

How to Reconcile Identity and What Matters in Survival: Y-Shaped Space-Time Worms

by

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ABSTRACT

Derek Parfit (1984) challenges our notion of personal identity as a criterion of survival by offering a thought experiment in which one goes through fission and survives as both postfission persons while being identical to neither of them since identity is a one-one relation. Parfit thereby argues that identity is not what matters in survival, and what matters is psychological continuity and connectedness which is a one-many relation. David Lewis (1983) offers a worm theorist solution by explaining fission in terms of multiple occupancy; that is to say that both post-fission persons (two distinct space-time worms) exist before fission by co-occupying the same pre-fission person stages. Theodore Sider (1996) points out the implausibility of the overlap of persons and offers the stage view as a solution. Thus, we can interpret fission as the overlap of two worms but not the overlap of two persons, for persons are not worms but the instantaneous stages of the worms, according to the stage view. I agree with Sider on the grounds that worm view and multiple occupancy view are not compatible. However, I will argue that we can keep the worm view and drop the multiple occupancy view instead, and interpret fission as a Y-shaped space-time worm. I will defend that two post-fission persons bear an identity relation to each other. In order to do so, I will suggest that we should redefine our notion of psychological connectedness. Fission forces all of us to give up something. Parfit sacrifices the criterion of identity for survival. Lewis keeps the criterion of identity for survival but sacrifices the criterion of uniqueness for identity by arguing that there is an overlap of two persons before fission. Sider avoids this problem but he sacrifices our notion of person, which ordinarily refers to a spacetime worm, by arguing that persons are stages. I will offer a more reasonable sacrifice and argue that we should give up the direct causal relation requirement for psychological connectedness. I will discuss the advantages of interpreting fission as a Y-shaped space-time worm, and answer to possible objections.

To myself,
The space-time worm
Some of whose temporal stages worked really hard
To complete this dissertation,
While others procrastinated relentlessly.

Hope you extend further into the future
And your later stages are as glamorous as the earlier ones!

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1. INTRODUCTION - PARFIT'S PUZZLE

I have decided to have a boring selection of vegetables for lunch instead of a delicious piece of cake because I believe, if I eat healthy, an old woman whom I apparently care about will survive longer and be healthier and grateful to me fifty years from now. Why do I care about the survival of this old woman? The intuitive answer is that:

(I) I care about the survival of this old woman because she is me.

This criterion of survival refers to personal identity. When I wonder whether I will survive, what I wonder is whether the person who will survive will be me.

“When we are concerned about our future, it is our numerical identity that we are concerned about. I may believe that, after my marriage, I shall not be the same person. But this does not make marriage death. However much I change, I shall still be alive if there will be some person living who will be me.” (Parfit, 1984, p.202).

Unlike qualitative identity which refers to having the same properties, the identity we care about, personal identity through time, is problematically considered to be numerical identity. When I am 88 years old, I will be qualitatively different from the person who I am now. I will gain and lose properties through the years and become someone who has more differences than similarities with my current self. Yet I care about my future self more than I would care about someone else who is qualitative identical with me. If you could make a replica of me, me and my replica would be qualitatively identical but I would not care about my replica as I care about my future self whom I am numerically identical with. What kind of a relation is identity? Identity is a transitive relation. If I am identical to my ten years old self and my ten years old self is identical to my five years old self, it follows that I am identical to my five years old self. Identity does not admit degree. I cannot say that I am more identical to my ten years old self and less identical to my five years old self.

You are either identical or not. There is no middle ground. Identity is also symmetrical. If I am identical to my ten years old self, then my ten years old self is identical to me.

One may find personal identity too broad as a criterion of survival. I care about the survival of this old woman because she is identical with me; however, what do we really mean by identity? Why is she me but not others? This leads us to the second criterion of survival:

(II) I care about the survival of this old woman because she is psychologically connected and continuous with me.

This refers to the psychological criterion of survival. Parfit defines it as psychological continuity and connectedness (the *Relation R*). He bases his psychological criterion on Locke's account of personal identity which puts a special emphasis on memory.

“Locke suggested that experience-memory provides the criterion of personal identity. Though this is not, on its own, a plausible view, I believe that it can be part of such a view.” (Parfit, 1984, p.205).

For Locke, what makes you the same person as you were is the fact that you remember being that person. In other words, (I) and (II) are not two different criteria of survival but one and the same thing. Locke's view is criticized on the grounds that it fails to accommodate the transitivity of identity.¹ A general remembers winning a battle as an officer. When he was an officer, he used to remember being flogged as a boy. However, he cannot remember being flogged as boy when he is a general. Thus, the general is identical to the officer and the officer is identical to the boy. If we apply the rule of the transitivity of identity, it follows that the general should also be identical to the boy who is being flogged. Yet the general does not remember being flogged as a boy. According to Locke's theory of identity, the general cannot be identical to the boy, and this leads

¹ See Thomas Reid (1785).

to a transitivity failure. Reid raises this objection, which is also known as the “brave officer objection”, to show that Locke’s memory-based theory of identity fails to track our intuitions about identity. It is commonsensical to hold that the general is identical to the boy due to the transitive nature of identity even though he does not remember being that boy. Reid’s example shows us that Locke’s memory criterion leads us to the absurd conclusion that the general is not identical to the boy, and thereby to the denial of transitivity of identity. In order to solve this problem, Parfit makes a distinction between psychological continuity which is transitive and psychological connectedness which is not transitive. The general is not psychologically continuous with the boy; however, he is psychologically connected to him. For Parfit, psychological connectedness matters more than psychological continuity. Thereby, Parfit’s revised version of Locke’s psychological criterion is not vulnerable to Reid’s objection of the failure of transitivity of identity.

Let us take a closer look at Parfit’s distinction between psychological continuity and psychological connectedness:

“Psychological connectedness is the holding of particular direct psychological connections.

Psychological continuity is the holding of overlapping chains of *strong* connectedness.” (Parfit, 1984, p.206).

A psychological connection is a causal relation between two psychological states such as beliefs, desires, intentions, personality traits and memories. For instance; having an experience and having the memory of that experience is considered a psychological connection since having the memory of an experience is ordinarily caused by having that experience. Psychological connectedness is an intransitive relation. It is a matter of degree. It may be weak or strong. Parfit does not say much about how to distinguish between weak and strong connections.

“For X and Y to be the same person, there must be over every day enough direct psychological connections. Since connectedness is a matter of degree, we cannot plausibly define precisely what counts as enough. But we can claim that there is

enough connectedness if the number of direct connections, over any day, is at least half the number that hold, over everyday, in the lives of nearly every actual person.” (Parfit, 1984, p.206).

This is how Parfit formulates strong connectedness though one may say that the “over every day” criterion seems arbitrary since there is no apparent reason why the interval that we measure strong connectedness should be a day. According to Parfit, I am strongly connected to myself yesterday, for I have many direct psychological connections to myself yesterday. I am also quite strongly connected to myself two days ago and three days ago but this does not mean that I am strongly connected to myself five years ago since psychological connectedness is an intransitive relation and a matter of degree. I obviously have fewer direct psychological connections to myself five years ago than to myself yesterday. I do not necessarily have more direct psychological connections to myself yesterday than the day before. During my undergrad years, myself on a Saturday had probably more direct connections to myself on that Thursday than that Friday because of the fuzzy memories the Friday evening due to excessive drinking. The directness of the psychological connections plays an important role in distinguishing psychological connectedness from psychological continuity since the directness implies intransitivity. Ceren on Saturday can have strong direct psychological connections to Ceren on Thursday in spite of the fuzziness of the connections on Friday. Yet I can stay sober and mentally alert for five years everyday with all the strong direct psychological connections to myself the day before without being strongly connected to myself five years ago. If I do not have enough direct connections to myself five years ago, I am not psychologically connected to myself five years ago.

Psychological continuity is a transitive relation like identity since it requires overlapping chains of strong psychological connectedness. I can say that I am psychologically continuous with myself five years ago if and only if my current psychological states have strong connections to

some of my states that are strongly connected to some of my states (add any number of strong connections here which are the overlapping chains) that are strongly connected to my psychological states five years ago. We can say that there are two important aspects of the psychological continuity which differs it from the psychological connectedness: transitivity and strength. Transitivity stems from overlapping chains. If A is strongly connected to B and B is strongly connected to C, A is psychologically continuous with C even if A is not strongly connected to C. Strength of the psychological connections is also important. Due to the requirement of strength, psychological continuity is not a matter of degree. I can be less psychologically connected to my nine years old self than myself yesterday but I am either psychologically continuous with my nine years old self or not. Heavy drinking is not advised if you want to be psychologically continuous with your drunk self. If you have fuzzy memories of last night, it means that you do not have strong psychological connections to your mental states last night and even if you are still psychologically connected to yourself last night thanks to a few psychological connections which indicate weak connectedness, you are not psychologically continuous with yourself last night. However, you will still be psychologically continuous with your pre-drunk self when you sober up since you will have strong psychological connections to your pre-drunk self.

It is open to debate what the necessary and sufficient components of the relation of psychological continuity and connectedness are. Memory is usually considered a necessary component of psychological continuity and connectedness though one may say that memory is necessary but not sufficient and there needs to be other mental faculties along with memory for one to be psychologically continuous and connected with another. Reid's *brave officer objection* which I discussed above may be considered one of the reasons why memory is not a sufficient

criterion. If we consider memory the only psychological criterion of identity, it fails to track our intuitions by giving us absurd results such as failure of transitivity of identity. Parfit's *Relation R* includes other kinds of psychological continuities and connections rather than just memory. The continuity of character, desires and intentions also play an important role. Parfit's revised version of Locke's psychological criterion does not answer to Butler's objection² to Locke's theory of personal identity, though. According to Butler, memory presupposes personal identity and thus cannot constitute it. My memory cannot be what makes me the person who I am since my memory necessarily belongs to me. The concept of memory includes the notion of personal identity because it necessitates a person who remembers having some experiences while being someone who is identical to her. Parfit claims that Butler's objection can be applied to the *Relation R* like this:

“On one interpretation, the objection would be this: ‘It is part of our concept of memory that we can remember only our own experiences. The continuity of memory therefore presupposes personal identity. The same is therefore true of your Relation R. You claim that personal identity just consists in the holding of Relation R. This must be false if Relation R itself presupposes personal identity.’” (Parfit, 1984, p.220).

In order to answer to this objection, Parfit introduces the concept of quasi-memory. Quasi-memory is a broader category than the ordinary memory and it includes ordinary memory as a sub-class.

You have a quasi-memory of an experience if and only if:

- (a) you seem to remember that experience;
- (b) someone actually had that experience;
- (c) your memory is causally dependent on that experience in the right kind of way.

² See Joseph Butler (1736).

Parfit's example of 'the right kind of causal dependence' is agreeing to have copied someone else's *memory-traces* to your brain.³ According to Parfit, we may quasi-remember other people's experiences whom we are not identical to and be very well aware of the fact that these experiences do not belong to us but someone else considering that we know that we have agreed to have copied someone else's memory-traces to our brain. If I know that I have agreed to have copied someone else's memory traces to my brain and I also know that I have never been to Venice but the other person has been there several times, I can be very well-aware of the fact that the vivid memory of being in Venice with the view of the church of San Giorgio and flying pigeons and with the cries of seagulls does not belong to me but the other person. The continuity of quasi-memory requires overlapping chains of strong connectedness of the quasi-memories which does not presuppose personal identity. This continuity of quasi-memory, Parfit believes, constitutes the unity of one's life without circularity.⁴

Parfit presents some thought experiments that challenge our preconceived ideas about what matters in survival. He presents these three cases:

Case I: Your brain is transplanted into a new body.

Case II: Your brain is divided into two halves. One half is destroyed. The other half is transplanted into a new empty body.

Case III: Your brain is divided into two halves. One half is transplanted into a new brainless body and the other half is transplanted into another new brainless body.

³ The example of *Venetian Memories*. See Derek Parfit (1984, p. 220).

⁴ Parfit's quasi-mental states are not limited to memories. He also talks about quasi-intentions, quasi-ambitions, and quasi-characteristics (Parfit, 1984, p.300).

In all three cases, the resulting persons have your memories, desires, intentions and character. In other words, they are mentally continuous and connected with you. In Case I and Case II, we tend to believe that we would survive the brain transplant and the resulting person is going to be us. Case III, on the other hand, is different according to Parfit since it is unclear whether we would survive the brain transplant or not. Our intuitions seem to fail us when it comes to fission. What happens to you in the Case III? Parfit claims that there are four possible outcomes:

Possible outcome 1 (PO1): You do not survive.

Possible outcome 2 (PO2): You survive as one of the two people (such as Lefty who is the person with the left hemisphere of your brain).

Possible outcome 3 (PO3): You survive as the other one of the two people (such as Righty who is the person with the right hemisphere of your brain).

Possible outcome 4 (PO4): You survive as both Lefty and Righty.

PO1 is not plausible because (remember Case II) we would say that even half of our brain is enough for us survive. While half a brain is enough to survive, how can we say that we fail to survive with both halves? Parfit asks “how could a double success be a failure?” (p.256). PO1 indicates that fission is equivalent to death. This is counterintuitive, for we would choose fission over death. PO2 and PO3 are not plausible, either. Since there is no reason why you should survive as Lefty but not Righty or Righty but not Lefty, PO2 and PO3 are completely arbitrary and thereby implausible. This leaves us PO4.

The plausibility of PO4 depends on what we understand by survival. If we mean identity by survival, you cannot survive both as Lefty and Righty according to Parfit since he believes that the identity we care about is numerical identity, and it is a one-one relation as the name implies. Numerical identity is the relation you have to only yourself and to no one else. Ordinarily, there

is only one person who is identical with you at a time. Thus, we can say that ordinarily you survive if the person whom you are numerically identical with survives. In fission cases though, there seems to be a discrepancy between numerical identity and what matters in survival. According to the PO4, you survive the fission as both Lefty and Righty. Lefty and Righty have their own bodies. When we count them, we count two people. Though they share some past experiences, they get to have their own experiences and their own private inner life after fission. They make their own decisions. They have their own desires and intentions. You cannot consider one responsible for the other's mistakes. If you kill one, the other one will not be harmed. One can survive the other's death. Lefty and Righty seem to be two people. If we want to say that there will be two people who will survive after fission, it follows that what matters in survival is a one-many relation since there will be more than one person as whom you will survive. Yet identity is a one-one relation and it cannot be what matters in survival if what matters in survival is a one-many relation. Thereby, Parfit divorces identity from what matters in survival.

If we mean psychological continuity and/or connectedness (the R-relation) by survival, on the other hand, it is possible to say that you survive as both Lefty and Righty.

“Reductionists would all accept the following claim. A future person will be me if he will be R-related to me as I am now, and no different person will be R-related to me. If there is no such different person, the fact that this future person will be me just consists in the fact that relation R holds between us. There is nothing more to personal identity than the holding of relation R. In nearly all of the actual cases, R takes a one-one form. It holds between one presently existing person and one future person. When R takes a one-one form, we can use the language of identity. We can claim that this future person will be this present person.

In the imagined case where I divide, R takes a branching form. But personal identity cannot take a branching form. I and the two resulting people cannot be one and the same person. Since I cannot be identical with two different people, and it would be arbitrary to call one of these people me, we can best describe the case by saying that neither will be me.” (Parfit, 1984, p.262).

Parfit is a reductionist about persons. He believes that personal identity consists in certain criteria.

⁵ The criterion of personal identity is the R-relation. If a future person is R-related to me, this person is identical with me. Moreover, identity is nothing more than the R-relation. Parfit is fine with using the *language of identity* when nothing happens that is extraordinary, such as fission. In fission cases, however, we cannot use this language since I will be R-related to both of the resulting persons while I cannot be identical to both. In this case, Parfit suggests that we should say that neither of the resulting persons will be me but I will survive as both.

In order to understand Parfit's move here, we need to understand that Parfit's reductionist view also includes the indeterminacy of identity. Parfit does not believe that the questions about identity necessarily have determinate answers. He accepts the existence of borderline cases. What Parfit wants to show is that we do not need to have certain answers to the questions about identity in order to be able to answer to some important questions about survival, psychological continuity and connectedness and also moral responsibility. Just as we do not know how many grains of sands will become a heap and we do not consider this lack of knowledge ignorance but instead accept that there is no determinate answer to this question, Parfit suggests that we should also accept that there are not necessarily definite answers to some questions about personal identity. What is the criterion of identity, then? We can say that A is identical to B when A is R-related to B and there is no one else who is contemporary of B and also R-related to A. When A is R-related to both B and C who are contemporaries, we cannot say that A is identical to both B and C since identity is

⁵ Physical criterion and psychological criterion are the two criteria of personhood. Psychological criterion is psychological continuity and connectedness which I have been discussing about. I will not discuss the physical criterion in this paper since it is not relevant.

a one-one relation. However, we cannot say that A is dead and B and C are brand new people. Neither can we say that what happens to A is as good as ordinary survival. Fission is not as bad as death but not as good as ordinary survival. Some questions about identity do not always have a true answer. If you ask “Will I be dead?” right before you go through fission, neither “yes” nor “no” will be the true answer. Someone will definitely survive but the survivor will not be you in the same way that your five years old self is you. No one will die because of fission in the same sense that we ordinarily talk about death; like the way that your grandparents died; the way that you have always assumed you would die. There should not be anyone who is psychologically continuous and/or connected with you after your ordinary death; however, there will be two people who are psychologically continuous and connected with you after fission. We can say that there will be two survivors of this fission who will be psychologically continuous and connected with you even if we cannot answer to any questions about the identity of these resulting persons. The identity of the resulting persons is simply irrelevant. Hence, identity does not matter in survival.

In order to reconcile identity and what matters in survival, Lewis explains fission in terms of multiple occupancy; that is to say that both post-fission persons exist before fission, and the pre-fission person stages are occupied by two persons. According to Lewis’s worm view, persons are continuants which are the maximal sums of their person stages that are connected by an identity relation. Sider adopts this multiple occupancy approach but develops a different view of persistence, and argues that persons are not continuants but instantaneous stages. In Chapter I, I will first discuss different theories of persistence. Then I will explain Lewis’s worm theorist multiple occupancy solution. After that, I will present Sider’s and my own criticism of Lewis’s view. In Chapter II, I will present Sider’s stage theorist multiple occupancy view and my criticism of it. The worm view and the multiple occupancy view do not work well together. Sider suggests

that we should drop the worm view and adopt the stage view which works better view the multiple occupancy view. By showing that the stage view is also problematic, I will argue that we may stick to the worm view and drop the multiple occupancy view instead. In Chapter III, I will present my solution to Parfit's puzzle; a worm view without multiple occupancy. I will interpret fission as a Y-shaped space-time worm. Before I present my view, I will discuss another view which is similar to mine; Dainton's branching in personal time view. I will argue that branching in personal time should be grounded in branching persons. At the end, I hope to be able to show that interpreting fission as a Y-shaped space-time worm may be a defensible solution to Parfit's puzzle.

2. CHAPTER I - WORM THEORIST MULTIPLE OCCUPANCY VIEW

In this chapter, I will discuss Lewis's worm theorist multiple occupancy view and how it deals with Parfit's puzzle. Multiple occupancy is the view that both post-fission persons exist prior to fission. The reason why the view is called "multiple occupancy" is that two post-fission persons seem to occupy the same space before fission. Let me first explain the theories of personal identity through time; namely the persistence theories. Persistence theories try to find the necessary and sufficient conditions for the identity of a being through time. What does it mean to say that I am the same person as I was five years old? How much can I change before I cease to exist? There are two main theories concerning the issue of persistence through time; endurantism (three-dimensionalism) and perdurantism (four-dimensionalism). The main difference between these two views is their approach to temporal extension. Perdurantists believe that things have temporal parts

as well as spatial parts while endurantists believe that things only have spatial parts, not temporal parts.⁶

I will explain endurantism before I start discussing perdurantism. According to endurantism, things wholly exist whenever they exist. I used to wholly exist when I was five years old and I also wholly exist now. An endurantist would surely say that I am the same person as I was when I was five years old even though I've lost and gained some properties through all these years. However, *the law of indiscernibility of identicals*⁷ requires that identical individuals must be indiscernible; that is to say that they have to share all their intrinsic properties. Intrinsic properties are the properties an individual has as a result of who they are unlike extrinsic properties which refer to a relation between them and the world outside. I did not have any grey hair when I was five but I unfortunately have a few right now. The property of *having grey hair* seems like an intrinsic property because this property I have does not depend on any relations I have with other things but belongs to me independently. Since I am numerically identical to my five years old self, I both have and do not have grey hair. Thus, I have incompatible properties. This is called *the problem of temporary intrinsics*. I have different intrinsic properties at different times. How can one and the same person both have and not have grey hair?

⁶ Neither of the persistence theories forces one to commit to the existence of parts. One may deny temporal parts and still be a perdurantist just as one may deny spatial parts and still be an endurantist as long as they can explain how objects are three or four dimensional.

⁷ See Gottfried Wilhelm Leibniz (1686), *Discourse on Metaphysics*.

An endurantist who is also an eternalist⁸ would say that I do not have incompatible properties because properties are always time-indexed; that is to say that properties are relations to times. I have the property of *not having grey hair at t1* and the property of *having grey hair at t2*. This view is called *indexicalism*. The problem with this view is that the properties of *not having grey hair at t1* and *having grey hair at t2* in this case would not be an intrinsic property but be an extrinsic property since I have this property in relation to a time. There would not be any properties that I have simpliciter. Let us say that I dyed my hair to its original colour at t3 and I have the property of *not having grey hair at t3*. When someone talks about the colour of my hair at t1 and t3 by stating that my hair has the property of *being ashy brown*, even though *ashy brown at t1* and *ashy brown at t3* are the same colour, my hair is ashy brown at t1 in virtue of instantiating the property of *being ashy brown at t1* and it is ashy brown at t3 in virtue of instantiating the property of *being ashy brown at t3*. At t4, nothing seems to change and my hair is still ashy brown but at t4 my hair is ashy brown in virtue of instantiating the property of *being ashy brown at t4*. These properties are different properties. We want to be able to say that my hair instantiates the same property at t1, t3 and t4 and a different property at t2 so that we can talk about genuine change by expressing that my hair changes at t2 because it is different from t1 and changes at t3 because it is different from t2 but there is no change at t4. Yet indexicalism does not let us talk about the instantiation of the same property because properties are time-indexed.

To solve this problem, endurantists developed another way of talking about the instantiation of properties which is called *adverbialism*. My hair instantiates the same property of *being ashy*

⁸ Eternalism is the view that time is a dimension like the dimensions of space. Past, present and future things exist equally.

brown but it instantiates this property in a t1-ly way at t1 and in a t3-ly way at t3. An adverbialist would answer to the problem of temporary intrinsics by claiming that I have the property of *not having grey hair in a t1-ly way* and the property of *having grey hair in a t2-ly way* and thereby these properties are not incompatible. Yet it is possible to say that adverbialism is vulnerable to the same problem as indexicalism since it also makes the properties relational. If we are to say that my hair has these properties such as *being ashy brown in a t1-ly way simpliciter*, it means that my hair instantiates the property of *being ashy brown in a t1-ly way simpliciter* at t2 as well as t1, then there is no explanation why my hair is ashy brown at t1 but not ashy brown at t2. Thus, we can say that neither indexicalism nor adverbialism has a satisfactory response to the problem of temporary intrinsics.

A presentist endurantist may avoid the problem of temporary intrinsics by claiming that past and future things do not exist; therefore, it is true that I have the property of having grey hair now but it is not true that I have the property of not having grey hair since my five years old self who does not have grey hair does not exist. However, presentism has its own problems. According to presentists, only present things exist and what is present constantly changes. Presentism is a version of the A-theory which commits to the theses that (i) there are irreducible and genuine temporal properties called A-properties (such as *being present, being future, being past*)⁹ and (ii)

⁹ Different views of the A-theory accept the existence of different A-properties. Presentists who believe that only present things exist accept that *being present* is a genuine and irreducible property. Growing block theorists who believe that past and present things exist but not future things accept that *being present* and *being past* are genuine and irreducible. Moving spotlight

time passes. An opposing view is the B-theory, which is also known as eternalism, which commits to the theses that (i) A-properties are reducible to B-relations (such as *earlier than*, *simultaneous with*, *later than*) and (ii) time does not pass; time is a dimension just like the dimensions of space.¹⁰ The most prominent objection against presentism is *the truth-maker objection*. *The truth-maker objection* goes back to *the argument from cross-temporal relations* which says that “[...] in order for a relation to hold between two things, both of those things will have to exist. [...] some things exist which are not present” (Bigelow, 1996, p. 37).¹¹ Presentism is incompatible with the thesis that there are truths about the past which are made true by things that exist in the past. Thus, the denial of truths about the past is problematic while it is what makes a presentist endurantist avoid the problem of temporary intrinsics.

According to perdurantism, things have parts in time as well as they have parts in space; therefore, they do not wholly exist at a particular time. So I am the same person as I was five years old, because neither my current self nor my five years old self are wholly me; the current me and my five years old self are the same person even though they have different properties because we both are the temporal parts of the same space-time worm; just like my left hand and right leg are different spatial parts of me and have different properties. One temporal part of me has the property of *having grey hair* and the other temporal part has the property of *not having grey hair*. These

theorists who commit to an eternalist ontology but believe that present is moving like a spotlight accept that *being past*, *being present* and *being future* are genuine and irreducible properties.

¹⁰ Even though it seems that A-theory is more compatible with endurantism, and B-theory with perdurantism, A-theorist perdurantists and B-theorist endurantists are not uncommon.

¹¹ See John Bigelow (1996), “Presentism and Properties”.

properties are not incompatible just as my hands have the property of *being on the keyboard* while my feet have the property of *not being on the keyboard*, and these properties are not incompatible. Thus, I can stay the same person even though I change. One main argument against perdurantism is that the perdurantist notion of change is not genuine change. It is called the *no-change objection*.¹² The temporal parts that do not have grey hair do not have grey and the temporal parts that have grey hair have grey hair permanently. The space-time worm cannot be said to have or not have grey hair. What changes, then?

There are two different ways of talking about changing objects. When we refer to the space-time worm, we are talking about the object atemporally. When we refer to a temporal part of an object relative to its other temporal parts, we are talking temporally. According to perdurantism, the difference between different temporal parts of the same space-time worm counts as change. Change occurs in virtue of the different properties possessed by the different temporal parts of the same space-time worm. Thus, it is true that Ceren in 1995 has the property of *not having grey hair* while Ceren in 2018 has the property of *having grey hair*. It is possible to say that Ceren has changed if we compare Ceren in 1995 to Ceren in 2018. Ceren persists despite the change since Ceren in 1995 and Ceren in 2018 are different temporal parts of the same space-time worm. This is the common perdurantist response to no-change objection. However, what we actually refer to in our ordinary language when we talk about a persisting object creates controversy among perdurantists.

There are two views of perdurantism; the worm view (the standard view of perdurantism) and the stage view (which is also known as exdurantism). Both views include space-time worms and

¹² See J.M.E. McTaggart (1927), *The Nature of Existence*.

temporal parts in their ontologies. The difference between these two views is whether we ordinarily refer to temporal parts/stages¹³ or space-time worms when we talk about objects. According to the worm view, I refer to the space-time worm when I say “I” while according to the stage view, I refer to a stage of the space-time worm (my current temporal part or stage) when I say “I”. The stage view has a similar answer to the no-change objection. I am the temporal stage that has the property of *having grey hair* now and I was the temporal stage that has the property of *not having grey hair* in 1995. These two temporal stages are causally related to each other in virtue of being the stages of the same space-time worm. What differs in the answer (to the no-change objection) by the stage view from the answer by the worm view? Unlike the worm view, the stage view is not vulnerable to the problem of whether the space-time worm has the property of *having grey hair* or *not having grey hair* since the sentence “I have grey hair” is made true by the temporal stage instead of the space-time worm. Thus, the sentence “I have grey hair” literally means “I have grey hair” since “I” refers to the person stage according to the stage view unlike worm view. However, stage view has its own disadvantages which I will discuss in detail in Chapter II. In this chapter, I aim to show that we may not need the stage view to deal with Parfit’s puzzle if we accept a worm view which is not a multiple occupancy view.

2.1. Lewis’s Solution to Parfit’s Puzzle

¹³ The terms *part* and *stage* are usually used interchangeably by both stage theorists and worm theorists. There is no inherent difference between the stage view and the worm view in terms of their mereological commitments. The defenders of both views may choose to talk about either parts or stages.

Lewis disagrees with Parfit's opposition between identity and what matters in survival, and wants to say that what matters in survival is identity as well as the R-relation which he calls mental continuity and connectedness. Lewis agrees with Parfit about the R-relation; what matters in survival in terms of person stages is mental continuity and connectedness. However, he argues that the alleged opposition between identity and what matters in survival stems from a false comparison.

“Of course the R-relation among stages is not the same as identity which is either among stages or among continuants. But identity among continuant persons induces a relation among stages: the relation that holds between the several stages of a single continuant person. Call this the I-relation. It is the I-relation, not identity itself, that we must compare with the R-relation” (Lewis, 1983, p. 5-6).

What matters in survival is mental continuity and connectedness which is a relation that holds between person stages. Yet the relata of numerical identity are not person-stages but continuant persons. Thus, numerical identity cannot be an equivalent of the R-relation. Lewis argues that the so-called discrepancy between what matters (which is the R-relation) and identity is the result of the difference of relata between numerical identity and the R-relation. For Lewis, the way Parfit talks about identity is based on wrong assumptions about how we persist through time. Parfit assumes that we persist through time by being numerically identical to ourselves. This is an endurantist assumption. Endurantists explain persistence in terms of numerical identity since they believe that we exist wholly whenever we exist. Lewis is a worm theorist perdurantist who believes that we persist through time by having temporal parts. It means that I am identical to myself next year if and only if my current person stage have an identity relation to the person stage who will exist next year. Lewis thereby argues that the equivalent of the R-relation is not numerical identity, but the I-relation which holds between person stages. A person stage refers to a temporal part or a

stage of a continuant person who is a space-time worm. A continuant person is the space-time worm that is a *maximal I-interrelated aggregate of person-stages*. This means that stages as well as the relations among stages are what constitute a person.

Lewis ultimately has two different answers to the question of what matters: (I) identity (the I-relation), and (II) mental continuity and connectedness (the R-relation). Yet these two answers, for Lewis, are actually not two different answers since he holds that the “I-relation is the R-relation” (1987, p.6). Let us remember that identity is symmetrical and transitive, and Relation R is asymmetrical and intransitive, according to Parfit. In order to show that these two relations are coextensive, Lewis argues that the I-relation and the R-relation are both symmetrical and intransitive. Lewis makes two moves to prove this point. First, he argues that the R-relation is symmetrical (p.7). Second, he argues that the I-relation is intransitive (p.9). Lewis does admit that the R-relation has a direction. However, he points out that while earlier stages are R-related to later stages with a forward R-relation, later stages are R-related to earlier stages with a backward R-relation. Thus, his definition of the R-relation includes both forward and backward relations and become symmetrical like the I-relation. Lewis’s second move in order to make the I-relation and the R-relation coextensive is the intransitivity of the I-relation. Lewis argues that the I-relation is an intransitive relation just like the R-relation.¹⁴ We may say that A is identical to B and A is identical to C without having to say that B and C are also identical. The transitivity of identity provide convenience for reconciling identity with what matters in fission cases. Because we can

¹⁴ Even though mental continuity is a transitive relation, mental continuity and connectedness (the R-relation) is an intransitive relation due to the intransitivity of mental connectedness.

say that A is identical to two different persons who are not identical to each other, the I-relation is a one-many relation like the R-relation when there is branching.

In the cases of fission or fusion, it is important how we count and what we count since it is the tricky part. Lewis mentions two possible ways of counting; counting the continuants who have stages at a time and counting the stages (p.10). Imagine there is a person in the room who is about to go through fission. Let us call her Elizabeth. You, Elizabeth and your three other friends are planning a road trip at T1. There seems to be five people in the room. A perfect number for a road trip! At T2, Elizabeth ruins your travel plans by going through fission. Now there seems to be six people in the room; you, Lisa, Beth and your three other friends, and now you need to hire a van for the trip unless you are willing to leave either Lisa or Beth behind. The question is how many people there are in the room at T1. If we count the continuants, we should say that there are six people in the room even before the fission. Lisa and Beth are two different continuant persons who have stages that overlap. We call these overlapping stages Elizabeth; however, none of the temporal stages of Elizabeth is occupied by exactly one continuant person since these stages are co-occupied by both Lisa and Beth. Yet we do not want to say that there are six people in the room before the fission or that there are two people where Elizabeth stands. This is why Lewis does not prefer counting the continuants who co-occupy a stage at T1. He suggests that we should count the stages, instead. In this case, the relation between Lisa and Beth is not an identity relation but rather a relation weaker than identity that Lewis calls 'tensed identity.' Lisa and Beth are obviously not identical simpliciter since they have different stages as well as overlapping ones. They are identical before fission but no longer identical after fission. Hence the relation between the continuant persons - the simpliciter relation between Lisa and Beth - is a relation weaker than identity while the relation between Elizabeth and Beth as well as the relation between Elizabeth

and Lisa are identity relations. Remember Lewis holds that the I-relation is the R relation. Since it seems that Lisa and Beth cannot be R-related to each other¹⁵, they cannot be I-related either. Both Lisa and Beth are R-related to Elizabeth. Accordingly, they are both I-related to Elizabeth.

2.2. Objections to Lewis's View

2.2.1. Sider's Objection to Lewis's Solution

Sider (1996) objects to Lewis's solution on the grounds that Parfit's puzzle involves identity, not the I-relation with which Lewis replaces identity. The common sense platitude, which Lewis believes the I-relation captures, is that identity is what matters in survival. Sider argues that what matters in ordinary language refers to what matters to persons while Lewis's I-relation seems to be what matters to person stages. The I-relation, Sider believes, fails to capture the common sense platitude unless persons are person stages. According to Sider, there are two possible ways to say that identity is what matters:

- (i) What happens to Ceren next year matters to Ceren now if and only if Ceren now is identical to Ceren next year.

¹⁵ After the fission, Lisa and Beth will go separate ways even though they share their pre-fission experiences. Both of their post-fission mental states will be causally dependent on the mental states of Elizabeth; however, there will be no causal connection between the mental states of Lisa and Beth. Yet causal dependence is not necessarily a requirement for the R-relation in Lewis's account. Later in this chapter, I will show that there is no reason why Lisa and Beth should not be R-related.

(ii) What happens to Ceren next year matters to Ceren now if and only if Ceren now is I-related to Ceren next year.

Sider argues that (i) captures the common sense platitude but it is what Parfit shows to be problematic in fission cases since identity in (i) refers to numerical identity. Lewis argues for (ii); however, according to Sider, it does not capture the common sense platitude when it is read in a Lewisian way. When we read (ii) in terms of Lewis's worm view, it goes like this:

(Lii) What happens to Ceren's person stage next year matters to Ceren's person stage now if and only if Ceren's current person stage is I-related to Ceren's person stage next year.

(Lii) indicates that the I-relation is what matters to person stages. For Lewis, a person is not a person stage but an I-interrelated aggregate of person stages. Sider argues that the I-relation, in this case, is not what matters to persons as the common sense platitude requires. Let us say that Lisa will suffer horribly and Beth will live in luxury after Elizabeth's fission. When Elizabeth (who is both Beth and Lisa) is worried about what will happen to Lisa, Beth is worried about something that will never happen to her. If what matters is the I-relation as the common sense platitude requires, what will happen to Lisa should not matter to Beth since Lisa and Beth are not I-related. Thereby, Sider concludes that Lewis's solution to Parfit's puzzle is not successful.

Sider's other objection to Lewis's worm view is that the way a worm theorist counts is counter-intuitive. If we count the continuants, our pre-fission counting seems to be problematic since we need to count Elizabeth, who seems like one person, as two persons. In order to avoid this problem, Lewis suggests that we should count the stages in this case. Thus, we should count by tensed identity which is a relation weaker than identity while counting spatially coincident persons. Sider has two objections to this solution. First, he argues that spatially coincident persons are undesirable and this overlap should be avoided. Secondly, he argues that counting is

necessarily by identity. For the first point, he emphasizes “the prima facie implausibility of such cohabitation” (p. 439). In order to show that this overlap leads to so many unanswerable questions, he rhetorically questions whether one of the post-fission persons hides under the bed prior to fission or why the pre-fission person does not weight as much as the sum of two post-fission persons if there are two persons in the room before fission. Sider does not deny that there are space-time worms some of whose stages can coincide; however, he denies that these space-time worms are persons since “no two persons can ever share spatial location at a time” (p.439).

For the second point, Sider argues that counting by a relation other than identity is not actually counting. Sider illustrates his point by discussing some scenarios about how we would give directions to Jane who needs to cross coinciding or oddly shaped roads. Let us say that two roads coincide where Jane intends to cross. If she asks how many roads she should cross in order to arrive where she wants to arrive, we would tell her that she needs to cross one road. Sider points out that according to Lewis, we did not count by identity when we answered ‘one’ to Jane but we counted by a relation which might be called *identity along Jane’s path*. Similarly, when we count coinciding persons prior to fission, we count one person since we count by the relation *identity-at-t* (tensed identity), according to Lewis. Sider argues that this is how Lewis explains our intuition that there is only one person in the room prior to fission. According to Sider, this is not counting since he believes that when we count, we count numerically distinct things.

Instead of saying that Jane will cross one road which we count by a relation weaker than identity, Sider suggests that we can say that Jane will cross one road segment which we count by identity. Since what matters to Jane is the number of the road segments she needs to cross in order to arrive at her destination, we should use road segments while giving her directions. Another scenario is that Jane wants to arrive at a barn and she needs to cross three road segments to get

there. So we tell her that she needs to cross three roads. Then we find out that these three roads are actually connected and it is one long winding road. Sider holds that our answer should remain ‘three’:

“But I believe we gave the correct answer, when we said 'three'. We told her what she wanted to know: the number of road segments she needed to cross. If someone came to me later and asked me for directions, my short answer would still be 'three'. I might add 'actually, you cross one road three times’” (Sider, 1996, p.441).

Sider does not deny that Jane crosses one continuant road to arrive at the barn; however, he denies that the number of the continuant roads she crosses is what matters to her. He argues that we do not always talk about *continuant roads* but sometimes we refer to *road segments* when we use the word ‘road’. What matters to Jane, when she asks for directions, is the number of the road segments she needs to cross. Since what matters is identity, *roads* in Jane’s question “how many roads do I need to cross?” refer to *road segments*. Sider claims to have shown that Lewis’s strategy of counting by a relation other than identity such as the relation of identity along Jane’s path is not as plausible as sometimes referring to *road segments* instead of *continuant roads* when roads segments are what matters to us. Similarly when counting persons, Sider argues that we count person stages instead of continuant persons because person stages are what matter to us.

2.2.2. My Objection to Lewis’s Solution

I think Sider has a point when he criticizes Lewis’s view on the grounds that what will happen to Lisa seems to matter to Beth. I agree that what will happen to Lisa cannot matter to Beth unless they are I-related. However, unlike Sider, I think that Lisa and Beth should be I-related. It seems that the worm view and the multiple occupancy view are not very compatible. Since persons are space-time worms according to the worm view, when it is combined with the multiple occupancy

view, it leads to the undesirable outcome that two persons overlap by sharing their pre-fission stages which Sider finds *prima facie* implausible. Sider suggests that we should give up the worm view and adopt the view that persons are temporal stages and combine it with the multiple occupancy view in order to deal with Parfit's puzzle. I think there is another solution. We can keep the worm view and give up the multiple occupancy view instead.

In order to understand why persons cannot overlap, I believe we should address an important component of the criterion of personal identity: uniqueness. You are distinct from others. You can only be identical to yourself and no one else. This means that there is only one person who is having your experiences. By *uniqueness*, I do not mean that there should only be one person stage who is you at a time. There may be two seemingly distinct persons at a certain time who are both you. Time travel, for instance, allows for situations like this.¹⁶ If I got into my time machine now and went back in time to meet myself an hour ago, there would be two temporal stages of me occupying different regions of space at the same time an hour ago. Yet these two person stages of me would be having distinct but related experiences. The time traveler Ceren would remember being an-hour-ago-Ceren who was surprised by the unexpected visit of the time traveler Ceren. An-hour-ago-Ceren would be hungry while the time traveler Ceren would not since I had dinner half an hour ago. These two temporal stages of the same continuant person would be R-related to each other which means that their experiences are related. Yet those experiences are distinct since two temporal stages of Ceren are not experiencing the same thing at the same time. The experiences are different for even the different stages of the same continuant person. How can any

¹⁶ Barry Dainton (1992) makes an analogy between time travel and fission. I will discuss this issue in detail in Chapter III. See Dainton (1992), "Time and Division".

of my temporal stages have the same experiences as someone else's temporal stages? At any given time before fission, Lisa and Beth are having the same experiences. What makes Lisa Lisa and Beth Beth if they occupy the same region of space, look the same, have the same character, memories, thoughts, beliefs and desires for a while?

My aim is not to say that two distinct objects cannot share parts. I have a rather specific claim: two distinct *persons* cannot share *temporal* parts. That is to say that two distinct persons cannot occupy the same spatial location, and more importantly cannot have the same mental states at the same time. Identity requires uniqueness which is being distinct from others. If you occupied the same spatial location with me and had the same exact memories, beliefs, intentions and desires with me, you would be me. Before fission, Lisa and Beth seems to be one and the same person; however, they seem to be two distinct persons after fission. In order to reconcile identity and what matters in survival, a worm theorist has to make a choice and either say that there are two overlapping persons before fission or say that post-fission persons bear an identity relation to each other. Lewis goes with the former and interprets fission as two partially overlapping worms. But I believe it is better to choose the latter and interpret fission as a branching worm. The problem with the former view is that it forces us to say that persons can overlap. I find it is easier to go with the latter view since no one would deny that the relation between two post-fission persons are different from the relation between any random two persons.

Lewis holds that Lisa and Beth have a relation weaker than identity which is called *tensed identity* since they share temporal stages; however, he never mentions an equivalent R-relation which may result from the fact that Lisa and Beth also share mental content. One may say that Lisa and Beth must be two different persons because their post-fission stages do not seem to be R-related since they are not causally dependent on each other. Lisa at t₂ is causally dependent on

Lisa at t1; not any of the stages of Beth. Is the requirement of causal dependence for the R-relation necessary for Lewis's account? Lewis writes:

“It does not matter, for the present, just which version I would prefer of the thesis that what matters is mental continuity and connectedness. I am sure that I would endorse some version, and in this paper I want to deal with a seeming problem for any version” (Lewis, 1984, p.2).

It seems that Lewis is not committed to a particular version of the R-relation. Though I believe that Lewis assumes the causal dependence requirement for the R-relation by dismissing the possibility that Lisa and Beth could be R-related, Lewis's neutral approach to the nature of the R-relation actually would allow for a worm view without multiple occupancy.

3. CHAPTER II - STAGE THEORIST MULTIPLE OCCUPANCY VIEW

Sider (1996) introduces and promotes the stage view on the grounds that it “resolves various puzzles about identity over time better than its rivals” (p.443). These rivals Sider refers to are endurantism and the worm view. Sider discusses three issues:

- (I) what matters in survival,
- (II) how and what we should be counting (especially in fission cases),
- (III) what we can say about the identity of spatially coincident objects.

These three issues are related to Lewis's solution to Parfit's puzzle. (I) is directly the discussion of Parfit's puzzle. Sider agrees with Lewis on the fact that both identity and psychological

continuity (and/or connectedness) matter in survival.¹⁷ Yet unlike Lewis, Sider does not clearly define psychological continuity. (II) addresses what we count when we count people (whether space-time worms or temporal stages) and how we count (whether by identity or a relation other than identity). The disagreement about how and what to count marks an important difference between the worm view and the stage view. (III) is related to the multiple occupancy solution to Parfit's puzzle since Lewis's multiple occupancy view, just as spatially coincident objects, deals with a counter-intuitive case of overlap. Sider argues that the stage view deals with these counter-intuitive overlaps by rejecting the existence of overlapping objects and persons, for what overlaps are aggregates while persons and objects are stages. In this chapter, I will present how Sider discusses these three issues to show that the stage view can deal with Parfit's puzzle better than Lewis's worm view, and lay out my objections to Sider's stage view.

3.1. What Matters in Survival?

3.1.1. What Matters to a Stage Theorist

Sider's stage view commits him to the same I-relation used by the worm theorists. The I-relation is the relation between the temporal stages of the same space-time worm. Yet for Sider, persons are not space-time worms but temporal stages. The sentence "I was once an undergraduate student" is analyzable into "There is a past person stage who is an undergraduate student and I-

¹⁷ In order to refer to the psychological criterion which Parfit calls 'psychological continuity and connectedness', Sider uses the term 'psychological continuity' while Lewis uses the term 'mental continuity and connectedness'.

related to me.” In order to illustrate his point, he makes an analogy between his stage view and Lewis’s counterpart theory. According to Lewis’s counterpart theory, an object *x* has the property of *possibly being F* if and only if there is an object *y* in a possible world which has the property of *being F* and has a counterpart relation to *x*.¹⁸ Sider describes the I-relation as an equivalent of the counterpart relation. Temporal operators such as ‘was’, ‘were’ and ‘will be’ are analogous to the modal operator ‘possibly’. Sider points out that the stage view does not say that someone else who is similar to me has the property of *being an undergraduate student*. I have the property of *once being an undergraduate student* thanks to my temporal counterpart who has the property of *being an undergraduate student*. According to the stage view, I am not identical to my temporal counterpart simpliciter. However, I was identical to my temporal counterpart since I am I-related to a past stage who is identical to my temporal counterpart. Similarly, I am not identical to the person stage that matters to me but I will be identical to the future person stage that matters to me because I am I-related to the future person stage that is identical to the person stage that matters to me. Thus, Sider formalizes the I-relation as follows: what happens to a future person matters to me if and only if I will be identical to that future person then. Sider argues that this formulation of the I-relation “adequately captures the spirit of the commonsense platitude that identity is what matters, for it says that what matters to me is what will happen to me.” (Sider, 1996, p. 438). Sider does not commit to any specific version of the psychological criterion; however, he claims that psychological continuity is what matters as well as identity and “a way to preserve both ideas would be the ideal solution.” (Sider, 1996, p.434). By showing that identity is what matters, he claims to have shown that both identity and psychological continuity are what matter in survival.

¹⁸ See David Lewis (1986), *On the Plurality of Worlds*.

What happens when I divide according to the stage view? Both Lefty and Righty matter to me, for they will both be psychologically continuous with me. It follows that I will be identical to Lefty and I will be identical to Righty. Sider emphasizes the difference between (i) “I will be both Lefty and Righty” and (ii) “I will be Lefty and I will be Righty” since he holds that (i) is an undesirable outcome and the stage view implies (ii). Sider says that (i) is a predication of *futurely-being-Lefty&Righty* while (ii) is a conjunction of two predications which is *futurely-being-Lefty&futurely-being-Righty* (Sider, 1996, p.439). If it were true that “I will be both Lefty and Righty”, this would mean that Lefty and Righty are identical because according to Sider, the sentence (i) can be understood as “I as the person stage who exists now have the property of being I-related to a future person stage that is numerically identical both to the referent of ‘Lefty’ at that time and to the referent ‘Righty’ at that time.” Sider claims that (i) is false since Lefty and Righty are not numerically identical. When I go through fission, I will not be both Lefty and Righty. Instead, I will be Lefty and I will be Righty. Thus, Sider is able to say what Parfit cannot say: identity is what matter in survival. According to Parfit, I survive the fission as both Lefty and Righty; however, I am identical to neither Lefty nor Righty since I cannot be identical to both. This is why Parfit argues that identity is not what matters in survival. Sider’s stage view allows us to say that “I will be Lefty and I will be Righty” instead of “I will be both Lefty and Righty” which is problematic due to the fact that identity is a one-one relation. Unlike Lewis, Sider is able to say that ‘identity’ is what matters for survival instead of the I-relation thanks to the counterpart analogy.

3.1.2. My objection to Sider’s Solution to Parfit’s Puzzle

Though Sider's solution to Parfit's puzzle may seem appealing thanks to its commonsensicality while handling the identity criterion of survival, there are some potential pitfalls. Sider does not elaborate on the psychological criterion of survival and prima facie denies that Lefty and Righty may be identical. If we believe that there is no controversy between psychological continuity and identity, we should assume identity whenever there is psychological continuity. I believe there are some hypothetical situations that force us to say that Lefty and Righty are identical if we take the psychological criterion seriously, and the stage view cannot handle these cases without giving up the intuitive counting.

Elizabeth gets on a duplicating teleportation machine at t_1 and then splits into Lisa and Beth at t_2 . Apart from the duplicating teleportation machine, there are two isolated boxes in the room that we are watching through cameras. We cannot see through these boxes but Elizabeth is told in advance to press the button inside to let us know that she is there. On the top of each box, there is a light which goes on when the button inside is pressed. At t_2 , we see the lights on both boxes go on. We get the signal from both boxes at the same time. At this point, the stage theorist is convinced that there are two persons in the room. What happens from Elizabeth's point of view? Elizabeth is in the duplicating teleportation machine at t_1 . At t_2 , Lisa finds herself in the sensory deprivation tank number 1 while Beth finds herself in the sensory deprivation tank number 2. The tanks are qualitatively similar. The temperature, the pressure, oxygen levels and all other environmental conditions are the same in both tanks. Both tanks are soundproof and lightproof. They shut off all sensory input. Thus, the mental states of Lisa and Beth are exactly the same. There is branching; however, it is not mental branching. Are Beth and Lisa different persons at t_2 ? If it is absurd to say that two distinct persons can have the same mental states when physically and mentally overlapping, how could it be okay to say that two distinct persons can have the same mental states

by mentally overlapping but not physically? Elizabeth survives in two distinct bodies. Yet there is no mental branching. Two distinct bodies have what matters in the survival of Elizabeth. They also have what matters in survival of each other.¹⁹ They are the one and the same person who happens to be in two different bodies at two different places at the same time. This is an absurdity just like Lewis's overlapping persons. Instead of two persons some of whose stages overlapping mentally and physically, there are either two persons overlapping mentally but not physically or one person with two different bodies at two different places at the same time. Sider *prima facie* rejects overlapping persons;²⁰ however, it is not certain whether it is the mental or the physical overlap what he rejects. If we track by the psychological criterion in order to determine the identity of persons, we should say that Lisa and Beth are numerically identical. In this case, if we want to count by identity, we need to admit that there is only one person in the room at t2. Is that how a stage theorist intuitively counts, though?

3.2. How and What to Count?

3.2.1. How and What a Stage Theorist Counts

As I discussed in the previous chapter, Sider finds the way the worm theorists count counter-intuitive and argues that ordinarily what we count are person stages and how we count is by

¹⁹ This may sound counter-intuitive; however, if you destroy the body we call Beth, Beth will still survive since there will be a person named Lisa who will have the same exact mental states Beth would have if she was alive.

²⁰ See Sider (1996), p. 439.

identity, that is to say that we count numerically distinct objects. In order to explain why it is problematic to count by relations other than identity, Sider appeals to the analogy between the stage view and the counterpart theory. Sider has several points here. First, he appeals to the analogy between counterpart theory and the stage view to show the advantages of the stage view when it comes to counting since “in trying to weight the importance of this advantage of the stage view over the worm view, it may be instructive to return to the analogy with counterpart theory” (Sider, 1996, p. 441). Both stage view and counterpart theory avoid the problem of counting counter-intuitively by counting by identity. According to Lewis’s counterpart theory, I have trans-world identities, i.e., persons who are related to me by counterpart relation and exist in possible worlds while I only exist in the actual world. Sider wonders why Lewis does not take persons as trans-world sums who extend through possible worlds just as space-time worms extend through spacetime.

“Lewis could have take me to be the sum of all of my counterparts, an object that spans worlds just as space-time worms spans times. Why not take objects to be trans-world sums? [...] The solution of counting by relations other than identity would be required in the *actual* case, as well as in the bizarre case of fission” (Sider, 1996, p.441-42).

Sider believes that Lewis’s reason for not committing to trans-world sums is the fact that I may possibly divide even though I do not actually divide and if we take persons as trans-world sums, this means that there are trans-world persons who overlap in the actual world. If persons were trans-world sums, there would be overlapping trans-world persons in the actual world that we would count as ‘one’ by a relation other than identity. Thus, Sider shows that counting by relations other than identity leads to an undesirable outcome by making another analogy to emphasize his point; an analogy between the worm view that considers objects spatiotemporal sums and a modal counterpart of the worm view that considers objects trans-world sums. Since counting by a relation

other than identity is obviously counter-intuitive in the actual case, a worm theorist does not treat actual and non-actual overpopulation the same way. According to Sider, counting by a relation other than identity is counter-intuitive in both cases, and both cases should be treated equally.

“So, I say, we should give a unified treatment of the two cases of overpopulation due to non-actual fission and overpopulation due to actual fission.” (Sider, 1996, p. 442).

Thus, Sider points out that the stage view can give a uniform treatment of modal and temporal fission while the worm view cannot.

3.2.2. My objection to Counting Stages

I admit that Sider’s analogy between the stage view and the counterpart theory is a fair criticism of Lewis and may convince someone who is already a modal realist to embrace the stage view. Yet I do not think that we should treat modal fission and temporal fission the same way, for I believe modality is fundamentally different than spacetime; however, I will not discuss my reasons here. My main concern with the stage view’s counting style is its alleged intuitiveness. A stage theorist counts stages and counts by identity. Imagine a civilization that consists of two-dimensional circles who dwell on the surface of Lake Louise and perceive the third spatial dimension as we perceive the temporal dimension. These lake surface people are actually sinking cylindrical columns with circle stages. Let us say these columns are multicoloured like a colour scale. What is a *circle* for them? Surely, they perceive themselves as circles; however, they are constantly sinking circles. They are constantly changing colour. If we introduced them a circle which lacks a third dimension, what would they think? Let us say we tossed a hoop which has the

same diameter as an average column into the lake.²¹ Is the hoop that is a circle but not a sinking column a lake surface person?

If a stage theorist accepts that there are spacetime worms but we are temporal stages, she needs to accept that a random person stage that pops up out of nowhere and lacks the temporal dimension is also a person.²² It is true that we sometimes refer to stages instead of worms and sometimes it is more practical. Yet it does not mean that persons are stages. Stages make sense only in the context of a worm. Let us say that one of the lake columns has a branching form and one circle goes through fission and becomes two circles. Surely, it is practical to count the circles for the lake surface people since it seems that what they ordinarily interact with are circles. Yet what they actually interact with are sinking columns and one circle becoming two circles makes sense only in the context of branching columns. If lake surface persons were circles, they would consider a hoop which does not change colour a lake surface person. Could they, though? When they talk about lake surface persons, they talk about colour changing circles; not any circles. I believe that a hoop would be a cause of existential crisis rather than a welcomed guest in the land of lake surface people. Moreover, we sometimes refer to worms. For instance, a stage theorist would have troubles answering to such questions as “how many persons have there been in the room for the last ten minutes?” especially if *the room* in this question is a room where a fission has occurred in

²¹ Let us ignore the height of the hoop and consider it a two dimensional circle.

²² Since space and time are inseparable, I realize that a person stage that pops up out of nowhere will still have a temporal dimension. My point here is not about the nature of spacetime but about how we count persisting objects. Thus, the lake surface is not a metaphor for the privileged present or sinking of the columns for the passage of time.

the last ten minutes.²³ I think we usually refer to worms instead of stages when we talk about the number of people during a certain period of time. If you are planning to throw a party and the caterer asks you how many people will attend, you count the worms, for it is impossible to feed all the instantaneous stages.

Another problem with the way a stage theorist counts persons is that it is uncertain what intuitive counting is and how to count when there is physical branching but not psychological branching. What are person stages? Are they physical or mental? We are relatively good at distinguishing physically distinct objects since they usually occupy different regions of space or they at least have different properties. How are we going to distinguish mental stuff? If you believe that physical states are prior to mental states, you may appeal to the physical distinctness of Lisa and Beth and may intuitively count two persons. However, imagine you are Elizabeth and you get into a machine which you believe is a teleportation machine but actually is a duplicating teleportation machine. You are told that there will not be mental states different than your mental states in the room where you will get teleported. You would assume that you will be alone in that room. Considering that you know it is true that there are no mental states different than yours in the room, the intuitive counting will lead to the conclusion that you are alone in the room. My point is that counting intuitively is not as simple as it looks when it comes to persons, for it requires us to decide first what person stages are.

3.3. Spatially Coincident Objects

²³ Moss makes a similar point. See Sarah Moss (2012), “Four-dimensionalist Theories of Persistence”, *Australasian Journal of Philosophy*, vol. 90, no. 4 : 671–86.

According to Sider, the stage view deals very well with other puzzle cases involving overlapping objects such as spatially coincident objects. We look for psychological continuity when we are dealing with the persistence of persons, and we equate the I-relation with psychological continuity. Yet for ordinary objects, Sider argues, there are other continuities we require them to have in order to persist. He gives the example of a melted copper coin. A coin is melted on Tuesday and ceases to exist; however, the lump of copper which constitutes the coin continues to exist. The lump of copper has the property of *existing after Tuesday* while the coin lacks this property. Since they have different properties, by Leibniz's law the coin and the lump of copper should be two distinct objects. On the other hand, we cannot count them as two distinct objects on Monday since they are indistinguishable on Monday. We are inclined to say that the lump of copper and the coin are identical on Monday but they are not identical on Tuesday.

"I account for the truth of:

- (2) The lump of copper is such that it will exist after Tuesday; and
- (3) The coin is not such that it will exist after Tuesday,

while denying that this implies that the coin and the lump of copper have different properties, by making a natural adjustment to the stage view. On the resulting version of the stage view, the expression 'will exist after Tuesday' is ambiguous" (Sider, 1996, p.443).

Sider argues that the expression 'will exist after Tuesday' is ambiguous and this ambiguity results from the ambiguity of the I-relation. When the coin is melted, it loses its shape and thereby a certain kind of continuity ceases to exist. Yet another continuity remains, for the matter of the coin does not change after the melting. Sider calls the former the *coin I-relation* which holds between the coin and the lump of copper until the melting on Tuesday; and the latter the *lump of matter I-relation* which holds between the coin and the lump of copper even after the melting on Tuesday.

Thus, Sider explains temporary identity by using multiple I-relations just as Lewis uses multiple counterpart relations to explain contingent identity. This strategy, according to Sider, allows the stage theorists avoid the problem of overlapping objects and persons since they believe that objects and persons are stages while what overlap are aggregates of stages.

It seems that the stage view neatly handles the problem of spatial coincidence. I do not have any arguments against the spatially coincident aggregates of object stages. Yet I doubt that the aggregates of person stages can overlap. In this chapter, I hope to have shown that we have good reasons to consider persons continuants instead of stages, and the stage view is not as advantageous as Sider claims when it comes to counting person stages. In the next chapter, I will show that the psychological criterion forces us to deny the existence of spatially coincident aggregates of person stages.

4. CHAPTER III - WORM VIEW WITHOUT MULTIPLE OCCUPANCY

So far, I have discussed two perdurantist multiple occupancy views and how they deal with Parfit's puzzle; Lewis's worm view and Sider's stage view. Lewis's view suffers from the incompatibility between the multiple occupancy view and the worm view, for it leads to the undesirable overlap of persons. Sider proposes the stage view which avoids this problem; however, the stage view has its own disadvantages which I discussed in the previous chapter. In this chapter, I will present and defend another solution to Parfit's puzzle; branching space-time worms, a worm view without multiple occupancy. Before I present my view, I want to discuss another view similar

to mine: Barry Dainton's branching in personal time view.²⁴ Dainton argues that fission may be interpreted as branching in personal time. However, he does not give us any reason why we should consider both post-fission persons the one and the same person with a branching personal time. I hope to be able to explain the identity relation between both post-fission persons by showing that what grounds the branching in personal time is the branching shape of the person. I will introduce and defend Y-shaped space-time worms as an explanation of fission cases.

4.1. Dainton's Branching In Personal Time View

Dainton's view does not commit itself to a specific theory of persistence and does not revise our concept of *person*. These may be considered the advantages of his view. Dainton's motivation is to show that there may be a non-revisionist solution to Parfit's puzzle. He argues that the defenders of the multiple occupancy solution revise the way we think of persons as drastically as Parfit.

“Revisionists fall into two categories: those who allow synchronic considerations to override diachronic, arguing that we ought to regard the products of fission as different people, numerically distinct from both one another and the person who divided into them, and those who argue that we should allow diachronic considerations to override synchronic in a way which allows us to regard the two people who result from a fission as identical with their pre-fission predecessor.” (Dainton, 1992, p.104).

For Dainton, Parfit falls into the first category while Sider and Lewis fall into the second one. Parfit's revisionism is obvious since he holds that identity is not what matters in survival. It also makes sense to think that multiple occupancy is a drastic revision, for Lewis's multiple occupancy

²⁴ See Barry Dainton (1992), “Time and Division”.

view leads to the overlap of persons and Sider's multiple occupancy view leads to the idea that persons are stages. Dainton believes that there may be a solution which does not require us to change the way we think of persons. We can consider fission a branching in personal time. He reminds us of the distinction between personal time and external time which is used by Lewis in order to explain time travel.²⁵ In the lives of ordinary people, there is no difference between the external time and the personal time. A time traveler, on the other hand, experiences events in a different order than an ordinary person. Let us say that I get into my time machine today on August 24, 2018 and travel back in time and arrive at August 16, 1999 to warn my young self about the upcoming earthquake. In my personal time, I live my life in accordance with the external time until August 2018; thereby I first experience August 1999 and then 19 years later, I experience August 2018. Yet on August 24, 2018 I go back in time and experience August 1999 again but this time after August 2018. In my personal time, it is 1999 at t1 and 2018 at t2 and it is 1999 again at t3. However, in the external time, there seems to be two Cereus who have different psychological and physical states on August 16, 1999. Dainton emphasizes the difference between personal and external times in order to show that there is nothing wrong with double existence which we find problematic in fission cases, for we are fine with it in the case of time travel.

“Fission, of course, is not time travel. But double existence is double existence. Why does the idea of persons leading a double existence strike us as so absurd in the context of fission but relatively banal in the context of time travel? The difference may be due partly to our familiarity with science fiction tales of time travel which result in double existence. But I suspect it may also be due to the fact that throughout the course of the relevant time travels we manage to keep a stronger grasp on the integrity of a single person's persistence than we do when think of fission cases” (Dainton, 1992, p.111).

²⁵ See David Lewis (1976), “The Paradoxes of Time Travel”

In the case of time travel, the double existence does not bother us since we are able to track the personal time of the time traveller. My double existence on August 16, 1999 is not absurd, for we are able to track the sequence of events from my point of view and thereby the difference between the mental states of Ceren the kid and Ceren the time traveller is understandable. Thus, Dainton points out that we do not find the double existence of a time traveller absurd while the double existence bothers us in the case of fission since we cannot keep track of the order of one's experiences. However, Dainton fails to explain why we can keep track of this order in the case of time travel while we cannot in the case of fission.

What motivates Dainton to hold that double existence is not problematic is the function and genuineness of personal time as well as external time. Dainton does not only borrow the Lewisian idea that "personal time is 'functionally equivalent' to external (real) time" in the lives of extraordinary people but also holds that "we must be prepared to go further than Lewis and hold that a personal time is a genuine temporal system" (Dainton, 1992, p.121-122). It means that personal time for a time traveller is equivalent to external time for an ordinary person and it is a legitimate temporal system.

"Personal time is the dimension which matters to a person with an extraordinary life in the way that external time matters to a person with an ordinary life: it is the truer measure of the extent, order and shape of their lives, in the sense that it is the dimension within which the successive stages of their lives are ordered as are the parts of ordinary lives through ordinary time." (Dainton, 1992, p. 122).

Dainton suggests that we should think in terms of personal time when we think of the lives of extraordinary persons such as time travellers or persons who go through fission. The order of successive stages in an ordinary person's life goes in accordance with the external time; however, this order may be different when there is a disagreement between personal time and external time. Dainton emphasizes that personal time is how we experience our life and we all think in terms of

past, present and future when we think of our life even when it is at odds with the external time. My double existence in 1999 does not lead to a simultaneous experience of my time traveller self warning my kid self about the earthquake and my kid self listening to my time traveller self in astonishment. I experience the event of meeting with myself first as a kid, then as a time-traveller 19 years later even though it seems like these life experiences are simultaneous in terms of the external time. Similarly, fission cases lead to seemingly simultaneous but actually non-simultaneous parts of lives. Thus, Dainton suggests that a person who goes through fission experiences her life in accordance with her own personal time.

“[...] you must be able to think of my life in terms of a branching structure which is an alternative *temporal* system, for you must be able to accept that, in a very real sense, my fission-twins do not live *simultaneous* lives.” (Dainton, 1992, p.122).

Just as the continuity of a time traveler makes sense only in terms of personal time, Dainton argues that we need a special temporal system to explain the continuity of a person who goes through fission. In Dainton’s view, fission is branching in personal time. After Elizabeth’s fission, it is not the case that Lisa and Beth have different experiences at the same time. Elizabeth has a branching personal time and she continues her life as both Lisa and Beth but not at the same time. The experiences of both post-fission persons are the future of the pre-fission person; however, both post-fission persons have their own presents and futures.

4.2. My Objections to Dainton’s View

I agree with Dainton on the grounds that there is nothing wrong with double existence and time travel is a good example to show that. Yet this does not show that there is nothing wrong with branching in personal time since time travel and fission are different from the point of view of the

person who experiences it. However, Dainton suggests that double existence is only weird in terms of external time:

“[...] if we view personal fission *solely* from the perspective of the type of personal time a dividing person would have, it becomes apparent that double existence is no more problematic than it would be in the case of time-travel. Although from the perspective of external time, double existence remains as problematic as ever [...]” (Dainton, 1992, p. 117).

One person may surely ‘double exist’ at a time even though it seems complicated within the framework of external time. However, I disagree with Dainton on the grounds that double existence in the case of fission is as unproblematic as in the case of time travel within the framework of personal time. Double existence is fairly simple in the case of time travel since a time traveller experiences events linearly like an ordinary person from the perspective of her personal time even though her personal time deviates from the perspective of the external time. Yet the personal time in the case of fission is branching, that is to say that it is very different from the personal time of an ordinary person. In fact, I believe that our notion of *person* ordinarily refers to persons with linear personal times.

Dainton wants to say that we may explain fission without revising our notion of *person*. In order to do so, he tries to show that persons may have alternative personal times. By *alternative*, he means *what deviates from external time*. Yet not all deviations from external time are equal since the personal time resembles the external time in the case of time travel and super-freezing²⁶ in terms of its linearity while it is nothing like the external time in the case of fission. For those who may hold that time travel is impossible, Dainton gives another example of an alternative personal time; the personal time of a person whose mental and physical activities are stopped by

²⁶ See Dainton (1992), p.115 for more information about super-freezing.

super-freezing and restarted by super-thawing many years later. Thus, the personal time of the person who stays super-frozen for a while will supposedly deviate from external time. It is supposed to be like a time travel to the future. However, super-freezing is not very different from ordinary dreamless sleep. If you had a fever and took some over-the-counter acetaminophen, you would probably sleep like a log and wake up with no awareness of how long you had been asleep. Yet it would not mean that your personal time diverges from the external time in the sense that we think of this divergence in the case of time travel. The time between super-freezing and super-thawing may be seen like an extraordinarily sound sleep or a coma. It is not like time travel. During time travel, the order of your mental states diverge from the external time. When you are super-frozen or unconscious, you do not have mental states. However, you always keep track of your personal time by comparing the order of your mental states to external time. If someone drugged you unconscious and kidnapped you to 1987 but brought you back before you woke up, you would not wake up thinking that your personal time diverges from the external time.²⁷ Thus, your personal time cannot diverge from the external time unless you are aware of this divergence during the divergence. Backwards time travel allows you to have mental states which are curved within

²⁷ I am not denying that there would be a divergence from the external time in terms of physical states. The personal time of your body would definitely diverge from the external time. For instance; you would wake up with a missing kidney if they stole your kidney in 1987. The reason why I am using mental states to keep track of one's personal time is that we usually track mental states rather than physical states as the criterion of the persistence of a person. However, it does not matter because your physical states are halted as well as your mental states when you are super-frozen.

the framework of external time. Super-freezing allows you to have a giant mental gap between your last state before getting super-frozen and your first state after getting super-thawed. Nevertheless, your personal time is linear unlike fission. My point is that Dainton's super-freezing example is not even a proper example of an alternative personal time and his example of time travel is not analogous to fission.

I have a different motivation than Dainton to say that there is nothing wrong with double existence. I believe that time is a dimension just like the dimensions of space. An object can have parts at different spatial locations at the same time just as it can have parts at different temporal locations at the same place. It is surely ordinary for an object to have parts at the same place at different times, for it is the case with all things which are not moving. Since there are three spatial dimensions and we are free to move around in space as we like, it is not absurd to occupy the same or different spatial locations at different times. Nobody makes a fuss about the double existence of an object which occupies the same spatial location at different temporal locations, for it is not even considered double existence but merely lack of movement.

Yet when an object occupies the same temporal location at different spatial locations, it is considered an absurdity. I think that our inability to move around in time unlike in space due to its being only one dimension and its inexplicable directionality causes this prejudice against the so-called double existence. However, time travel is moving around in the temporal dimension just as we move around in the dimensions of space. This is why we do not find double existence in the case of time travel as disturbing as in the case of fission. When I time travel, my double existence makes perfect sense; the extra 'existence' is there because she moved from one point to another in

the temporal dimension to get there.²⁸ When you do not bother to wander around in the dimension of time, your successive stages are ordered in a linear way with one stage at a time. When you travel back in time, the order of your successive stages are at odds with the external time which means that some of your (externally) past stages is followed by some of your (externally) future stages. You are temporally bent. Your ability to move in the dimensions of space gives you the privilege of having various shapes other than your initial shape. If you are initially standing still, you can lie down; you can sit down or do a headstand if you would like. Similarly, your ability to move in the dimension of time gives you the privilege of having various temporal shapes other than your initial shape which is linear with one stage at a time. I believe this is the case with time travel; however, fission is different. By moving in the dimensions of space, you can sit down if you are standing still but you cannot grow another arm out of your shoulder. Well, unless you initially have branching arms... The normal shape of a space-time worm is linear with a certain directionality. You can wander around in the dimension of time; however, the order of your stages is always perfectly clear and ordinary just as your head is still your head even though it is where

²⁸ I believe your existence is actually ‘triple existence’ in the case of time travel. You do not get teleported from future to past when you travel back in time. You literally move through the dimension of time. If I travel back in time to yesterday at 3:00, there will be three stages of me yesterday at 03:01. These are my ordinary person stage occupying yesterday at 03:01, my person stage who is in the time machine travelling back to yesterday at 03:00, and my time traveller person stage who is reliving yesterday at 03:01. We tend to ignore the person stages in the time machine but we should keep them in mind to understand that time travel is moving through the dimension of time.

your feet should normally be when you do a headstand. Just as you cannot spatially branch by moving your body in the dimensions of space, you cannot temporally branch by moving in the dimension of time. If you have a temporally branching form, I believe it is because you have an extraordinary temporal shape to begin with.

I think we should first identify the function of personal time in order to see the difference between time travel and fission. Personal time explains the order of the stages and the directionality we observe in persisting objects. If you travel back in time with a broken cup to a time when it was not broken, the cup you are travelling with will still be broken even though you will find there is an unbroken stage of the same cup. If I travel back in time to 1999, I will not arrive there being 19 years younger than I am now even though there will be a stage of me there who is 19 years younger than I am now. We tend to say that a later person stage is causally dependent on an earlier person stage; a later person stage can remember the experiences of an earlier person stage; an earlier person stage worries about a later person stage; and so on. If the personal time of an ordinary person is like a stick compared to the ordinary world, the personal time of a time traveller is like a bent stick. There is no difference between their continuities, though. They are both perfectly linear. The personal time of a time traveller is as ordinary as the personal time of an ordinary person in terms of the order of her person stages. The difference is just relative to the outside world. This is because of the shape of the time traveller as a space-time worm. She is an ordinary person occupying the dimension of time in an extraordinary way. It is as if she was sitting down while everybody else was standing up. Her waist occupies the same height with her knees; however, she knows that her waist should ordinarily be higher, and it occupies the same height as her knees just because she is sitting down. I know that my time traveller temporal stage in 1999 ordinarily is a later stage than my kid temporal stage in 1999; the time traveller stage is there at the same temporal

dimension with the kid temporal stage just because I am a time traveller space-time worm with the bent shape of a time traveller. In the case of fission, the personal time is indeed extraordinary since there is branching. Post-fission stages share a past but their present and future stages are distinct.

Dainton wants to say that one has an alternative branching personal time in the case of fission just as one has an alternative personal time in the case of time travel; however, as I have discussed, though they both deviate from the external time, personal time of a time traveler resembles the personal time of an ordinary person in terms of its linearity while personal time in the case of fission is branching and quite extraordinary.

“The life-history of a dividing person can be represented by a ‘Y’ shape, the life continuities which determine personal time, and which ordinarily are sufficient for continued personal existence, running from the bottom of the figure upwards” (Dainton, 1992, p.117).

I do not disagree with Dainton. I believe that people who go through fission have Y-shaped personal times. Yet I believe Dainton fails to explain what grounds the Y-shaped personal time of the person who goes through fission and why we should accept this person as one person with a branching personal time. Dainton’s argument for the branching personal time is based on the premise that there are other alternative personal times which we find acceptable; however, I hope to have shown that branching is completely different than other so-called alternative personal times in terms of how the stages are ordered. Dainton accepts that both post-fission persons bear strong psychological connections to the pre-fission person but not to each other in the original account of connectedness. Dainton and I both think that post-fission persons are somehow connected but disagree on what explains this connection.

“[...] there seems to be no *a priori* reason to rule out the possibility of temporal systems whose moments are not all strongly connected.” (Dainton, 1992, p. 118).

Why should we consider post-fission persons one person? In virtue of what, are they the same person? Dainton does not give us strong reasons to think of post-fission persons who are not strongly connected as the same person but he gives us hope for a novel solution to Parfit's puzzle; a solution without multiple occupancy. He tries to show that fission may be considered branching in personal time and thereby we can have an account of fission that does not revise our concept of *person*. Yet it is hard to believe that ordinary persons can have branching personal times, for branching in personal time seems to make one quite extraordinary. Though I agree that fission leads to branching in personal time, I believe that this branching in personal time should be grounded in branching persons.

4.3. Y-Shaped Space-Time Worms

I think that a worm view without multiple occupancy may be a neat way to deal with Parfit's puzzle. We may consider a person who goes through fission a Y-shaped space-time worm if we consider ordinary people I-shaped space-time worms. I am not saying that any object which goes through fission is a Y-shaped space-time worm. There may be overlapping objects. What I am saying is that we have strong reasons to consider a *person* who goes through fission a Y-shaped space-time worm instead of assuming that there are two overlapping persons in the case of fission. The most important reason for this, I believe, is the criterion of uniqueness for personal identity. Identity requires uniqueness, that is to say that identity necessities being distinct from others. Since the identity relation among person stages is the R-relation, the uniqueness we care about should be the uniqueness of mental states. There are surely different relations we track in order to determine the identity of an object; however, the most important one we track to determine the

identity of a person is the mental relation. As long as we take the mental uniqueness requirement seriously, we cannot talk about an overlap of persons, for it is absurd to say that two distinct persons can have the same particular mental state. Before fission, Lisa and Beth are indistinguishable. One may say that Lisa and Beth are distinct persons in virtue of having different mental states after fission. But I disagree. The distinctness between post-fission persons is different from the distinctness between two ordinarily distinct persons. Distinct persons ordinarily do not share mental states or have overlapping stages.

The person stages of both post-fission branches are surely continuous and connected with the pre-fission person stages. Are the person stages of the post-fission branches completely unrelated to each other, though? Thanks to their shared past, two branches are actually very similar, especially the person stages which come right after the fission. We cannot say that post-fission branches are psychologically connected with each other if we believe that psychological connectedness requires causal dependence. The original account of the R-relation includes causal dependence, and thereby causal dependence becomes what holds the stages of a continuant person together. I admit that there is no causal dependence between the mental states of post-fission branches; however, there is an undeniable similarity that we cannot ignore due to the fact that both are causally dependent on the same mental states. If we stick to the causal dependence requirement for the R-relation, we violate the uniqueness requirement for identity by accepting that distinct persons can share mental states. This is why I believe we need to modify the R-relation by loosening the causal dependence requirement.

I suggest that we should redefine psychological connectedness as a direct and/or an indirect causal relation among mental states. If B is causally dependent on A, and C is causally dependent on A, let us say that B and C have an indirect causal relation which is sufficient for psychological

connectedness. Similarly, if A is causally dependent on both B and C, let us say that B and C have an indirect causal relation and thereby they are psychologically connected. By doing so, we accept the existence of Y-shaped space-time worms in the case of fission, upside down Y-shaped space-time worms in the case of fusion, and X-shaped space-time worms in the case of fusion which is immediately followed by fission. Committing to a worm theorist ontology allows us to be able to loosen the criterion of causal dependence for mental connectedness. What explains the relation between two things that are both causally dependent on the same thing is the existence of a branching thing which includes all these three things as its parts.

Is it worth adding these oddly shaped space-time worms to our ontology? I believe it is. A worm view with oddly shaped worms is less problematic than a worm view with multiple occupancy. Lewis's multiple occupancy view violates the uniqueness requirement of identity as I discussed in Chapter I. It seems obvious to me that persons should not share temporal parts. If two persons have the same particular mental state at any given time, they cannot be two distinct persons, for there is only one person at the moment of overlapping mental states. I think that our motto here should be "once one, always one" while tracking the identity of persons. The mental state you are in at certain time determines your unique identity; it is what makes you distinct from everyone else. Once you share this uniqueness with someone else, you are the same person simpliciter. This does not mean that you cannot have two distinct mental states at a time. If these two mental states belong to different branches of the same space-time worm, it does not threaten the criterion of uniqueness, for one can have two person stages at a time. Fission forces us to make a choice between two overlapping persons who have the same particular mental state at a time and a branching person who has two distinct mental states at a time. It seems obvious to me that the former violates the criterion of uniqueness while the latter is explicable.

How does the worm view with oddly shaped worms deal with Parfit's puzzle? Elizabeth is a Y-shaped space-time worm. After the fission, she has two temporal stages at a time. One of the post-fission branches calls herself Lisa and the other one calls herself Beth. Any stages of Lisa and Beth are I-related and R-related to each other as well as to the pre-fission stages even though they do not causally depend on each other while they causally depend on the pre-fission stages. Thus, Elizabeth survives fission as both Lisa and Beth. A pre-fission person stage is I-related to both post-fission person stages and there is nothing wrong with that, for every stage we have as ordinary space-time worms is I-related to many past and future stages. My current temporal stage is I-related to my yesterday person stage as well as my next week person stage. One may argue that being I-related to both Lisa and Beth should be confusing for Elizabeth in terms of future concern if Lisa will have the time of her life while Beth will suffer horribly. I do not think that it is as problematic as it seems. As an ordinary, non-branching, I-shaped space-time worm, I would not know how to feel if I was going to have a great time tomorrow and suffer horribly the day after that, for I am I-related to both of these stages and they are both in my future. Yet it is not uncommon to be happy for one of your future stages and worried about another.

Fission forces all of us to give up something. Parfit sacrifices the criterion of identity for survival by arguing that the pre-fission person survives as both of the post-fission persons but none of the post-fission persons are identical to the pre-fission person. Lewis keeps the criterion of identity for survival but sacrifices the criterion of uniqueness for identity by defending that there is an overlap of two persons before fission. Sider avoids this problem but he sacrifices our notion of *person*, which refers to a continuant, by asserting that persons are stages. As Dainton suggests, Parfit, Lewis and Sider all revise our concept of *person* in a way; and I believe they do it by making revisions to personal identity. Dainton claims to have not revised our concept of *person*; however,

he fails to explain how an ordinary person can have a branching personal time since it requires a revision to the R-relation and this cannot be done without a worm theorist ontology. We do not have any reason to believe why Lisa and Beth should be the same person despite the lack of strong mental connections between them. I argue that Lisa and Beth should be considered the same person in virtue of being the stages of the same Y-shaped space-time worm. I consider them the stages of the same space-time worm, for I do not want to give up the uniqueness requirement of identity. Thereby, I avoid the overlap of persons unlike Lewis; I keep the idea that persons are continuants unlike Sider; I can say that identity is what matters in survival unlike Parfit; and I can explain why we should consider post-fission persons the same person unlike Dainton. Yet I do make sacrifices as well. I want to say that Lisa and Beth are R-related; however, the nature of the R-relation between Lisa and Beth is different from the R-relation among Lisa's stages. Thus, I propose to revise our notion of *R-relatedness* by giving up the causal dependence requirement for mental connectedness instead of our notion of *identity* in order to explain fission. It is still a revision but not as drastic as the revisions of others.

My view also allows us to treat Y-shaped persons different than regular persons. An ordinary person is an I-shaped space-time worm or a bent I-shaped space-time worm in case she travels in time while a Y-shaped space-time worm may be classified differently than these ordinary persons, for we indeed treat them differently. If I murdered someone today and travelled back in time to hide in 1920, I would still be responsible in 1920 for the crime I had not committed yet. The space-time police would not refrain from looking for me and the judges of the criminal court of time travellers would not think twice finding me guilty. However, if I went through fission and Lefty murdered someone, no one would be likely to think that Righty was responsible for the crime. If Lefty died before getting punished, the judges of the criminal court of branching persons would

not easily find Righty guilty considering that these judges are ordinary persons trying to implement the justice of the ordinary persons. We tend to find the successive stages of a person responsible for the crime. This is why a time traveler may get arrested in 1920 for a crime she commits in 2018; nevertheless, no one thinks baby Hitler is responsible for the Holocaust. None of the stages of Righty is causally dependent on the stage of Lefty who commits the crime. Thus, Righty is not Lefty in terms of the original account of mental connectedness. But Righty is Lefty in the sense that they have some mental connectedness; that is to say that they are very similar and have indirect causal connections in virtue of being causally dependent on the same person stage. If the crime happens shortly after fission, you might want to keep an eye on Righty since Lefty and Righty are strongly connected. There may be trickier cases. For instance; what if I commit a crime before going through fission and get a sentence of 30 years? Will Lefty and Righty get 30 year each or share it and get 15 years each? Branching space-time worms in the case of fusion would be even more problematic. Lisa commits a crime and fuses with Beth. Should we punish Elizabeth? What if Lisa hurts Beth? Is Elizabeth guilty or the victim or both? How are we going to implement justice in this case? When we think of morality, we think in terms of linear personal time. Branching is extraordinary and may require different treatment. However, this should not change the way we think of ordinary persons.

4.4. Possible Objections to Y-shaped Space-Time Worms

One may say that Lisa does not have what matters in Beth's survival, for if Beth died, Lisa would not have the mental relations which would warrant Beth's survival. This is not true unless what matters in survival is a transitive relation. Since the fission, Beth has been having her own

experiences; she has her own memories which Lisa lacks, she has her own talents and habits. When Beth dies, there will be no person stage of Elizabeth who remembers having taken a trip to Las Vegas since Beth went there but not Lisa; who can speak French since Beth learnt French after fission and Lisa did not; who drinks a cup of coffee first thing in the morning since Beth loves coffee while Lisa is definitely a tea person. But wait! Remember the brave officer objection. If you cannot, do not worry! While you were reading my Chapter II, you used to remember reading the objection I had mentioned in the Introduction, and now you remember what you remembered while reading Chapter II. Even though you are not psychologically continuous with yourself who did read the objection, you are psychologically connected to yourself then. This means that you are still R-related to yourself who did read the brave officer objection. We do forget what we used to remember, we lose our skills which we fail to practice often, and we change our habits; however, none of these makes us lose what matters in our survival.

The R-relation is an intransitive relation due to the intransitivity of mental connectedness unlike mental continuity. I follow Lewis's lead and hold that what matters in survival is the R-relation which is an intransitive relation and R-relation is I-relation which is also intransitive. Unlike Lewis, I feel free to give up the transitive mental continuity and take the R-relation as only (my revised version of) mental connectedness at least when it comes to the survival of a Y-shaped person, for the mental continuity often does not help us track the identity of persons. I do not want to say that mental continuity is completely irrelevant and the survival of ordinary persons never tracks it. It is as relevant as numerical identity. It seems to work for determining the criterion of survival until you come across a difficult case such as fission. A person is numerically identical with herself and a person stage is numerically identical with herself; there is surely one space-time worm who is you and there is only one person stage of you who is that particular person stage of

you. However, diachronic criterion of identity is not numerical identity which is transitive but the I-relation which is intransitive. Similarly, the diachronic criterion of the R-relation is not the transitive mental continuity but the intransitive mental connectedness.²⁹ Transitive relations such as numerical identity and mental continuity should be considered synchronic. Thus, we can say that Lisa is mentally connected to Beth and this is enough for Beth's survival.

Does the worm view with Y-shaped worms revise our concept of *person* radically? I do not think so. It requires some revisions to the R-relation such as loosening the criterion of causal dependence and giving up mental continuity both of which can be explained in terms of the worm theorist ontology. It does not require any revisions to our concept of *identity*. I would call the worm view with multiple occupancy a radical revision of our concept of *person* since it allows persons to share mental states and violates the uniqueness requirement which I believe is a necessary component of our concept of *person*. We know that everyone has their own mental states, and it is what makes a person that person and not anyone else. The stage view also revises our concept of *person* quite radically by asserting that persons are stages since being a person stage only makes sense in the context of a space-time worm, and thereby we cannot be instantaneous stages but constantly changing instantaneous stages, and it is just another way of saying that we are space-time worms. I have to admit that my view also revises our concept of *person*, for we tend to consider persons sum of causally connected stages. We want every stage to be causally dependent on the previous stage no matter where this stage is located in the dimension of time. This is why time travel does not threaten our concept of *person* while fission does. We prefer our personal time

²⁹ By *mental connectedness*, I mean my revised version of mental connectedness with a loose criterion of causal dependence.

to be linear and we do not care if the line seems bent to another observer as long as we perceive it linearly.

By accepting the possibility of Y-shaped space-time worms, we stretch our concept of *person* a bit. Yet it is not a radical revision since it does not require us to apply everything we say about the branching worms to ordinary worms. A non-branching person persists by having successive stages all of which are causally related to each other while a branching person has some stages which do not bear direct causal connections to each other. Even if we deny that branching persons are persons, and call them 'blah', identity still matters. The pre-fission blah stage is identical to both post-fission blah stages since they are the stages of the same Y-shaped blah. It may be disputable whether we should consider Y-shaped persons persons; however, I believe that it would not be a major revision to expand our notion of *personhood* to include oddly shaped space-time worms. The possibility of different persons sharing mental states is a radical revision, for it robs us of our ability to identify distinct persons. Thus compared to the notion of *personhood* multiple occupancy view suggests, I believe it is more reasonable to add branching persons to our ontology.

Conclusion

I discussed two perdurantist solutions to Parfit's puzzle; Lewis's worm view and Sider's stage view. I argued that both views are problematic since Lewis sacrifices the criterion of uniqueness while Sider sacrifices our notion of *person* in order to reconcile identity and what matters in survival. I discussed Dainton's branching in personal time view, and showed that Dainton fails to explain what grounds the branching in personal time. I offered a worm view without multiple

occupancy as a solution to Parfit's puzzle. I hope to have shown that we have some good reasons to interpret fission as a Y-shaped space-time worm.

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