well as endure continuously, which means to exist at two different times and at all the times in between.

The endurantist fully believes that persistence is a matter of identity. The object before and after change is the same identical object; just like fish swimming through the water, objects travel through time while staying self-identical. However, the object is not exactly the same through the change when it comes to its properties. According to the ITC-argument, this leads to a contradiction, but the endurantist objects that the persisting and changing object does not instantiate the incompatible properties at the same time (McCall & Lowe 2009:277). One of the elements of change which I emphasized in chapter 1, section 1.4 is that the incompatible properties that are instantiated in a scenario of change, are instantiated at different points in time. This time aspect has not been incorporated into the ITC-argument, and therefore we get the contradiction.

Most likely then, the endurantist would make some adjustments to the third premise of the ITC-argument, as this is supposed to account for change. Here is the original third premise:  $Fa \wedge \sim Fb$ . ‘*a*’ represents the object before change, and ‘*b*’ represents the same object after change, but the time aspect is not present in the formalisation. The full formulation would specify that the object instantiates some property *F* at time  $t_1$ , and some other incompatible property  $\sim F$  at a later time  $t_2$ . So a predicate is only complete when it informs not only of the object and the property it instantiates, but also of the point in time at which the object instantiates the property: *a* is *F* at *t*. Lowe adds to this that the endurantist reading of this should be ‘*a* is *F-at-t*’ (Lowe 1988:73). The four dimensionalists would read it ‘*a-at-t* is *F*’ because they pick out a temporal part of the object, i.e. *a* at time *t*, and say about it that it instantiates *F*. Endurantists on the other hand leave the object alone, and relativise the instantiation instead (ibid.).

I suggest that the endurantist would reformalise the third premise of the ITC-argument thus:  
 $F_{t_1}a \wedge \sim F_{t_2}b$ . This then is the ITC-argument after the endurantist's adjustment:

1.  $a = b$  [premise]
2.  $a = b \rightarrow (\forall F)(Fa \leftrightarrow Fb)$  [LL]
- 3<sup>E</sup>.  $F_{t_1}a \wedge \sim F_{t_2}b$  [premise]

This argument accepts persistence as a matter of identity, which is represented by the identity relation in the first premise. It also accepts LL as a condition on identity. Finally, the argument detects no disagreement between persistence, identity and change, because of the relativisation of the property to the time of instantiation. It is perfectly consistent with the first premise,  $a = b$ , that  $a$  instantiates  $F_{t_1}$  and that  $b$  instantiates  $\sim F_{t_2}$ .  $F_{t_1}$  and  $F_{t_2}$  are not the same property, so the negation of the one does not collide with the other. Therefore, the new argument does not lead to the contradiction that  $a \neq b$ .

At first sight, this solution seems acceptable. The logic of the argument adds up, and it avoids any of the conclusions that we are trying to avoid: that  $a \neq b$  or that LL is false. But the relativisation of the property to the time of instantiation needs inspection. Presumably, the complete formulation of a predicate must include the point in time of the instantiation not only in situations of change. An instantiated property is always instantiated at a time, and more often than not, it will not be instantiated by the object throughout the object's lifespan. Things are under constant change: fading in colour, gaining and losing particles, etc. So, an object never instantiates just  $F$ , but always  $F$ -at- $t$ . Even in situations where the object instantiates a property throughout its entire lifespan. The question is what ' $F$ -at- $t$ ' is: It is not merely a property, because it incorporates the extra information about time. This is why Lewis argues that the endurantist treat properties like relations.

Lewis' argument against the endurantist solution is that it poses a problem which he calls the problem of temporary intrinsics (Lewis 1986:203–4). This argument claims that the endurantist's account of how objects instantiate intrinsic properties that are only instantiated temporarily – as opposed to throughout the whole lifespan of the object – does not accurately treat these intrinsic properties as genuine properties. Rather they treat them as relations between an object and a time (ibid:204). A three dimensional object  $a$  which exists at times  $t_1$  and  $t_2$  for instance, is related to  $t_1$  by being  $F$  at this time, and it is related to  $t_2$  by being  $G$  at this time. But intrinsic properties are not relational, as discussed in chapter 1, section 1.3.

Intrinsic properties are defined by Lewis as properties of an object which it has independently of anything else, i.e. they are had *simpliciter* (Lewis 1988:65). Examples of temporary intrinsic properties could be colour and shape for instance: if an object is green at some times, while yellow at other later times, then in this scenario, the property 'green' is a temporary intrinsic property of the object.

If we follow Lewis' claim that the endurantist treat properties as relations between objects and times, the endurantist would analyse temporary intrinsic properties thus: a three dimensional object *a* has some temporary intrinsic property *G*, 'green' e.g., by standing in the 'being green at' relation to the time which it instantiates the property. However, Lewis objects that properties are not relations: "If we know what shape is, we know that it is a property, not a relation." (Lewis 1986:204). Since properties such as shape and colour in reality are relations between an object and a time, on the endurantist account, they cannot genuinely be intrinsic. 'Intrinsicity' requires there to be no dependence on anything external as defined earlier, but endurantism cannot meet this requirement when it comes to temporary intrinsic properties, since their understanding of property instantiation is that an enduring object stands in a relation of having these properties to certain times, and not to other times. An intrinsic property must be instantiated *simpliciter*, according to Lewis (1988:65), but since this does not seem to be the case on the endurantist view, it effectively denies that there are temporary intrinsic properties (*ibid.*). What we are left with is an enduring object which has no intrinsic properties; no shape, no colour, nothing that is instantiated as a relation between the object and the time of instantiation.

Lowe answers this objection and claims that change in an object's intrinsic properties is really a rearrangement of the fundamental particles that makes up the object (Lowe 1987:153–4). When an object has undergone a change in its shape for instance, the object's fundamental particles has rearranged themselves in such a way that they are standing in a different relation to each other after the change from the relation they stood in before the change (*ibid.*). The fundamental particles are enduring because they never change their own intrinsic properties (*ibid.*). These particles could be the fundamental particles of modern physics, for instance, whose properties stay the same throughout all eternity. An object's shape then, in not a relation between the object and a point in time, but the particular relation of its fundamental particles at a certain time. But Lewis points out that there is still a temporary intrinsic problem for this view. Now there is a problem of temporary intrinsic relations, because the particles stand in their relation to each other not intrinsically, but in relation to different times (Lewis

1988:69–70). The  $n$ -place relation between the  $n$  number of fundamental particles which make up a given object is an intrinsic relation in that it does not depend on any external object or relations. However, argues Lewis, the fundamental particles cannot stand in genuine temporary intrinsic relations because these relations must be had in relations to different times, just as the temporary intrinsic properties are had in relation to times.

The endurantist then is not able to give an account of property instantiation that is not in conflict with the argument from temporary intrinsics. Without intrinsic properties, as Lewis emphasizes, there really is nothing left of the object: no shape, mass, colour, etc. which it has purely of its own. Furthermore, an object without intrinsic properties cannot genuinely go through intrinsic change, which would make the case for real change on the endurantist theory quite weak. As mentioned in the section on change in chapter 1, extrinsic change is not a change in the object itself, only in the surroundings of the object and the object's position to its surroundings. This is a very serious implication, but it is not a surprising: an object that has no properties purely of its own cannot go through changes in itself. There is nothing to this object, so there really is nothing that can persist through change. This is not the endurantist's position, as their goal is to give an account of persistence that complies with change and identity. This then, shows that the endurantist account does not succeed.

In the next section, I will introduce a different version of three dimensionalism which purports to secure the common understanding of properties and thus avoid Lewis' argument from temporary intrinsics. Instead, the theory introduces an adverbial view of instantiation. To formalise this, I will suggest a new category in logical language to account for adverbs.

## 2.2 The adverbial solution

Haslanger promotes a slightly different version of three dimensionalism which I will simply call 'adverbialism'. This theory claims that there is a more basic notion of instantiation, i.e. that there is a more basic notion of an object's being  $F$  (Haslanger 1989:122). It is this instantiation which stands in a relation to a time, and not the object or the property itself (ibid:120). The property is still treated as a genuine property, while the way it is being had depends on the time of instantiation, so to speak. About a banana that is green on Monday and yellow on Friday e.g., we can say that the banana is green in a Monday-ly way, while yellow in a Friday-ly way.

This means that the predicate ‘ $Fa$ ’ does not give us the full information about what is going on during instantiation. The manner in which  $F$  is obtained is lacking. This could be added to the predicate by creating a new category in logic which would function like an adverb. Let us represent this adverbial category with ‘ $A$ ’ and decide that it should go between the predicate and the object to account for the fact that the instantiation is modified in a certain way. I suggest this structure: ‘subject’ + ‘adverb’ + ‘property’. By switching the places of property and variable, it will be easier to differentiate the adverb-category from the relation-category. The predicate ‘ $a$  is  $F$  in manner  $A$ ’ would then be formalised: ‘ $aAF$ ’. This way, the adverb ‘Monday-ly’ can be differentiated from the adverb ‘Friday-ly’ by representing the former with ‘ $M$ ’ e.g., and the latter with ‘ $F$ ’, without it being confused with a relation.

Like endurantism, adverbialism would also make adjustments the third premise of the ITC-argument. ‘ $a$ ’, ‘ $b$ ’ and ‘ $F$ ’ stays the same, but the distinct adverbial information is added. I suggest keeping ‘ $A$ ’ to represent the adverb in both predicates, but differentiate between the adverb in the two instantiations by adding ‘ $m$ ’ to one and ‘ $n$ ’ to the other, like so: ‘ $A_m$ ’ and ‘ $A_n$ ’. The new premise three is then formalised:  $aA_mF \wedge \sim bA_nF$ . To be sure, this is read “ $a$  is  $F$  in an  $A_m$ -ly way and  $a$  is not  $F$  in an  $A_n$ -ly way. The adverbialist version of the ITC-argument then looks like this:

- |                  |  |           |
|------------------|--|-----------|
| 1.               | $a = b$  | [premise] |
| 2.               | $a = b \rightarrow (\forall F)(Fa \leftrightarrow Fb)$ | [LL]      |
| 3 <sup>A</sup> . | $aA_mF \wedge \sim bA_nF$                              | [premise] |

There is no longer any steps in the argument which would lead to the contradiction that  $a \neq b$ .  $a$  instantiates  $F$  in the adverbial sense  $A_m$  which indicates that  $a$ ’s instantiation of  $F$  is adverbially related to a time  $t_1$ , while  $b$ ’s instantiation of  $\sim F$  is adverbially related to a time  $t_2$ , and  $t_1$  and  $t_2$  are distinct times. Since  $a = b$ ,  $a$  and  $b$  are the same object. Therefore, we can in fact switch ‘ $a$ ’ and ‘ $b$ ’ in the formalisations, and say that  $bA_mF$  and  $aA_nF$ . Furthermore, call the one object that both ‘ $a$ ’ and ‘ $b$ ’ denotes ‘ $c$ ’, and say that  $cA_mF$  and  $cA_nF$ . All completely accurate and compatible with LL and the premise that  $a = b$ .

This adverb explaining the way in which  $F$  is had cannot be a part of the property is self.  $F$  cannot be interpreted as “on-Monday-yellow”, for example, because the argument would end up just like the first version: The banana on Friday – which is green all over – is not “on-Monday-yellow”. The adverbialist argues that the property stays a property in the way we are

used to, and that it therefore avoids the arguments from temporary intrinsics. The object  $a$ , can instantiate  $F$  *simpliciter* temporarily, because the instantiation is not merely instantiation, but instantiation in an  $A_m$ -ly way. However, it is not clear that this account is adequate. It depends on what instantiation means. Even though the adverbialist saves the property from turning into a relation, it obscures our understanding of instantiation. The ‘is’ in ‘is  $F$ ’ is not one of identity, which is a relation, but one of merely being of the sort that the property in question is. By adding an adverb, the instantiation turns into something it is not. Even though the adverbialist has introduced a new category to account for adverbs in logical formalisation, this adverb seems very closely related to the category of relations. It now seems that the object instantiates its property by being related in a certain way to it. The object is related to the relevant property in an ‘instantiate-in-an- $A$ ’-ly way. Like the endurantist in the previous section that ends up with an object with nothing to it: the object is not simply  $F$ , rather it ‘is-in-a-certain-way’  $F$ .

In the following section, I suggest a third type of three dimensionalism which is very similar to adverbialism, but does not add any new understanding of anything in logic. Rather it uses familiar logic to solve the contradiction in the ITC-argument.

### 2.3 The temporal solution

A closely related solution to the adverbial solution is a sort of *temporal* solution. It proposes to solve the apparent problem in the ITC-argument by introducing some operators from temporal logic into for formalisations of the premises. These are operators, which modify expressions by adding a future and past tense to them: ‘**F**’ is the future operator and ‘**P**’ is the past operator. They are read ‘will be...’ [**F**( $Fa$ )] and ‘was...’ [**P**( $Fa$ )]. By adding these operators, the temporal solution can formalise sentences in such a way as to accommodate for the different times at which the different properties are instantiated. In the case of the ITC-argument, premise 3 is incorrectly formalised because it lacks an operator to specify the time of property instantiation. Consider the banana example again: The banana on Monday is green, while the same banana on Friday is yellow. As a three dimensionalist solution, the temporal solution accepts premise 1 of the ITC-argument, which claims that this banana persists through the colour change by identity. Rather the problem with the argument is that the formalisation of change in premise 3 does not account for the point in time at which the incompatible properties are instantiated. To formalise this premise using temporal operators, we could for example take one of the instantiations to be tenseless, i.e. presently instantiated,

and then modify the other as either past instantiation, ' $\mathbf{P}(Fa)$ ', or future instantiation, ' $\mathbf{F}(Fa)$ '. In this case the new premise could for instance look like this: ' $\mathbf{P}(Fa) \wedge \sim Fb$ '. This is read "It was the case that  $a$  is  $F$  and it is the case that  $b$  is not  $F$ ." The ITC-argument would then be formalised:

- |   |           |
|---|-----------|
| 1. $a = b$  | [premise] |
| 2. $a = b \rightarrow (\forall F)(Fa \leftrightarrow Fb)$ | [LL]      |
| 3 <sup>T</sup> . $\mathbf{P}(Fa) \wedge (\sim Fb)$        | [premise] |

Again, we see that the new premise 3 will not lead to the contradictory conclusion that  $a$  and  $b$  are non-identical. But this solution is not really adding anything tangible to the understanding of persistence. The theory does not say anything about how it is possible to keep an identity relation between  $a$  and  $b$ , and as we have seen with the endurantist solution, relation to times will lead to a wrongful understanding of properties. Seeing as the temporal solution is a three dimensional solution, something like the endurantist explanation of the instantiation of a property at a certain time is likely how the temporal theory would have to understand premise 3<sup>E</sup>, and this is not satisfactory as we have seen.

The problem with the temporal solution is not the logic itself, but the lack of interpretation. The endurantist and the adverbialist are also able to avoid the contradictive conclusion using logic, however they have interpretations of their formalisations as well. This is important as we are in fact analysing common occurrences. If the logic does not explain how to understand the formalisations in natural language and elaborate on them in a way that relates to these occurrences, then we are just as far as we were before.

As none of the three dimensionalist attempt at solving the ITC-argument do so in a manner consistent with all the connected aspects of persistence, I will move on to their opposing doctrine: four dimensionalism.

## Chapter 3

### Four dimensionalism

Four dimensionalists claim that properties are instantiated by the temporal parts of object. So, when an object undergoes change, the incompatible properties at the different times are instantiated by different temporal parts. Exactly how this is to be understood differs between Lewis' perdurance theory and Sider's stage theory. The most important difference lies in what the two theories take to be the referent of a statement of property instantiation, i.e. what they take to be the ordinary objects. A statement that says e.g. that 'the mug is blue' could either refer to the whole aggregate of temporal parts which comprise the lifespan of the mug – call this aggregate a *continuant* – or it could refer to only one temporal part of the mug. The former construal belongs to Lewis' perdurance theory, and the latter to Sider's stage theory.

In the following chapter, I will introduce perdurantism and the stage theory and give an account of their solutions to the ITC-argument. I will also critically discuss each of the solutions. The biggest surprise with these theories is that they seem to deny the idea that persistence is a matter of identity, which I have set as a platitude following Lewis and the everyday intuition based on how we talk about and understand persistence. Because of this, they introduce a new semantics for analysing persistence statements. This will be further explored and discussed in chapter 4.

#### 3.1 The perdurance solution

On the perdurance theory, objects are understood as aggregates of multiple temporal parts. They are not only physically extended in space, but also physically extended through time. In this way, they can be likened to worms with their long bodies that stretch through space. Similarly, regular objects stretch (physically) through time, by having different temporal parts at different times. Objects, when viewed in their completeness, i.e. the whole aggregate of temporal parts which make them up, will look wormlike. Have a look at the illustration in figure 2:

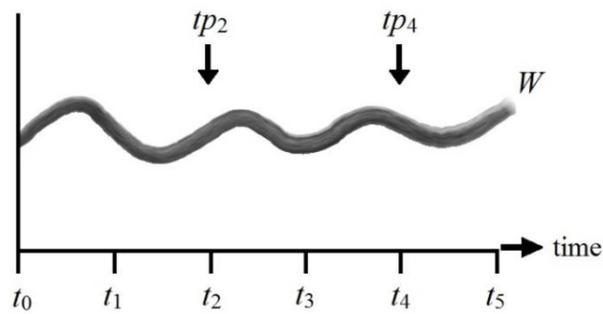


fig. 2

The horizontal axis illustrates time as going from an earlier point in time,  $t_0$ , to later times,  $t_1$ ,  $t_2$ , etc., in chronological order.<sup>11</sup> The black squiggly line,  $W$ , represents an ordinary object. As indicated by the downward pointing arrows, this object has different temporal parts,  $tp_2$  and  $tp_4$  for instance, which are completely separate, physical parts of  $W$ , located at different points in time. These temporal parts cannot leave their temporal location:  $tp_2$  is, and will always be, located at  $t_2$ . Let us say that  $t_4$  is the present moment. Then all we can observe of  $W$  now is the temporal part  $tp_4$ . Nevertheless,  $W$  consists of many more parts that are unobservable to us at each moment, because they are located at different points in time.

Since ordinary objects are continuants, the subject in a property instantiation statement such as ‘the mug is blue’ will be the mug-continuant (Lewis 1988:66). I.e. the sum of the temporal parts that make up the mug from its conception to its termination is the object that we call the mug. So when we say about an object,  $a$ , that it has a property,  $F$ , we are in fact referring to the whole continuant, and saying that it instantiates  $F$ . However, ‘ $a$  has  $F$ ’ cannot be the full statement; suppose  $a$  does not instantiate  $F$  at all times throughout its lifespan. It could still be true that  $a$  is  $F$  at the time the statement is uttered. So it is evident that ‘ $a$  is  $F$ ’ lacks a time-referent to fix the exact point in time that the continuant instantiates  $F$ . The full sentence would be ‘ $a$  is  $F$  at  $t$ ’. As mentioned in the previous chapter, to avoid confusion about how this statement is should be understood, Lowe specifies the formulation ‘ $a$ -at- $t$  is  $F$ ’ for the four dimensionalists (Lowe 1988:73). This points out that we are referring to one of the time slices of  $a$ , namely the one that exists at  $t$ , which consists of one or more instantaneous temporal parts of  $a$ . With this time indexed formulation in mind.

<sup>11</sup> I.e.  $t_0 < t_1$  and  $t_1 < t_2$  and  $t_2 < t_3$ , etc.

The ITC-argument, after the perdurantist has tweaked it, would presumably look like this:

1.  $a = b$  [premise]
2.  $a = b \rightarrow (\forall F)(Fa \leftrightarrow Fb)$  [LL]
- 3<sup>P</sup>.  $Fa_{t_1} \wedge \sim Fb_{t_2}$  [premise]

' $Fa_{t_1}$ ' stands for ' $a$ -at- $t_1$  is  $F$ ' and ' $\sim Fb_{t_2}$ ' stands for ' $b$ -at- $t_2$  is  $\sim F$ ', and  $t_1$  and  $t_2$  are different points in time. The perdurantist allows both premise 1 and 2 of the original ITC-argument, but rejects the formulation of premise 3. The original premise 3 does not include time indices in the predicate, and so lead to a contradictory conclusion that  $a \neq b$ . We cannot derive this contradiction when the third premise is specified by the perdurantist.

Here is an in-depth explanation of the new argument: According to the perdurantist, ' $a$ ' and ' $b$ ' both refer to the same object in premise 1 and 2, which means that they refer to a continuant. However, they are incomplete references when we want to say about this continuant that it is  $F$  at one point in time and  $\sim F$  at some later time. The whole continuant is not both  $F$  and  $\sim F$  all over. E.g. a banana-continuant is not both yellow all over and green all over. Note that 'all over' includes all times that the object exists as well, because this is included in the understanding of objects as continuants. That a continuant is green all over, e.g., means that it is green at every spatial part as well as at all times. So it is not the whole continuant that instantiates  $F$ , given the change implied in premise 3 of the ITC-argument. Rather it is a temporal part of the continuant, which is  $F$  all over, and a different temporal part, which is  $\sim F$  all over. Therefore, when these incompatible properties are introduced in the third premise, we have to specify which temporal parts of the continuant that instantiate the properties. Without the time indices, we are lead into a faulty conclusion. These time indices are ' $a$ -at- $t_1$ ', i.e. the temporal part of the continuant,  $a$ , which comprises  $a$ 's temporal parts at  $t_1$ , and ' $b$ -at- $t_2$ ', i.e. the temporal part of the continuant,  $b$ , which comprises  $b$ 's temporal parts at a different time  $t_2$ . From premise 1 we know that  $a$  and  $b$  are the same continuant, so we could just as well formulate premise 3<sup>P</sup> like this:  $Fc_{t_1} \wedge \sim Fc_{t_2}$ . ' $c$ ' here refers to the continuant, while the time specifications relativize the predication to the relevant temporal parts of  $c$  which instantiate  $F$  or  $\sim F$  respectively.

There are two related problematic areas of the perdurance solution that I want to point out. The first problematic element is that there is a jump in predication from premise 1 and 2 to premise 3<sup>P</sup>. The first two premises refer to the continuant named both ' $a$ ' and ' $b$ ', while

premise 3<sup>P</sup> refers to temporal parts of this continuant. Premise 1 and 2 then refer to an ordinary object, while premise 3<sup>P</sup> refers to only a part of the object: a temporal part. So we are not actually talking about the same thing throughout the argument. Nevertheless, the perdurantist argues that the predication in premise 3<sup>P</sup> holds for the object in premise 1 and 2 as well. The same object – by the names ‘*a*’ and ‘*b*’ – is still mentioned in premise 3<sup>P</sup>: ‘*Fa<sub>t1</sub>*’ and ‘*Fb<sub>t1</sub>*’ incorporates *a* and *b*, because the relevant temporal parts are picked out through which continuant they are part of. Thus, there is a jump in predication, not only from premise 1 and 2 to premise 3<sup>P</sup>, but also in premise 3<sup>P</sup> itself. It seems then that the perdurantist says about the object (*i.e. a continuant*) that it (*now a temporal part*) instantiates a property. At first the subject of the property instantiation statement is the object, then there is a jump to the temporal part as the subject.

In fact, we make this jump all the time, given perdurantism. When we talk about a mug and its properties for instance, we could say something like “the mug has a handle”. We do not say that “the temporal part of the mug at the present moment has a handle”, or “the mug-at-the-present-moment has a handle”. Alone ‘the mug’ refers to the object which is the mug, meaning the whole mug-continuant, yet in a property instantiation statement, ‘the mug’ is (more often than not) relativised to a time. “The mug has a handle” hides this relation behind the word ‘the mug’, but the complete statement would read something like “the temporal part of the mug at the present moment has a handle”. Yet it is the continuant which is the true referent of the subject in the property instantiation statement, as it is the true object on the perdurantist view. Rarely, if ever, does a continuant instantiate exactly the same properties throughout its lifespan. If the subject of every property instantiation statement is always the temporal part that instantiates the property in question, then we would almost never say anything about ordinary objects. This is not what the perdurantist claims; we do talk about the object, but we talk about the object in virtue of – or by way of – the relevant temporal part. This suggests that property instantiation is very often a relational notion for the perdurantists. Instantiating greenness *e.g.*, will consist in a relation between the object (the continuant) and the relevant green temporal part of the object.

Lewis agrees that there is a relation in the notion of how objects instantiate properties, but argues that that is not a problem (Lewis 1988:66). What would have been a real problem were if objects could not instantiate any properties *simpliciter*. This is the essence of Lewis’ argument against endurantism: Since the endurantist accounts for property instantiation relationally, no properties are instantiated *simpliciter*, and so objects have no intrinsic

properties. All their properties turn out extrinsic.<sup>12</sup> The conclusion then was that since the perdurantist is able to account for instantiation *simpliciter*, while endurantism is not, perdurantism has the upper hand. However, it is no longer obvious that perdurantism is able to account for instantiation *simpliciter* in a more persuasive way than the endurantists. This is the second problematic area of the perdurance solution.

‘Instantiation *simpliciter*’ means that the object in question instantiates a property in and of itself *without qualification*. According to Lewis, an object instantiates a property *simpliciter* in virtue of having a temporal part which instantiates this property *simpliciter* (Lewis 1988:66). The temporal parts instantiate their properties timelessly. They exist only at an instant and so their intrinsic properties they instantiate will always be the same. Any intrinsic property which is instantiated by a temporal part then is instantiated *simpliciter*. This suits the description of instantiation *simpliciter* as being completely of the object without qualification.

While it is quite acceptable that temporal parts can instantiate properties *simpliciter*, it seems more dubious that continuants can instantiate properties *simpliciter* as well. As explained earlier, objects instantiate properties in a relational manner also on the perdurance theory, because objects instantiate their properties in virtue of the properties of their temporal parts. Likewise, then, with instantiation *simpliciter*: An object instantiates a property *simpliciter* in virtue of having a temporal part which instantiates that property *simpliciter*. But instantiation *simpliciter* is supposed to be without qualification. For an object to instantiate a property in virtue of anything other than itself is for it not to instantiate that property *simpliciter*. An example of the perdurantist formalisation of a predicate of instantiation *simpliciter* will make this clearer: Say that  $F$  is some intrinsic property that an object,  $a$ , instantiates at some time  $t$ , but not at other times. Following Lewis,  $a$  is a continuant, and it instantiates  $F$  in virtue of having a temporal part at  $t$  which instantiates  $F$ . This temporal part instantiates  $F$  *simpliciter*, so therefore does  $a$  also instantiate  $F$  *simpliciter*. I agree that the temporal part instantiates  $F$  *simpliciter*, but I am not convinced that  $a$  also does so. If  $a$  instantiates  $F$  *simpliciter*, the formalisation should just be ‘ $Fa$ ’ – no added qualifications needed. However, ‘ $Fa$ ’ is not a complete predicate as we have seen. It does not specify which temporal part of  $a$  that instantiates  $F$ . We need a time index to fix the point in time of instantiation, just like premise 3 of the original ITC-argument needs. The full formalisation is actually ‘ $Fa_t$ ’, where ‘ $a_t$ ’

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<sup>12</sup> See chapter 2, section 2.1 for Lewis’ argument from temporary intrinsics against endurantism.

denoted the temporal part of  $a$  that instantiates  $F$  *simpliciter*. Since  $a_{t_1}$  is a proper part of  $a$ , i.e.  $a_{t_1}$  is smaller than the whole continuant that it  $a$ ,  $a_{t_1}$  and  $a$  are not identical.

We are supposed to accept that, since a temporal part of an object instantiates a property *simpliciter*, the object also does so. I am going to have a try understanding how this can be. Again an analogy of spatial parts may be helpful. My body has a finger, i.e. there is a finger attached somewhere on my body, even though the finger is only one part of my body. Similarly, with temporal parts: The mug has a handle, though the handle is just at one temporal part of the mug-continuant, and not at all its temporal parts. In the spatial part scenario, we would not hesitate to say that something,  $x$ , has a property or a part, just because it is not situated all over  $x$ . Therefore we should not hesitate to say that an object like a mug-continuant should have a property completely and without qualification, though it is only situated at a temporal part of the mug-continuant.

However, because of the jump between continuant and temporal parts, it is not obvious that the perdurantist can account for instantiation *simpliciter* of objects. If an object,  $a$ , (i.e. a continuant) instantiates  $F$  *simpliciter* because it has a temporal part at  $t_1$  which instantiates  $F$ , we should be able to say that  $Fa$ , talking solely about the continuant. But imagine if  $a$  also instantiates  $\sim F$  by having a temporal part at a different time  $t_2$  which instantiates  $\sim F$ . If we are only talking about  $a$  alone (as a continuant) when stating that  $a$  instantiates  $F$  *simpliciter*, we seem to have a strange situation.  $a$  instantiates  $F$  *simpliciter*, but  $a$  also instantiates  $\sim F$ . This is logically impossible. So, we must add the relativisation to the temporal part, either explicitly or implicitly. But then the claim that the object  $a$  (the continuant) instantiates  $F$  *simpliciter* is less obvious.

In the next section, I will introduce the stage theory and formulate their suggested adjustments to the ITC-argument. The stage theory, as a four dimensionalist theory, believes in temporal parts, and so agrees with perdurantism that the incompatible properties in a change scenario are not instantiated by the same temporal parts. However, instead of relativising the continuants to the time of the relevant temporal parts, the stage theory suggests perhaps the most non-intuitive adjustment as a solution. The suggested solution will require an extensive inquiry into a new understanding of how things persist, which will be introduced and explored in its own chapter afterwards.

### 3.2 The stage theory solution

While the perdurance theory claims that objects are aggregates of temporal parts, the stage theory says that objects *are* temporal parts (Sider 2001:60–1). On this view, temporal parts are called *stages*. So an object is an instantaneous stage (temporal part), or rather, an object  $x$ , which exists at an instantaneous moment  $t$  is identical to its stage which exists at  $t$ . Since stages are instantaneous they do not last over any amount of time. This means that ordinary objects do not last over time either, since they are stages. Furthermore, since stages do not change their intrinsic properties, this means that ordinary objects do not change their intrinsic properties either. Both of these statements are true on the stage view, but it does not mean that there are no such things as persisting objects and change in these, according to the stage theorist. I will come back to this after the stage theory alteration of the ITC-argument.

The aggregates of stages will still be called continuants when talking about the stage theory. But continuants are not ordinary objects according to the stage view. This means for instance that I am identical to the stage that exists as I am writing this sentence, but not the stage that writes the previous sentence. Nor am I identical to the whole set of stages that comprise the continuant-me. Note the tenseless language used when referring to the writing that the stages do: even though the previous sentence is written by a past stage, this stage “still exists” so to speak, as explained in section 1.6 of the first chapter, and so it is “still writing” the sentence.

Because of the shift in predication from continuants to stages, Sider does not run into the same problem as the perdurantist when it comes to jumping back and forth between the subjects of predication. On the stage theory, whenever an object is green, it is green *simpliciter*. And it is so in the most direct way; not by having some part which is green, but by simply *being* green itself. There is no object beyond the stage, and so anything which is predicated of a stage is predicated of an object and vice versa. Therefore, there is never a jump between different subjects of predication. But it does mean that the stage theory suggests a rather special solution to the ITC-argument: Since  $a$  and  $b$  in the ITC-argument are objects, this must mean that they refer to instantaneous stages. And since objects do not exist at more than one instant, they obviously cannot instantiate incompatible properties at different times. It is also given that no object can instantiate incompatible properties at the same time. So, if  $a$  and  $b$  do in fact instantiate incompatible properties, as premise 3 in the original ITC-argument establishes, then they cannot be the same object. Therefore, Sider would deny the

first premise of the ITC-argument, which claims that  $a = b$ . The argument would then end up like this:

- |                  |  |   |
|------------------|--|---|
| 1 <sup>S</sup> . | $a = b \rightarrow (\forall F)(Fa \leftrightarrow Fb)$ | [LL]  |
| 2 <sup>S</sup> . | $Fa \wedge \sim Fb$                                    | [Premise]   |
| 3 <sup>S</sup> . | $a \neq b$   | [1 <sup>S</sup> , 2 <sup>S</sup> ; Modus tollens] |

This version of the ITC-argument agrees with LL and accepts that if there is an instantiation of different properties, then  $a$  and  $b$  are not identical. Using the banana example once more, let ' $a$ ' be the banana on Monday, and ' $b$ ' be the banana on Friday, and ' $F$ ' stand for 'green'. Ordinarily we would not hesitate to say that the banana on Monday and Friday are the same banana, and that it has changed from being green to not being green. However, the stage theorist would argue that  $a$  and  $b$  are not the same object. They exist at different instants, and so are identical to different instantaneous stages and not each other.

Since the stage view claims that the relation between the stages of a continuant is not one of identity, one might argue that the theory has not actually met the criteria of persistence. However, as stated earlier, Sider does not discard persistence all together. We still want to be able to say that a person is five years old, that a train has travelled 100 km, or that the newly painted house is the same house as before the paint job. Without persistence, these sentences would never be true. To account for persistence, Sider employs a type of counterpart theory where certain stages are related in an appropriate manner for persistence.

In the next chapter, I will introduce the counterpart theory and examine how it is supposed to account for persistence. One of the most interesting aspects of this theory is its relation to identity, as persistence has been considered a matter of identity so far. In fact, even Lewis who claims that it is a common platitude of persistence that it is a matter of identity meets some problematic implications concerning persistence and perdurantism.

## Chapter 4

### Temporal counterpart theory

The counterpart theory that Sider employs for his stage theory is based on the modal counterpart theory that Lewis presents in *On the Plurality of Worlds* (1986). The book explores modality and argues for modal realism, the doctrine that all possible worlds and individuals are real concrete entities, not just abstract stories about how the actual world could have been.<sup>13</sup> By ‘individual’ I will mean anything that exists in either the actual or any possible world. One of the questions about modality that Lewis tries to answer in the book is how individuals in the different possible worlds are related to each other. The answer to this question will give us an account of how to analyse modal statements. One potential answer is that possible individuals are identical to each other through a trans-world identity relation. This would mean that I, e.g., am identical to all the possible versions of myself. However, Lewis argues against trans-world identity in an argument similar in structure to his argument from temporary intrinsics, which I introduced in chapter 2, section 2.1. Instead he suggests that possible individuals are counterpart related to each other. This is a special relation that is supposed to pick out the right individuals in different possible worlds that are such related to each other that one of them is the possible version of the other. Sider modifies this relation to suit his stage theory in order to account for persistence. On his version, certain stages are related to each other in a special way so that the one is the future version of the other. This way, Sider claims to have an account of how to analyse temporal statements.

I will start this chapter off with an introduction to Lewis’ modal counterpart theory and his argument against trans-world identity.<sup>14</sup> Following this is a section about the temporal version of the theory, which examines how the counterpart relation is supposed to account for the persistence of objects as instantaneous stages. The topic of identity through persistence will be examined again. Both Lewis and Sider argue that they can account for identity being the important relation between different stages that persist. I will examine these claims and move on to an in-debt exploration of the temporal counterpart relation. In order to do this, I will use

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<sup>13</sup> Again, I am using Lewis’ vocabulary about modality, where ‘actual’ is like an indexical, referring to the world in which the speaker is located.

<sup>14</sup> For an introduction to Lewis’ theory of modality and a more in depth presentation of his reasons for abandoning trans-world identity, see his *On the Plurality of Worlds* (1986).

both Lewis' work on the modal version of the relation as well as Sider's work about the temporal version, and compare differences between the two versions.

#### 4.1 Modal counterpart theory

Lewis' theory of modality – modal realism – takes all possible worlds to be real and concrete. This means that all the individuals inhabiting these worlds are also concrete. So there exists a concrete living brunette in some possible world, which is my possible self as a brunette.<sup>15</sup> In order to explain how the individuals of different possible worlds can be the possible versions of each other, Lewis needs an account of the relation between these individuals. For this purpose he suggests that certain individuals are possible versions of each other through being counterpart of each other (Lewis 1986:194). So the possible version of Lewis, who pursued a career as a professional footballer instead of reading philosophy, is a counterpart of the actual Lewis (the philosopher) of our world. This counterpart is a concrete living footballer. The theory of counterparts is introduced because we have to abandon trans-world identity, according to Lewis. The theory of trans-world identity claims that the actual world and all possible worlds overlap in such a way that the actual individual is identical to all of its possible versions. I.e. an individual which exists in this world, the actual world, is identical to all the possible versions of itself. The actual G.E. Moore, e.g., is identical to all the possible versions of G.E. Moore, like the ones without any hands for instance. So G.E. Moore is a shared part of all the (possible) worlds that contain a version of G.E. Moore. Call this shared part comprising all of the possible versions of any given individual a trans-world individual. It might seem quite intuitive that an actual individual and all its possible versions should be identical to each other. If I am actually a blonde, but could possibly be a brunette, then this brunette would still be me; not some other person. Saul Kripke argued that an individual would not care about what happens to someone else the same way she cares about what could happen to herself. So if the possible individual is not identical to the actual individual, then the actual individual is not going to care about what happens to that other individual as if this was to happen to herself (Kripke 1980:45 note 13). The trans-world identity theory would perhaps soothe such an objection; however, there arises a familiar problem from this identity claim.

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<sup>15</sup> I'm actually blond.

This problem is based on the fact that a trans-world individual – an actual individual along with all her possible versions – will have different properties in the different worlds. Since all possible individuals that make up one trans-world individual are in fact identical with each other, an implication will be instantiation of contradictory properties (Lewis 1986:200).

Consider this example: The actual G.E. Moore has two hands and some possible version of G.E. Moore has no hands. The trans-world identity theory says that the actual and this handless possible G.E. Moore are identical. So the trans-world G.E. Moore has both two hands and no hands. This is clearly unacceptable. Everything either has  $F$  or  $\sim F$ , and never both.

It would not help to argue that actual and possible individuals are identical, yet instantiate incompatible properties *at different worlds*. That a trans-world individual instantiates some property  $F$  at possible world  $w_1$ , and the property  $\sim F$  at possible world  $w_2$ , where  $w_1$  and  $w_2$  are not the same worlds. This relational understanding of instantiation cannot save the trans-world identity theory because it leaves the trans-world individual without any intrinsic properties, according to Lewis (1986:201). Just like is the case in the argument from temporary intrinsics, the properties of the trans-world individual are all taken as relations; in this case, relations between the individual and different worlds. Since intrinsic properties are not relations to something external, the property of having-no-hands-at- $w_1$  is not an intrinsic property.<sup>16</sup> The consequence is that trans-world individuals have no intrinsic properties. Strip the trans-world individual of all its extrinsic properties, and there is nothing left of it, if we follow Lewis' argument. Lewis calls this argument the problem of accidental intrinsics (1986:201).

So the conclusion is that identity is not the relation which holds between the possible individuals of modal realism. However, there must still be some sort of relation between them or else there would be no analysis of modal statements. This is where the theory of counterparts enters in. Still viewing all individuals that are possible versions of each other as making up a trans-world individual, our alternative is to view the possible individuals as non-identical parts of the trans-world individual. Just like a cat can be both white and grey by having a part which is white and a different part which is grey, a trans-world individual can both have hands and have no hands by having a part which has hands and a different part which has no hands. Such a trans-world individual could instantiate having two hands and

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<sup>16</sup> Just like being bent at  $t$  ( $F$ -at- $t$ ) is a relational property, and so not an intrinsic property, according to the temporary intrinsics argument against endurantism in chapter 2, section 2.1.

having no hands without contradicting LL or running into the problem of accidental intrinsics. This is because each of the instantiations is relative to different counterpart individuals of the trans-world individual in question.

On one sense, there are no trans-world individuals according to the counterpart theory. There are no shared parts that exist at multiple possible worlds, like the trans-world identity theory claims. On another sense, counterpart individuals can be said to be different parts of some trans-world individual just like I can be in both Norway and Finland by standing with one foot on each side of the border. In this case I am trans-country individual, although no part of me is a shared part of my Norwegian side and my Finnish side. I only have different, non-identical parts which exist in different countries. On the counterpart theory, the only trans-world individuals are trans-world individuals of the latter sense.

With this theory of counterparts, Lewis has a way of analysing modal statements in his modal realist framework. The modal counterpart theory analyses modal statements by way of counterparts like this: the modal statement  $\Diamond Fx$ , where  $x$  is at possible world  $w_1$ , is true iff there is some possible world  $w_2$  with a counterpart of  $x$ ,  $y$ , and  $Fy$  at  $w_2$ . This means that some individual  $x$  at a possible world  $w$  has a modal property ‘possibly-being- $F$ ’ in virtue of having a counterpart at a different possible world, which instantiate the non-modal version of this property. So, the modal statement ‘G.E. Moore could have had no hands’ is analysed: There is a possible world where there is a counterpart of the actual G.E. Moore, and this counterpart has no hands.

Even though the problem of accidental intrinsics argues against the trans-world identity theory based on its construal of all properties as relational, there is in a way a relational aspect of property instantiation on the counterpart relation as well. Any modal statement such as ‘ $\Diamond Fa$ ’, where ‘ $a$ ’ denotes a possible individual, is true iff the possible individual,  $a$ , stands in a counterpart relation to another possible individual,  $b$ , that exists at a different possible world, where  $b$  instantiates the non-modal version of the property. This should show that, at least modal properties are not completely non-relational, so they are not intrinsic by the syntactical criterion of intrinsicality described in chapter 1, section 1.3. The metaphysical criterion also agrees: there is no possible world in which an object instantiates a modal property ‘ $\Diamond Fa$ ’ without standing in a counterpart relation to some other possible individual,  $b$  which instantiates  $F$  non-modally. But that modal properties are all extrinsic should not be a problem, and non-modal properties can still be intrinsic.

In the following section, I will explain how the modal counterpart theory can be translated into a temporal version that suits Sider's stage theory. I will give an explanation of how the relation between temporal counterparts at different times is supposed to account for persistence on the stage view.

## 4.2 Temporal counterpart theory

Employed in stage theory, the counterpart relation is temporal rather than modal. Simply put, temporal counterpart theory allows the stage theorist to analyse persistence statements about objects in such a way that objects persist by having counterparts at different times. A temporal statement, such as 'the banana was green', for example, would then be a persistence statement. In temporal logic, the structure '*a was F*' would be formalized ' $\mathbf{P}(Fa)$ ', while '*a will be F*' is formalized ' $\mathbf{F}(Fa)$ '.

Temporal counterpart theory defines persistence by saying that an object *was F* iff it has a temporal counterpart that is *F*. Likewise, an object *will be F* iff it has a future temporal counterpart that is *F* (Sider 2006:14). Note that the 'is' in 'is *F*' in these definitions is *tenseless*, because the stage at this time instantiates the non-temporal version of the property, i.e. just *F*. This stage will always instantiate just *F*. Take, for instance, an object *a*, which is a stage that exists at instant *t*. Considered alone, *a* does not persist, since it is instantaneous, but *a* has multiple temporal counterparts that exist at either earlier or later times. These are all the other stages that make up the continuant that *a* is a temporal part of. *a* could for example be a stage of a banana-continuant consisting of some green stages on Monday and some yellow stages four days later on Friday. Due to the counterpart relation between the stages of the banana-continuant, each banana-stage is a persistent object. Here is a full analysis: The banana-continuant has a temporal part sometime on Monday, call it the instantaneous stage  $S_1$ , at time  $t_1$ , which has the property *G* (green). It also has a temporal part sometime on Friday, call it the instantaneous stage  $S_2$ , at time  $t_2$ , and  $S_2$  has the property  $\sim G$ . We want to say that  $S_1$  and  $S_2$  are the same banana which has persisted through a colour change. However, Sider's stage theory claims that the stages are separate objects and that none of them last beyond an instant. For the two objects  $S_1$  and  $S_2$  to be persisting objects, Sider proposes that there is a temporal counterpart relation holding between the two stages, such that they persist by standing in this relation to each other (Sider 2001:193). The banana-stage  $S_1$  has the temporal property 'will be  $\sim G$ ' in virtue of being counterpart related to banana-stage  $S_2$ , which instantiates the non-temporal property ' $\sim G$ '. Likewise,  $S_2$  has the temporal property 'was *G*'

in virtue of being counterpart related to  $S_1$ , which instantiates the non-temporal ‘ $G$ ’. Thus, we can analyse all persistence statements about any object.

In elaborating on the temporal counterpart theory, Sider draws a comparison to the I-relation that Lewis introduces for the same purpose for his perdurantism. According to Lewis, the I-relation can account for both identity and psychological continuity being what matters for persistence when it comes to persons. Sider argues that the stage theory is better than perdurantism when it comes to accounting for identity as part of what matters for personal persistence with regards to the I-relation. The I-relation is basically the counterpart relation, but it bakes identity into it. I will end the following section with a discussion of whether the I-relation really is able to account for identity.

### 4.3 The I-relation

In ‘All the World’s a Stage’, Sider elaborates on the counterpart relation by examining the I-relation which Lewis introduces in ‘Survival and Identity’ (1983). In Lewis’ article, the I-relation is a ‘unity relation’ which is supposed to hold between stages iff they are parts of a certain continuant (ibid:59). Lewis’ focus is on persons and what matters for personal persistence.<sup>17</sup> His aim is to include both identity and psychological continuity into what matters for personal persistence, despite the problems that Derek Parfit points out.<sup>18</sup> These problems arise from fission cases. Here is an example: Let us say that both identity and psychological continuity is what matters for personal persistence, i.e. a future person matters to me iff this future person is both identical to me and also psychologically continuous with me. Now consider a person  $a$  who, at some point in time divides into two people,  $b$  and  $c$  that are similar to  $a$  in all psychological respects. I.e. both  $b$  and  $c$  are psychologically continuous with  $a$ . According to the part of our presupposed criterion which calls for psychological continuity, both  $b$  and  $c$  should matter to  $a$ . However, this scenario does not agree with the criterion that identity also is what matters:  $b$  and  $c$  are not identical, so, because of the transitivity of identity,  $a$  cannot both be identical to  $b$  and  $c$ . Since the scenario cannot account for both identity and psychological continuity,  $b$  and  $c$  do not matter to  $a$  in the way that they would if they were the continuation of  $a$  through persistence (Sider 1996a:2–3).

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<sup>17</sup> My use of ‘matter’ in this sense will mean that a future person matters to present person if they are in fact one persisting person: by being person stages of the same person continuant. It will have nothing to do with empathy or caring about completely separate people, i.e. person stages that are not part of the same person-continuant.

<sup>18</sup> See Parfit’s ‘Personal Identity’ in *Personal Identity* (Perry (ed.) 1975:199–223).

The psychological continuity condition says that for any person P and for any person P\* that exists at some time in the future, P\* matters to P iff P's current stage is psychologically continuous with P\*'s stage at that time (Sider 1996a:4). This formulation suits both perdurantism and the stage theory because 'person P' and 'person P\*' can be analysed as either a person-continuants, in which case the time indices mentioned relativise the continuants to the relevant stages when needed, or it can be analysed as person-stages.

Lewis attempts to solve the problem of combining identity and psychological continuity by introducing the I-relation, which he claims can account for both identity and psychological continuity on his perdurantist theory (Lewis 1983:58). This is the claim that Sider tries to unravel and argues against in his article 'All the World's a Stage' (1996a). After a couple of attempted definitions of the identity-component that both lead to problems, Sider's diagnosis is that Lewis' position must be that a future person P\* matters to a present person P iff P's present stage and P\*'s stage at that time are person I-related to each other (Sider 1996a:5). This formulation suits perdurantism because it can comply with the perdurantist claim that person P and P\* are continuants. Then, when referring to these persons at specific times, the formulation places indices on the person-continuants, to point out the right stages: Person-continuant P has a stage that is present, and person-continuant P\* has a stage that exists sometime in the future. The first discarded definition that Sider considers fails to comply with the idea that continuants – being the ordinary objects – are the right subjects of the sentence. Therefore it cannot be the right formulation for perdurantism.<sup>19</sup> Secondly, the diagnosed formulation fits the condition that psychological continuity is also what matters for personal persistence. The second discarded definition that Sider considers fails to comply with the condition of psychological continuity.<sup>20</sup> This discarded formulation states that a future person P\* matters to a present person P iff P = P\*, but this is too strong, because then two stages of different people cannot be psychologically continuous with each other, as the example of fission shows.

When having decided which formulation of the I-relation that suits perdurantism best, Sider moves on to examine how it fits with the persistence criterion of identity and psychological continuity. But to understand Lewis' position on this completely, I suggest a closer look at his understanding of continuants in fission cases first. According to Lewis' perdurantism, when

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<sup>19</sup> This formulation reads: "A person stage matters to my present stage if and only if it bears the I-relation to my present stage" (Sider 1996a:4).

<sup>20</sup> This formulation reads: "For any person P and for any person P\* existing at some time in the future, M(P\*,P) iff P=P\*" (Sider 1996a:5). Where 'M(P\*,P)' is read: 'P\* matters to P'.

an object undergoes fission, there are in reality two continuants present: one which comprises the stages before fission and the stages of one of the objects after fission, and another continuant which comprises the stages before fission and the stages of the other object after fission (Sider 2006:18). So, in the scenario of a person *a* who divides into person *b* and person *c*, there are really two different person-continuants present at all times. At the time of *b* and *c*, it is more obvious that there are two objects present, since *b* and *c* are separate. But since objects are continuants, according to Lewis, and there are clearly two separate objects after fission, this must mean that there are two overlapping objects before fission. Therefore, at all the instants that *a* exists, there are two continuants that overlap by sharing stages (ibid.).<sup>21</sup> Because the two continuants present at the instants of *a* overlap, it is impossible to distinguish one from the other. So, it is indeterminable whether *b* matters to *a* as opposed to *c*. In fact, they both matter to *a*, because they both stand in the I-relation to *a*. In Lewis' view, *a* cannot desire anything uniquely for her future as *b* as opposed to her future as *c*, anything *a* desires is a shared desire for *b* and *c* (Lewis 1983:73). So, it seems that in Lewis' view, *a* is both *b* and *c*, because it is not possible to distinguish between the continuant that *b* is part of and the continuant that *c* is part of at the times of *a*. Again, both *b* and *c* are psychologically continuous with *a*, and both *b* and *c* is *a*, so both parts of the criterion for personal persistence is met, according to Lewis' theory.

Even so, Lewis' position still does not seem to meet the identity criterion. Sider complains that this theory will have the strange implication that what happens to *c* can matter to *b*, even though they are separate persons, i.e. they are person stages that are not part of the same person-continuant (1996a:5). Sider does not go into details on how this problem comes about, but here is my take on it: Consider the same fission case of *a*, *b* and *c* as before, and say that *a* exists at time  $t_1$  and *b* and *c* exist at times  $t_2$  and  $t_3$  ( $t_1 < t_2$  and  $t_2 < t_3$ ). *c* at  $t_3$  is tortured while *b* at  $t_3$  is fine. According to Lewis, *a* and *b* are the same person because they are I-related to each other. Likewise with *a* and *c*. For *c* to matter to *b*, the I-relation must be transitive. If it is transitive, we would get this argument:

1.  $b_2 I a_{t_1}$  [Premise]
2.  $a_{t_1} I c_{t_3}$  [Premise]

So,

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<sup>21</sup> Imagine a two-pronged fork: the handle represents the two overlapping continuants before fission, while each of the prongs represent the separate continuants after fission. In this case, '*a*' refers to the handle, while '*b*' and '*c*' refer to one prong each.

' $I$ ' stands for 'I-related to' and the relevant stages of  $a$ ,  $b$  and  $c$  are represented with their respective points in time in subscript. Again, this is a simple matter of transitivity, since both  $b$  and  $c$  are I-related to  $a$  and there is no distinguishing between the continuants that  $b$  and  $c$  are parts of at the times of  $a$ ,  $b$  and  $c$  are I-related to each other by transitivity through  $a$ .

Somehow then, even though  $b$  is not part of the same person-continuant as  $c$ , they are I-related to each other. However, the I-relation is supposed to be exclusive to stages of the same continuant. Something is not right, and it seems that Lewis' claim that the two continuants are indistinguishable at the times of overlap is what is causing the strange entailment of this fission scenario. Sider objects to the detour that Lewis makes from mattering into the realms of desire, when it comes to the indistinguishability of the two continuants present at the times of  $a$ . Lewis claims that  $a$  cannot desire anything uniquely of  $b$  or  $c$ , but this does not carry over to the business of mattering, says Sider:  $b$  can still matter to  $a$  independently of  $a$ 's desires for the future (Sider 1996a:5). There is still two distinct mattering-relations present, one between  $a$  and  $b$ , and another one between  $a$  and  $c$ . This mattering-relation is what is important for personal persistence, so unless this is distinguishable between the two continuants, there is no distinction between the persistence.

Perhaps Lewis could argue that the I-relation is not transitive, and in fact he does: "The I-relation will fail to be transitive if and only if there is partial overlap among continuant persons." (Lewis 1983:62), i.e. the I-relation is intransitive in the case of fission or fusion. But in this case, the I-relation loses yet another claim at encompassing identity, because the identity relation is transitive. If the I-relation is not, then it does not carry all the traits of identity. On the other hand, it could also mean that the objects after fission (or before fusion) are in reality new objects, and not the same persistent object. In this case,  $a$  stops existing at a time  $t$  and at the same time, two new objects came to be out of nothing. This is in fact the absurd that Lewis tries to avoid to begin with, so Lewis is no further along. So the question is whether the stage theory can do a better job at accounting for both psychological continuity and identity when it comes to personal persistence.

Sider suggest that the identity criterion for persistence should rather be formulated like this: for any person  $P$  and any future person  $P^*$ ,  $P^*$  matters to  $P$  iff  $P$  *will be* identical to  $P^*$  (Sider 1996a:8). This is to say that  $P$  has the temporal property 'will be  $P^*$ '. Much like I earlier

explained the analysis of temporal properties, ‘P will be P\*’ is analysed through the temporal counterpart theory (in this case called the I-relation) thus: P ‘will be P\*’ iff P stands in the counterpart relation to P\* and P\* at that time is P\*. In the words of the I-relation, P ‘will be P\*’ because P stands in person I-relation to P\*, and P\* is P\*. Notice that P has the temporal property ‘will be P\*’, while P\* has the non-temporal property version of it, which is ‘is P\*’. ‘Is P\*’ is meant to mean ‘is identical to P\*’ and that P\* is identical to P\* is not a problem at all; everything is self-identical.

To make it even clearer why this analysis of the I-relation does comply with the real identity relation, let me spell it out even more detailed. Say that person-stage P is at time  $t_1$  and person-stage P\* is at a later time  $t_2$ . If P\* is P’s counterpart at  $t_2$  – or P and P\* are person I-related to each other – then P will be identical to P\*, because P\* is identical to P\*. Again, there is no “funny-identity” going on, only self-identity, which is the only type of identity.

Let us now examine how the stage theory would account for fission. Consider the same example as before:  $a$  exists at time  $t_1$  then undergoes fission sometime after, which produces the two separate  $b$  and  $c$ , which exist at the times  $t_2$  and  $t_3$ . On the perdurance view, there are two separate continuants present at the times of  $a$ , because there are two separate objects after fission, and objects are continuants. The stage view, however, claims that objects are stages, and since there is only one stage present at every instant at which  $a$  exists, there is only one object present as well (Sider 2006:18). Add to this the stage theory analysis of identity by the I-relation, we see that  $a$  will be (identical to)  $b$  and also that  $a$  will be (identical to)  $c$  (Sider 1996a:8). However, Sider insists that this does not imply that  $a$  will be both  $b$  and  $c$  at the same time. Only that  $a$  will be  $b$  and that  $a$  will be  $c$  (ibid.). Again, Sider objected to Lewis’ claim that  $a$  cannot desire anything uniquely for  $b$  or  $c$ , and claims that there will nonetheless be a unique mattering relation between  $a$  and  $b$  and between  $a$  and  $c$  (ibid:5). So he avoids the conclusion that  $b = c$ , which is false. But the same problem arises for Sider: the identity relation is transitive, however, the stage theory account of the I-relation does not seem to be.

Furthermore, as ‘will be  $P$ ’ is a temporal property, it is not intrinsic according to the definition of intrinsicity from earlier. A stage which instantiates ‘will be  $P$ ’ has this property by standing in a relation to another stage. There is no possible individual that instantiates ‘will be  $P$ ’ without standing in a temporal counterpart relation to some future stage, assuming the stage theory is correct for all possible worlds. Thus both the syntactical and the metaphysical criterion of intrinsicity render temporal properties extrinsic. However, identity properties are

presumably intrinsic. These are properties of the structure ‘being identical to *a*’. No possible isolated individual is not identical to what she is identical to. The temporal property ‘will be *P*’, though it is the temporal version of ‘is identical to *P*’, is not intrinsic. However, no temporal or modal version of an intrinsic property would be intrinsic, as I discussed in chapter 1, section 1.3. So, this might not mean that the I-relation is not the same as identity, but it does tell us that the relation between stages of the same continuant is not one of identity in its non-temporal version.

So far, I have examined the counterpart theory, how it is supposed to account for persistence on the stage theory and discussed the two theories’ accounts of personal persistence with the use of the I-relation. In the following section, I am going to examine the counterpart relation in even more detail. I am going to study Lewis’ postulates of the modal counterpart relation, translate them into a temporal version and see if the details fit with the temporal version. I will also compare the identity relation and the counterpart relation to see whether the counterpart relation really can account for the common platitude of persistence as a matter of identity.

#### 4.4 The counterpart relation

In the article “Counterpart Theory and Quantified Modal Logic” (1968), Lewis writes down eight postulates of the counterpart theory in quantified modal logic. In this section, I am going to translate these postulates into temporal language, and explain how these postulates can be understood temporally rather than modally. I am then going to accentuate some points about the counterpart relation, which we get from the postulates and evaluate their fit with Sider’s stage theory.

Here are Lewis’ postulates of the modal counterpart relation with his English formulation following in brackets:

##### Language:

$Wx$ : ‘*x* is a possible world’

$Ixy$ : ‘*x* is in possible world *y*’

$Ax$ : ‘*x* is actual’

$Cxy$ : ‘*x* is a counterpart of *y*’

@: ‘actual’

Postulates:

- P1:  $\forall x\forall y(Ixy \rightarrow Wy)$  [Nothing is in anything except a world]  
P2:  $\forall x\forall y\forall z(Ixy \wedge Ixz \rightarrow y = z)$  [Nothing is in two worlds]  
P3:  $\forall x\forall y(Cxy \rightarrow \exists z(Ixz))$  [Whatever is a counterpart is in a world]  
P4:  $\forall x\forall y(Cxy \rightarrow \exists z(Iyz))$  [Whatever has a counterpart is in a world]  
P5:  $\forall x\forall y\forall z(Ixz \wedge Iyz \wedge Cxy \rightarrow x = y)$  [Nothing is a counterpart of anything else in its world]  
P6:  $\forall x\forall y(Ixy \rightarrow Cxx)$  [Anything in a world is a counterpart of itself]  
P7:  $\exists x(Tx \wedge \forall y(Iyx \leftrightarrow Ay))$  [Some world contains all and only actual things]  
P8:  $\exists x(Ax)$  [Something is actual] (Lewis 1968:114)

Since these postulates apply to Lewis' theory of modality, the individuals mentioned are located at different worlds. On a temporal version however, they are located at different times. So, ' $Wx$ ' is translated into ' $Tx$ ': ' $x$  is a time'. Since objects are stages on the stage view, individuals are understood as instantaneous stages. So ' $Ixy$ ' is translated into ' $Axy$ ': ' $x$  is at time  $y$ '. Actuality would be understood as the present, and the counterpart relation stays the same. Our new language is then:

- $Tx$ : ' $x$  is a time'  
 $Axy$ : ' $x$  is at time  $y$ '  
 $Px$ : ' $x$  is present'  
 $Cxy$ : ' $x$  is a counterpart of  $y$ '  
 $\pi$ : 'present'

and the translated postulates:

- P1<sup>T</sup>:  $\forall x\forall y(Axy \rightarrow Ty)$  [Nothing is at anything except a time]  
P2<sup>T</sup>:  $\forall x\forall y\forall z(Axy \wedge Axz \rightarrow y = z)$  [Nothing is at two times]  
P3<sup>T</sup>:  $\forall x\forall y(Cxy \rightarrow \exists z(Axz))$  [Whatever is a counterpart is at a time]  
P4<sup>T</sup>:  $\forall x\forall y(Cxy \rightarrow \exists z(Ayz))$  [Whatever has a counterpart is at a time]  
P5<sup>T</sup>:  $\forall x\forall y\forall z(Axz \wedge Ayz \wedge Cxy \rightarrow x = y)$  [Nothing is a counterpart of anything else at its time]  
P6<sup>T</sup>:  $\forall x\forall y(Axy \rightarrow Cxx)$  [Anything at a time is a counterpart of itself]  
P7<sup>T</sup>:  $\exists x(Tx \wedge \forall y(Ayx \leftrightarrow Py))$  [Some time contains all and only present things]

P8<sup>T</sup>:  $\exists x(Px)$  [Something is present]

The first and third postulate ascertain that nothing can exist ‘beyond time’. If it exists, it is at a time. This seems extremely plausible and goes well with the stage theory. Since all objects are instantaneous stages, they are by definition placed at a time. Time is not something over and above the points of the temporal parts, it does not “move” as might be a common everyday understanding of time. The second postulate fits right in with Sider’s stage theory: Nothing exists at more than one time. Again, stages are instantaneous, so every object is instantaneous, i.e. not at more than one time. This is if ‘thing’ in ‘nothing’ refers to objects. Sider believes in unrestricted mereology, so the aggregate of any group of different temporal parts would be, at least ‘a thing’, if not an object. However, Sider gives stages a special position as ‘ordinary objects’. Whether this means that they have some unique position as objects in a more fundamental way than anything else, or merely that we ordinarily refer to stages when we talk about objects is not obvious from Sider’s texts. But, it seems to me that the latter is more likely, since he does believe in unrestricted mereology. In addition, the term ‘ordinary object’ creates a distance to just ‘object’, as if there are other ‘unusual’ objects as well. This does not mean that there is nothing more than a verbal dispute between perdurantism and stage theory. The stage theorist might perhaps agree with the perdurantist that continuants are after all objects, even though they are not what we ordinarily refer to as objects. However, the perdurantist still cannot agree with the stage theorist that temporal parts of continuants are objects. Even if the perdurantist should also believe in unrestricted mereology, and so would have to say that also temporal parts are objects in themselves, there are different implications of taking continuants and stages as subjects of proposition instantiation statements, as I have discussed in chapter 3.

Back to the postulates of the temporal counterpart theory. Postulates five and six tell us that everything has just one counterpart at the same time as itself, and this counterpart is always the individual itself. The counterpart relation is introduced to the stage theory to explain how stages at different times relate to each other in order for them to persist. There is no need for a stage to be related in this way to any other stage at the same time. Consider the two separate stages  $S_1$  and  $S_2$  at the same time. For them to be counterpart related to each other would not amount to persistence. Persistence is existence at various times, by Lewis’ definition, not at various places at the same time (Lewis 1986:202). Comparing the counterpart relation to the I-relation mentioned in the previous section, we see that one of the perdurantist’s problems was that two different objects after fission would be I-related to each other. This is not an

implication of the stage theory, and it should not be either. There is no situation where an object instantiates a property in virtue of standing in a counterpart relation to another stage at the same time which instantiates that property in some other way. In the ordinary scenarios of the temporal counterpart relation, an object instantiates a temporal property in virtue of standing in the counterpart relation to another stage at another time, which instantiates the non-temporal version of this property. In the case of two stages at the same time, there is no equivalent difference in properties. Both would instantiate the non-temporal version because they are at the same time, and so there is no temporal difference to their instantiation, in which case there is no need for a counterpart semantics for analysis.

The last two postulates say that there is a special time called ‘present’ and that everything at this time is present. Just as Lewis points out for the modal version, the temporal postulates  $P2^T$  and  $P8^T$  make the time mentioned in  $P7^T$  unique. This is because  $P8^T$  ascertains that there is something that is present, and  $P2^T$  assures that none of these things are at more than one time. Since all present things are at the time described in  $P7^T$ , no present thing is at any other time.

Through discussing the I-relation in section 4.2, I have already found some aspects of the special relation between stages of the same continuant which distinguishes it from identity. In the following I will have a closer look at the postulates and compare them with the identity relation. I will also check if they really suit the case of persistence as we are used to it.

The counterpart relation differs from the identity relation on several points. To begin with, two individuals that are counterparts of each other need not have exactly the same intrinsic properties (Lewis 1986:202). All identicals, however, must have the same intrinsic properties, as LL suggests. Two counterparts should be allowed to differ, because not allowing any difference would make the counterpart theory very unhelpful as a semantics for both modality and temporality. In the modal case, we want to keep at least some deviations from actuality possible. No difference allowed means nothing other than the state of the actual world is possible. In the temporal case, we want to keep deviations from the present possible, otherwise, there would never be any change.

Secondly, while the identity relation is both symmetric and transitive, the counterpart relation need not be either, according to what Lewis says about the modal version: An individual  $x$  in possible world  $w_1$  may have a counterpart  $y$  in a possible world  $w_2$ , even though  $x$  is not  $y$ 's counterpart in  $w_1$ . Lewis argues for the possibility of asymmetry with an example: Suppose

the counterpart  $x$  in  $w_1$  of the actual individual  $y$  is a mix of  $y$  and  $y$ 's sibling.  $x$  is the individual that is closest in resemblance in  $w_1$  to both  $y$  and  $y$ 's sibling. So  $x$  is both  $y$  and  $y$ 's sibling's counterpart in  $w_1$ . However,  $x$  could resemble  $y$ 's sibling more than it resembles  $y$ , in which case  $y$  is not  $x$ 's counterpart in the actual world (1968:116). Because of the possibility that there is an individual which resembles  $x$  more than  $y$  does in  $y$ 's world, it does not matter that  $x$  is  $y$ 's counterpart in  $x$ 's world.

Based on this, it seems that there is a criterion of similarity which picks out the individuals that are counterparts. This same principle is the basis for Lewis' argument for the possibility of intransitivity as well: Suppose  $x_1$  in  $w_1$  is the individual that resembles  $x_2$  in  $w_2$  most, so  $x_1$  is  $x_2$ 's counterpart in  $w_1$ . Suppose also that  $x_3$  in  $w_3$  is the individual that resembles  $x_1$  the most in  $w_3$ . So  $x_3$  is  $x_1$ 's counterpart in  $w_3$ . It is possible that there is some other individual in  $w_3$  which resembles  $x_2$  more than  $x_3$ , in which case  $x_3$  is not  $x_2$ 's counterpart in  $w_3$  (Lewis 1968:115).

Both the argument that Lewis give for the asymmetry and the argument for the intransitivity of the counterpart relation is based on the idea that the counterpart of a specific individual is the individual in a possible world which is closest to it in resemblance. I will call this the similarity principle. This seems to be a guiding principle that tells us which individuals in any given possible world is the right counterpart of a specific individual. However, it is not mentioned as a postulate. This could be because of some drawbacks of the principle: First of all, similarity in itself cannot be a criterion of which individual in a possible world is the right counterpart of a certain actual individual. A semantics for modality needs to be able to account for dissimilarity. More pressingly, a counterpart of an actual individual need not be the individual in a certain possible world which is closest in similarity to the actual individual. Imagine a possible world  $w_1$  in which G.E. Moore has no hands, but has an identical twin. This twin has both hands intact. In fact, the twin is more like the actual G.E. Moore than his counterpart in  $w_1$  is. Since the scenario is possible, and the counterpart theory is supposed to be our tool for interpreting modal talk, counterpart theory has to allow for exceptions to the similarity principle.

This counterexample has a perhaps even more convincing analogy on the temporal version. Let us say that the black haired scientist Peter (30) makes a perfect clone of himself in 2016, and calls the clone-baby 'Peter jr.'. Thirty years later, in 2046, Peter, now 60, is a grey haired man, and Peter jr., now 30, is an exact copy of the thirty year old Peter. It is clear that Peter jr.

in 2046 is more similar to Peter (30) in 2016 than Peter (60) himself is in 2046! Yet, Peter (60) is Peter (30)'s counterpart in 2046, and Peter jr. (30) is not. So when we ask in 2016 e.g. "what will Peter (30) look like in thirty years?" the counterpart of Peter (30) that we are referring to is not going to be the individual in 2046 that is the most similar to Peter (30) in 2016. So similarity is not a necessary or sufficient characteristic of the relation between counterparts.

Back to the claim that the counterpart relation does not need to be symmetrical or transitive. It does not seem like it is ever the case that stages of the same continuant are not symmetrically temporal counterpart related to each other. If a stage  $S_1$  at time  $t_1$  is temporally counterpart related to a later stage  $S_2$  at the later time  $t_2$ , then it seems that  $S_2$  will always also be temporally counterpart related to  $S_1$ . Take the black haired scientist from the former paragraph as an example: Peter (30) *will be* Peter (60), and Peter (60) *was* Peter (30). Furthermore, it seems also always to be transitive: if Peter (60) *will be* Peter (90) in the future, then so will Peter (30).

In the modal case, it is less obvious that the counterpart relation must be symmetric and transitive, but on the temporal version, at least in ordinary situations, it seems that the relation always is. However, abnormal situations such as fission and fusion scenarios may lead to the non-transitivity of the temporal counterpart relation. These cases would require that the temporal counterpart relation not always be transitive. If fission is possible and the temporal counterpart relation transitive, then the two objects after fission end up temporally counterpart related to each other, which is not desirable. Either fission and fusion cases are not possible, or the stages after fission are not temporally counterpart related to the stages afterwards.

In the final chapter, I will review the implication that the differences between perdurantism and the stage theory has for their view of counting objects, before I conclude the essay.

## Chapter 5

### Conclusion

In the previous chapter, I examined in detail how perdurantism and the stage theory account for persistence. I also argued that the stage theory has the more satisfactory account, but perhaps only marginally so. The rather simple difference between perdurantism and the stage theory – that ordinary objects are either continuants or stages – has quite a few differing implications: their view of persistence, instantiation *simpliciter* as we have already seen, and as we will see in this chapter, also for their view of counting. In this final chapter, I am going to examine and evaluate the implication that perdurantist's and the stage theorist's understanding of what an ordinary object is, has for their view of counting objects. To really test the theories on this point I will look at two problematic scenarios

#### 5.1 Coincidence and counting objects

A very important area of difference between the two four dimensionalist theories is *coincidence* and the matter of counting objects. Coincidence is the idea that two objects are present at the same place at the same time, i.e. that they occupy the same physical and temporal extension. Sider gives this definition of coincidence: “[...] objects *coincide* iff (1) they share the same spatial location at the time, and (2) there is some class of parts of which each is composed” (Sider 2001:141–2). Whether coincidence is possible or not is not immediately important in this essay. The focus is rather on what the implications are *if* there could be coincident objects. However, the theories of perdurantism and the stage theory do have implications for whether coincidence does occur or not, as I will briefly discuss in this section.

If there are in reality two numerically different objects present in the same area, then how many objects should we count? Consider the example of a statue made of a lump of clay; is there one object or two? Is there merely a clay statue present, or both a statue *and* a lump of clay? I will venture to say that the intuitive answer is ‘one’, but again LL leads to a funny conclusion. It seems that the statue and the lump of clay have a few differing properties: the statue exists for a shorter amount of time than the lump of clay, for instance, and the lump of

clay could survive a smashing, while the statue could not. Call the lump of clay ‘*a*’ and the statue ‘*b*’. Seeing as the lump of clay then has some property *F*, which I will let stand for ‘persisting through a smashing’, and the statue does not have this property, we have a familiar formalisation:  $Fa \wedge \sim Fb$ . Due to the fact that *a* and *b* do not instantiate all of the same properties, LL will not allow *a* and *b* to be identical. Thus, it seems that there really are two distinct objects present. However, this does not mean that we should count two objects when we count the lump and the statue. When asking someone how many objects they have on their shelf, and they inform us that there are two objects on the shelf, we would be surprised to only find a statue there. Even stranger situations occur if objects undergo fission or fusion: how many objects are present before fission into two objects? Again, ‘one’ is the intuitive answer, but this is not necessarily the answer we will get. I will present two funny scenarios where the perdurantist and the stage theory struggle with counting. The first one is a case of fission just like the fission case in chapter 4, section 4.3.

Scenario 1 – One object undergoes fission and splits into two objects:

Say that an object such as my cat – Ali – undergoes fission at some time  $t_1$ , so that at some later time  $t_2$ , there are two physically distinct cats present; one on my lap and another on my shoulders, e.g. Call these cats  $Ali_2$  and  $Ali_3$ . Both  $Ali_2$  and  $Ali_3$  used to be Ali at time  $t_0$ , earlier than  $t_1$ . How many cats are there at  $t_2$  and  $t_0$ ? Ordinarily, we would count two cats at  $t_2$ , and at  $t_0$  we would count just one cat. At  $t_0$ , we only find two ears, four paws, one tail, etc., and all of these are stuck to one and the same meowing body. These finds lead us to the conclusion that there is just one cat present in regular cases. The perdurantist, however, sees it differently. Since the perdurantist claims that ordinary objects are continuants, they would have to say that there are two cats present, not just at  $t_2$ , but at  $t_0$  as well. Since  $Ali_2$  and  $Ali_3$  clearly are different objects at  $t_2$ , they are separate continuants. The continuants that are  $Ali_2$  and  $Ali_3$  have separate temporal parts at  $t_2$ , but at  $t_0$  they share a temporal part (Sider 2006:18). Since  $Ali_2$  and  $Ali_3$  are two separate cats, there are two cats present at  $t_0$  as well, which means that the perdurantist must answer ‘two’ on the question of how many cats there are at  $t_0$ .

Nevertheless, this is a very strange conclusion and the stage theorist does not get this conclusion. Sider analyses the situation like this: the cats  $Ali_2$  and  $Ali_3$  which exist at  $t_2$  are identical to two separate stages, but they are counterpart related to the same stage at  $t_0$  – the stage that is Ali. Since ordinary objects are identical to the stage that they occupy at the time

of their existence, and there only is one stage at  $t_0$ , the stage theorist will count only one cat at  $t_0$  (Sider 2006:18).

The perdurantist account of counting is not very satisfactory, even though the scenario given is strange. As mentioned in the introduction to this section, not everyone will believe that coincidence is possible, but if there should ever be a case of fission – or fusion – of objects, perdurantism would imply coincidence. Even though fission and fusion situations are not ordinary, they do happen: cell division happens all the time. The case of the fission of Ali seems a lot clearer than the cases of cell division, even though we never experience that cats and other everyday things ever undergo fission or fusion. If the perdurantist is right, there are presumably tons of coinciding cells making up everyone at the moment. This is if cells are ordinary objects. Given unrestricted mereology, cells would at least be objects... Either way, the stage theory account is a lot less strange. We would always get the intuitively correct number when counting. The stage theory does not deny coincidence directly, but it does not imply it and it would never conclude alone that there are ever two stages in one.

Based on the analysis of this scenario, the stage theory has the upper hand on perdurantism, but there are counting problems for the stage theory as well. The second scenario concerns counting objects over a given interval of time.

Scenario 2 – Ali sleeps undisturbed in his cat-bed for an hour:

Let us say that my cat Ali sleeps all alone in his cat-bed for an entire hour. When counting how many cats there have been in the cat-bed during the hour that Ali was sleeping in it, we would ordinarily only say ‘one’. The perdurantist will have no problems counting just to one in this scenario, since there has only been one continuant in the cat-bed the whole time, the perdurantist would be happy to answer ‘one’. The stage theorist on the other hand, must answer something like “lots of cats”, since there have been lots of instantaneous stages located in the cat-bed during this hour. This answer is obviously not satisfactory, and Sider’s solution is to bring in a notion of *perspective* (Sider 2006:19). The idea is that speakers sometimes refer not to a single stage, but to a certain interval of time, i.e. a collection of stages. The specific time interval is implicitly or explicitly the “temporal topic” of the utterance. In the scenario of Ali sleeping in the cat-bed, the time interval that is in the question “How many cats have there been in the cat-bed during this last hour?” is explicit. The answer should also take this hour as its perspective. Examining the last hour, we do find that there have been a ton of cat-stages in the cat-bed, however, we do also find that they are all

counterpart related to each other in such a way that each stage is a persisting object: they are stages of the same cat-continuant. Therefore, when answering ‘one’, the perspective that is implicit in the answer is the last hour. The questioner understands this, as she asked for it and expects the answerer to take the same perspective that she did when asking.

The perspective solution is not the same as a reversion back to perdurantism, because the collection of stages that we are talking as referent is not itself an ordinary object. They are merely counterpart related to each other in such a way that they are all persisting objects. Neither are we jumping from talking about stages to talking about entire continuants. We are only temporarily combining some of the stages of a continuant in order to predicate of objects properties that take time to instantiate. .

In the last section, I will summarise the essay and restate persistence in accordance with the stage theory and the temporal counterpart theory.

## 5.2 Persistence restated

In the first sections of this essay, I introduced a definition of ‘persistence’ given by Lewis. The definition said that “[...] something *persists* iff, somehow or other it exists at various times” (Lewis 1986:202). This was just a neutral definition that was meant to present a general structure, but we still need a detailed explanation of how things can exist at various different times. I proceeded to examine some three dimensionalist explanations of existence at multiple times. The first of which was Lowe’s endurantism, which claims that things exist at various times without having temporal parts (McCall & Lowe 2009:278). The second variation was Haslinger’s adverbialism, which supports the endurantist claim of existence at various times, but argues that objects can still have temporary intrinsics *simpliciter* by understanding the instantiation adverbially. In both cases, an object can exist at various different times, and the relation between such an enduring object at the different time is one of identity. So the three dimensionalists accept the first premise of the ITC-argument:  $a = b$ .

The first four dimensionalist theory, perdurantism, also accepts this first premise of the ITC-argument. The theory argues that an object exists at various different times by having different parts at the different times it exists. The different temporal parts are not identical, but they are parts of the same (self-identical) object: a continuant. Just like the three dimensionalist theories, perdurantism claims that it is an object that exists at different times, but this is not by the parts at the different times standing in an identity relation. Rather the

whole aggregate of the temporal parts make up one self-identical object. This being said, I have found through my evaluation of perdurantism that the identity relation in premise 1 of the ITC-argument, which perdurantism accepts, does not mean the same for the perdurantist. In the original argument, ' $a = b$ ' was supposed to account for persistence. Lewis claims that identity is what matters; regardless perdurantism is not able to account for persistence as a matter of identity. This is seen from the unsatisfactory account of identity on the I-relation. The constant jumps between subjects of predication, which leaves the perdurantist account of instantiation *simpliciter* questionable, and the implications the theory has for counting, renders the theory unsatisfactory. Especially when the last theory – the stage theory – is able to account for these aspects in a more straight forward, and more easily understandable way.

The stage theory stands out from the theories presented in this essay by being the only theory that argues that objects never exist at more than one time. The stages, which are the ordinary objects, only exist for at an instant. This theory claims that we do not talk about things through continuants, as explained in chapter 3, section 3.2. Rather we talk about things directly, by referring to the specific stage, or the collection of the specific, relevant stages. For example when we say something like “I bought this house ten years ago”, we are referring to the house-stage which exist at the time of utterance, and say about it that it stands in a certain temporal counterpart relation to a house-stage which exists at ten years ago. The current house-stage has persisted somehow, from ten years ago until now. Although this deviates slightly from the intuition that identity is what matters for persistence in the way that the persistent object is identical to the object it is at earlier and later times, the stage theory has shown itself to be the theory that can answer most of the problematic areas that persistence and the connected concepts pose. The seeming identity-relation between stages of the same continuant for example, is explained thus: a persistent object cannot *be* identical to a later stage, because ‘be’ here is the non-temporal version of identity. Only the later stage in question instantiates the non-temporal identity property. The earlier object we were first referring to, because it exists at a different time, must instantiate a temporal version of this property: the persisting object *will be* identical to a later stage.

As promised, here is a restated understanding of persistence, which is in accordance with the stage theory: an object persists iff it is temporally counterpart related to at least one other stage. This other stage exists at a different point in time, as postulate P5<sup>T</sup> of the temporal counterpart relation states that nothing is a counterpart of anything else at its time.

Lewis claims that the counterpart relation need not be symmetrical or transitive, but as I have argued, the temporal counterpart relation is symmetrical in every situation, and transitive in all ordinary, non-fission and non-fusion cases. The stage theory allows us a way of discarding coincidence: If there is only one stage, there is only one object. Hence, there are no coincident objects, and so there should be no problem letting the temporal counterpart theory be symmetric and transitive. The temporal counterpart theory should therefore add postulates claiming symmetry and transitivity between the counterparts.

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