The embodied self: Endurantism or perdurantism?

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Abstract

There is increasing awareness of the importance of the body in psychology and philosophy of mind. Embodied accounts of the self are promising in explaining the perceived unity and continuity characteristic of it: the body provides spatiotemporal locatedness, and embodied experience provides relationships to and interaction with the environment. Given this emphasis on the body, it is surprising to find a lack of consideration of how the embodied self persists through time: as a three-dimensional entity, or rather as a four-dimensional one with temporal parts as well as spatial parts? Conversely, in discussions on persistence over time, a purely mental approach is dominant. I set out to detail the metaphysical debate on persistence, how it is typically applied to persons, and develop a novel account merging various influential lines of thought. The result is an embodied self as a perduring, bio-processual entity.

Introduction

The self: we are all intimately familiar with it, yet it is a plentiful source of debate in philosophy and psychology. It is commonly held that we experience ourselves as being both temporally extended and unified (Gallagher, 2011). That is, I have the experience that I-today is the same as I-yesterday, in essence, and that all my experiences at any moment are unified to create a single, multifaceted experience of myself and my surroundings. It is often, but not always, held that I *have* a self in that sense, i.e. that this unity and continuity is not illusory, and that there is some kind of essence or core that is relatively stable or at least continuous over time.

The self seems to be intimately related to perception, experience, cognition and action. Embodiment is argued to be fundamental for these (Gallagher, 2005). One major proponent of

perception as embodied is Noë, who argues that perception is something we accomplish, not something we undergo (2004). If embodiment is the foundation of the self, we cannot understand the it independent of the body. Many recent theories of the self (and psychology in general) have taken inspiration from this and emphasize the importance of embodiment. For instance, Newen (2018) posits:

> "The basis for a self is a biological system that perceives and acts in the world, and such a biological system is a self only if it develops self-representations about itself 'as itself', i.e. in an immediate way, not representing itself as an object but as the subject of perception and action or thinking." (p. 3)

Henry and Thompson (2011) distinguish between proposals of the self as "merely embodied" versus "bodily", where they argue in favor of the latter. Being merely embodied entails that while the self is necessarily embodied, it is "presented to oneself in introspective self-awareness as a mental subject and not as a bodily one" (p. 235). Being bodily entails three things:

> "First, introspective self-awareness is not our primary mode of self-awareness; rather, we are prereflectively self-aware in world-directed perception, action, and feeling. Second, introspective self-awareness is not the only mode of self-experience that can be nonobservational, i.e., not based on being presented to oneself as an object. On the contrary, prereflective self-awareness presents the body not as an object of inner or outer perception, but rather as the subject of perception, action, and feeling […]. Finally, therefore, self-experience in its most basic nonobservational form presents oneself as a living bodily subject and not as a purely mental one." (p. 236)

In other words, while many of the merely embodied theories emphasize the importance of proprioception for the self, the bodily theory stresses that it is more important that the body allows a perspective on the world and the objects in it. I will follow the stronger reading. The

body—in contrast to experience or the mind more generally—is best suited for providing the continuity and unity for the self. I will show that a psychological criterion—the more popular alternative—is too vague and has unwanted results.

I consider the body to be a material, biological entity. In metaphysics, it is subject of great debate how objects persist through time; what is their temporal and spatial structure? Endurantists hold that objects are three-dimensional: wholly present at every instant, cruising through time? Perdurantists hold that they are four-dimensional: they have parts along the temporal as well as the spatial dimension. Embodied accounts emphasize the importance of the body in providing spatiotemporal location necessary for the self, and many consider the body to be a material object. Surprisingly, however, there is no literature considering how exactly the embodied self persists through time. Is it a spatial entity that changes over time, or is it a spatiotemporal entity that, wholly considered, includes all the change, and in that sense does not change at all? I will examine the stances, their problems, and consequences to develop a novel account of the embodied self that takes into account how it persists through time.

The issue is of interest for philosophy and psychological research generally. The way the self is conceptualized, what the relation to the body is, and how we should conceptualize these over time fundamentally affect debates and empirical research in philosophy of mind and many areas of psychology, including the developmental, social, and cognitive areas.

Additionally, the issue has both clinical and moral relevance. If it is convincing that the body provides the continuity required for the self, perhaps psychotherapy should integrate the body more in its practices. Perhaps creating a discontinuity in the experience of the body could serve the penalizing system. The outcome of the endurantism versus perdurantism debate would have consequences for psychotherapy and law as well. If the self is an object that changes over time, therapy may need to focus more locally, whereas if the self, wholly conceived, stretches out over time, a more holistic approach might be warranted. Additionally, if perdurantism wins, and we consist of temporal parts that are potentially overlapping, with some of them perduring

longer than others, examination of how one could address all the overlapping parts, and of the consequences of certain temporal parts seizing to exist is warranted. If the part seized to exist, or if the self had already changed, would therapeutic intervention be successful? Would penalty be justified? Could individual temporal parts be targeted by law?

In order to develop my proposal, I will examine the endurantist and perdurantist accounts in metaphysics in chapter 1. Then, I will expound on how the debate is applied to philosophy of mind and psychology in chapter 2. The prevailing opinion here is that psychological continuity is what matters in persistence of persons, but also that there are various problems with this criterion. Having established a good understanding of the debate, the stances, and the stakes, I will apply it specifically to develop a novel account of the self in chapter 3. This account combines features of Olson's three-dimensionalist animalism and Hudson's four-dimensionalist psychological approach, among others. The account will be tried against various puzzles that are returning subject of discussion, and finally some general implications will be examined.

1. Endurantism versus perdurantism in metaphysics

To come to an informed understanding of whether the embodied self is best conceived of as enduring or perduring, the first step is a clear exposition of the endurantist and perdurantist positions in general. I will therefore discuss how objects in general might persist over time. There will first be a quick word on what objects are. Then, the difference between endurantism and perdurantism will be brought forth by discussion of the central claims of perdurantism. Finally, both accounts of how objects persist will be detailed.

1.1 Particulars

Before we dive in, a quick metaphysical word on particulars: the (commonsense) objects that make up the world, such as tables and cars. Particulars are characterized by (i) not being exemplifiable; (ii) having only temporary existence; (iii) being contingent entities; (iv)

undergoing change during existence; and (v) having a spatiotemporal location (Loux & Crisp, 2017). They are contrasted with universals: repeatable entities such as the number five and a square. Substratum theorists hold that a particular is a whole made up of some subject or substratum *together with, but independent of* its various properties. Bundle theorists, conversely, deny the existence of a property-less "bare substratum". The bundle theorist is the epitome of an essentialist: a particular is nothing more than its properties—if one were to pick properties away with a metaphysical tweezer, there would be nothing left—and all properties contribute equally to the way the particular is. Substratum theorists epitomize the polar opposite: the essence of the particular is entirely free of any properties, and all its properties are inessential to its being.

Substance theorists oppose the parts-whole division posited by the former two, rather, particulars are ontologically irreducible fundamental entities—no metaphysical tweezers could pick at these. Further, universals and particulars are not all the metaphysical categories: particulars belong to specific *kinds*, such as houses and bodies and persons, and these kinds cannot be reduced to a set of properties.

Both substance and bundle theorists acknowledge an essence determined by the kind that marks out the particular as what it is, and distinguish it from the universals that lie outside that essence. Substance and substratum theorists agree that the association of attributes with concrete particulars requires a subject, but disagree that this means the subject is a constituent of the particular and disagree that it should be characterized as bare.

For the upcoming discussion, take note of the following.

(i) Most authors considered here take the self to be a substance or substratum;

(ii) These stances do not force a specific type of property crucial to the self (e.g. thoughts, ideas, perceptions);

(iii) While these metaphysical stances do not strictly commit one to a stance on endurantism or perdurantism (Loux & Crisp, 2017, p. 234), endurantism harmonizes easily with the substance and substratum theory, whereas perdurantism harmonizes easily with bundle theory (Benovsky, 2009; Meincke, 2018; Inductivo, 2013).

To provide a rough characterization, on the substance theory, the self is a kind of discrete, unanalyzable, self-identical particular. On the bundle theory, the self is a bundle of properties. Finally, on the substratum theory, the self is made up of (a) properties and (b) a core self that has these properties (Benovsky, 2009).[1] I take it that with these in mind, the reader can fill in roughly how "objects", "individuals", "persons", and "selves" are to be interpreted in most of the following. We will return to the topic briefly in chapter 2, and more elaborately in chapter 3. How do particulars exist at different times, i.e. how do they persist?

1.2 Persisting particulars

There are three relevant interwoven debates. Certain of the stances are commonly combined—on these I will focus—but it is generally acknowledged that other combinations are in principle possible. The debates are: eternalism versus presentism; three-dimensionalism versus four-dimensionalism; and endurantism versus perdurantism.[2] Perdurantists typically posit a strong analogy between space and time in at least three ways (Sider, 2001; 2008a; 2008b) and these will feed exposition of the different stances.

(i) Just as there are spatial parts, there are temporal parts.

Endurantists typically hold that objects have three dimensions—width, depth, and height—and are wholly present at any one time t_n. That is, they are usually three-dimensionalists and

[1] Benovsky seems to conflate substance and substratum theory, and calls this substance theory.
[2] Frequently, the terms four-dimensionalism and perdurantism, and three-dimensionalism and endurantism, are used interchangeably. I will adhere to the terms perdurantism and endurantism, but numerous of the cited sources use the other convention.

presentists. For the endurantist, persistence over time is a matter of existing wholly and completely at different times, therefore of numerical identity: "my bike" yesterday and "my bike" today pick out one and the same object in the world (unless I have bought a new bike, of course). This is called being "wholly present", and section 1.3 Temporal parts: a closer lookwill examine this notion more closely.

Perdurantists, on the other hand, hold that objects have an additional dimension—time—and that objects are not wholly present at any one time(-slice). Rather, the whole and complete object is the object from the start until the end of its existence. Just a bike has spatial parts—a wheel, a seat, a frame—it also has temporal parts[3]—a bike has a wheel-today, a wheel-yesterday, and a wheel-tomorrow. Spatial parts are no more special than temporal parts: my hand is a spatial part of me that has a spatial location at the end of my arm, and just so, my hand yesterday is a temporal part of me that has a temporal location in the day before today. Persistence over time is a question of having parts at different times that together form a particular object: "an object lasts over a stretch of time by having different parts located at the different times within that stretch" (Sider, 2013, p. 405). Section 1.4 Wholly present: a closer look will examine temporal parts more closely.

(i) Objects and their parts are equally real across space as well as time, i.e. eternalism holds.

Most endurantists support presentism. Presentism is the thesis that only the objects of the present are real (Loux & Crisp, 2017; Sider, 2001), i.e. the logician's quantifiers range over only present things (Crisp & Smith, 2005). Combining these views, it follows that objects do not have parts that do not exist at present.

[3] Of note: perdurantism is the view that objects *have* temporal parts, not that objects persists *because of having* temporal parts. However, it often is, and should be, taken as the latter, as being an explanatory account of how things persist. A similar point holds for endurantism (Wasserman, 2016).

Most perdurantists, by contrast, support eternalism: objects (or parts) in all of the past, present, and future are equally real (Loux & Crisp, 2017; Sider, 2001), i.e. the quantifiers of logic range over all objects of all times (Crisp & Smith, 2005). Combining these views, objects are four-dimensional, meaning they have temporal parts in addition to spatial parts. Whereas presentism holds that the present is privileged, and therefore so are the present objects, eternalism holds that none of the temporal parts of an object are privileged, nor are any of their spatial parts. Spatially distant objects are as real as nearby objects, and in the same way, objects that exist concurrently with us are as real as objects of the past and the future. We do not know as much about objects that are very far away in terms of space (or very stretched out in space, for that matter) as we know about those that are very near to us, but that does not make us less inclined to say they are real, or that we know about them (and to the extent that it does, so it holds for time as well). For objects distant in space, we need technology to gain information about them—e.g. a telescope—and the same holds for objects distant in time—e.g. carbon dating and muon tomography.[4]

(ii) Just as there is no objective "here", there is no objective "now".

For the eternalist perdurantist, "There is a canal here" may be a true statement when made by someone in Amsterdam, but not when stated by someone in Cape Town. Similarly, "it is raining now" may be true when stated at 12:00 o'clock today, but not when stated at 15:00 o'clock.[5] This is to say, eternalists hold a tenseless theory of time: reference to time is possible, but not essential, and this reference is exact (e.g. "May 25th 2019", "After the Paleolithic era"). By contrast, presentists hold a tensed theory of time: expressions are incomplete without a reference to a certain time, but this reference is indexical (e.g. 'now', 'here'); they require a

[4] Note that telescopes not only peer deeply into the spatial dimension, but also into the temporal dimension, and vice versa for carbon dating.
[5] Note that both kinds of statements make implicit reference to the other dimensions as well.

certain vantage point. Endurantists will commonly acknowledge that certain processes or events have temporal parts, i.e. a party may have an early and a late part, but they will not concede this more generally. Objects and people have spatial parts at different times alright, but these are always time-indexed. The perdurantist by contrast, considering temporal parts on par with spatial parts, will say objects and people have parts, full stop.

1.3 Temporal parts: a closer look

For the perdurantist, again, persistence through time is a matter of having different temporal parts existing at different times, and all these parts belong to an object equally. "My bike" yesterday refers to different temporal parts than "my bike" today, but they refer to parts of the same object. The grain size of the time-slice under consideration determines how many temporal parts are combined to form a particular object. The smallest grain is a time-slice, at which only instantaneous temporal parts exist. Bike-today can be considered to consist of the temporal parts bike-this-morning, bike-this-afternoon, and bike-this-evening. If my bike's seat is stolen at noon, the spatial part *seat* makes up the object that can be called bike-this-morning, but not bike-this-afternoon. My bike, wholly considered, has the spatial part *seat* for some of its existence, but not for all of it. My bike, wholly considered, then, does not undergo change. It is simply a combination of specific temporal and spatial parts over a specific spread of time, and depending on the temporal region under consideration, it lacks or has a certain number of them.

Perdurantists usually follow the definition of an instantaneous temporal part provided by Sider (2001). To understand it, we need to define existence, parthood, and overlap. Firstly, existence-at-*t* can be defined as (p. 59):[6]

[6] The worm view is commonly accepted in addition, which holds that the space-time worms are the referents. Alternatively, the stage view holds that there are instantaneous stages which are the referents. I will keep to the worm view.

(E@T) An object *x* exists at time *t* $=_{df}$

x has a temporal part that exists at that *t*.

Straightforwardly, my bike only exists today only if it has parts today. Next, parthood, or an object *x* having a certain temporal part *y*, can be defined as follows (p. 57):[7]

(P@T) *x* is part of *y* at *t* $=_{df}$

(i) *x* and *y* each exist at *t*; and

(ii) *x*'s instantaneous temporal part at *t* is a proper part of *y*'s instantaneous temporal part at *t*.

Here, a *proper* part is a part of the object not the size of the whole object, in contrast to an improper part, which is the size of the whole object. So my bike's wheel at any instance is a proper part of my bike at that instance if and only if the bike and the wheel both have a temporal part at that instance, and the wheel part is (a spatial) part of the (temporal) bike part at that instant. Finally, overlapping objects can be defined as follows (p. 58):

(PO) *x* has some part at *t* that does not overlap *y* at *t* $=_{df}$

(i) *x* and *y* exist at *t*, but

(ii) *x* is not part of *y* at *t*.

Overlapping occurs when two objects have a part in common. The overlap relation covers parthood as well as identity.[8] To the extent that the wheel and the bike are in the P@T relation, they overlap.

[7] Note that the definitions are all temporally qualified; this is a choice to avoid direct rejection by the endurantist reader. While the perdurantist would generally speak in an atemporal fashion, it does not run counter their position to use temporal qualification in their definitions.

[8] Sider extends Simons' (1987) account of spatial overlap here. In Simons' case, neither parthood nor identity is required for overlap. According to the present definitions for temporal overlap, it is required.

We are now in a position to define an instantaneous temporal part (p. 59):

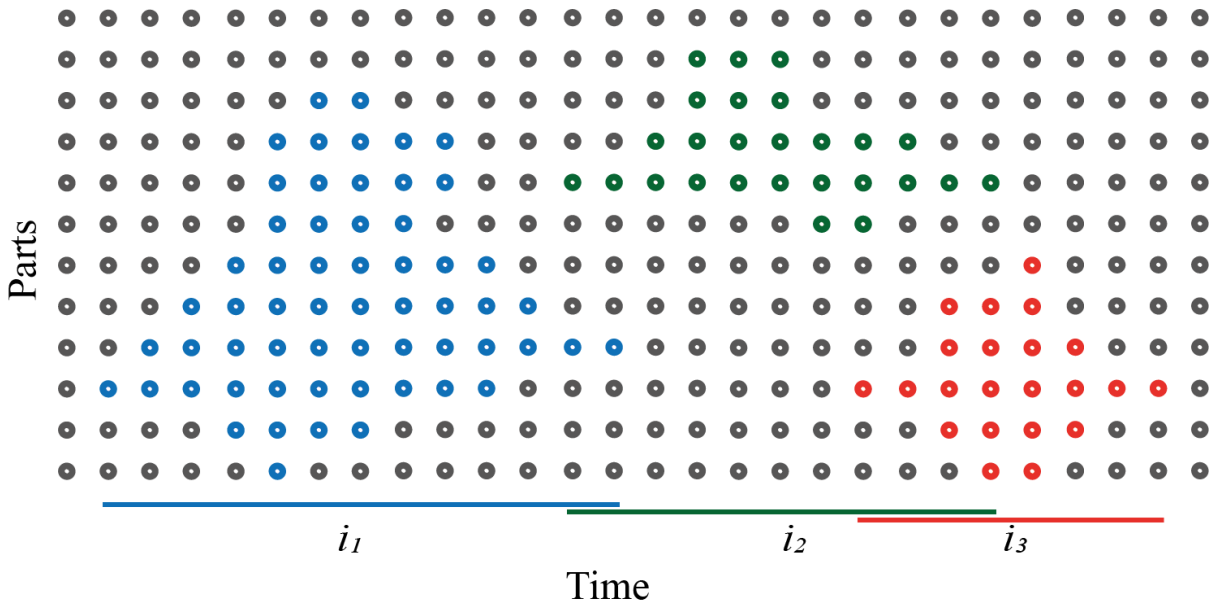
(ITP) *x* is an instantaneous temporal part of *y* at instant *t* $=_{df}$

(i) *x* exists at, but only at, *t*;

(ii) *x* is part of *y* at *t*; and

(iii) *x* overlaps at *t* everything that is part of *y* at *t*.

This ensures that "my current temporal part should be a part of me now that exists only now but is as big as I am now" (p. 59). In other words, at every moment of a spatiotemporal object's existence, it has a temporal part. Refer to Figure 1. Parts composing perduring objects over time.



Different objects in blue, green, and red, persisting over intervals i_1, i_2, and i_3, respectively. for a representation of perduring objects.

Figure 1. Parts composing perduring objects over time. Different objects in blue, green, and red, persisting over intervals i_1, i_2, and i_3, respectively.

Most perdurantists embrace the Principle of Unrestricted Composition: any combination of parts could be seen as constituting an object. There could thus be an object consisting of my left hand today, the Eiffel Tower in April 2008, and the University Library tomorrow. "Just as we can think of a temporally extended object as divisible into infinitely many parts, so we can

think of temporally smaller items as combinable in infinitely many ways" (Loux & Crisp, 2017, p. 321). None of the parts is privileged; any combination could be considered an object. This seems troublesome: our experience of the world does not seem to conform to this at all. There is no arbitrariness in how objects seem to be made up at any one time, nor between different times. We are inclined to cut up the world in specific ways, consistently.

The perdurantist has to explain how it is that there are no privileged parts—any combination is just as valid as any other—yet we tend to have a specific view of the world. Effingham (2009) raises the following objection:

> "Take the object composed of a turnip from throughout the year 1979 and all of Pavarotti's temporal parts from 1980-2007. Given this treatment of properties, that object was, in 1979, a turnip but was, from 1980 onwards, a tenor. So some tenor was once a turnip!" (p. 303)

Indeed, this sounds whimsical! But it is unlikely that it would be correct to say this under perdurantism. Those particular temporal parts together trivially create an object that is a turnip for some of its career and a tenor for another. Also, there is no teleportation, merely distant spatiotemporal locatedness of different parts. On the epistemological level, of course, we do not recognize this as one object, but that is another (to be addressed) issue.

Unrestricted Composition is motivated by the following critique. How can we device a criterion for cutting up the world in a way that matches out perception, while not anthropocentric nor vague (Sider, 2013)? Anthropocentrism is directly implied by requiring the cutting up to have to match our perception of the world. It is, however, not unthinkable that some other species would cut up the world differently from us—indeed, even within the human species there may be differences—and who is to say we have the correct solution? Does this not end up being as arbitrary as allowing all parts to combine into a potential object? As for vagueness, the concepts we recognize have blurry borders. When does a heap of sand from

which I remove one grain at a time seize to be a heap? If we accept the vagueness in our concepts, why not accept it in where one should cut up the world?

When it comes to explaining persons and selves, however, it seems we need a slightly more meaningful way of cutting up the world. The commonly proposed set of criteria is centered around certain relations that specific parts, those that tend to make up the objects as we see them, consistently enter into. These are relations of spatiotemporal proximity—they are always extremely near one another—similarity—they are always highly similar—and causality—preceding parts cause succeeding parts (Loux & Crisp, 2017). Since the endurantist, by contrast, considers objects to be wholly and completely present at any one time, and holds this to be unproblematically unanalyzable (Loux & Crisp, 2017), there seems to be no issue of where to draw borders. Only present parts are considered, and spatial parts do not potentially combine with indefinitely many spatial parts to form objects. We will now have a closer look at what it means to be wholly present.

1.4 Wholly present: a closer look

Endurantism denies there is an instantaneous object for every instant at which a persisting object exists (Effingham, 2009). Problematically, there is no generally agreed upon definition of "wholly present". Most authors give a rough approximation at best. This may be due to the fact that it seems to be an intuitive notion, but intuition will not suffice presently.

Commonly, "wholly present" is roughly defined as every part of *x* existing at *t* (Sider, 2001). Persistence is numerical identity for the endurantist, but s/he does want to hold that objects can change over time. The endurantist, then, directly faces trouble with Leibniz' Law of Identity, which holds that if and only if *x* and *y* have all their properties in common, they are numerically identical. If change is a difference in properties and identity is sameness of properties, change and identity are clearly at odds.

The solution is to time-index all parts and properties, consistent with presentism. *Being tan*, then, would not be a property of me, but *being tan in summer* is, and this does not contradict my having the property *not being tan in winter*. Further, I can have both properties my whole existence. But the cost is that there are only time-relative properties for the endurantist, which would not satisfy anyone who wants to know what it means to have one of those properties. The perdurantist, positing temporal parts, can explain that for an object to have the property *being tan in summer* means for it to have a temporal part in summer that has the property of being tan, period (Sider, 2013). The endurantist, opposing temporal part, does not have this option, and is left with an infinitude of unexplained time-indexed properties. Objects have only relational properties, and therefore objects have no properties apart from their relations. This is unsatisfactory especially for intrinsic properties—e.g. being spatially extended, having a shape, having a color—where the property considered *should* exist without being in a relation (Sider, 2013). Without intrinsic properties, there is no way to distinguish properties that do seem relevant to an object—e.g. its shape—from properties that do not—e.g. what is going on in the house next door—since all of these are indexed properties of that object. Furthermore, rather than explaining change, it seems to make it dissipate (Meincke, 2018): all my properties are forever the same, so I do not change.

Following presentism, "wholly present" might be explained as there not existing parts of the object in the past and future. This is not a very informative explanation, since it is a negative account and it leaves much unexplained. Crisp and Smith (2005) set out to construct a satisfactory and comprehensive definition of "wholly present". The result is this (p. 340):

For part *x*, region of space(-time) *R*, and object *y*:

(WP) *x* is wholly present at $R =_{def}$

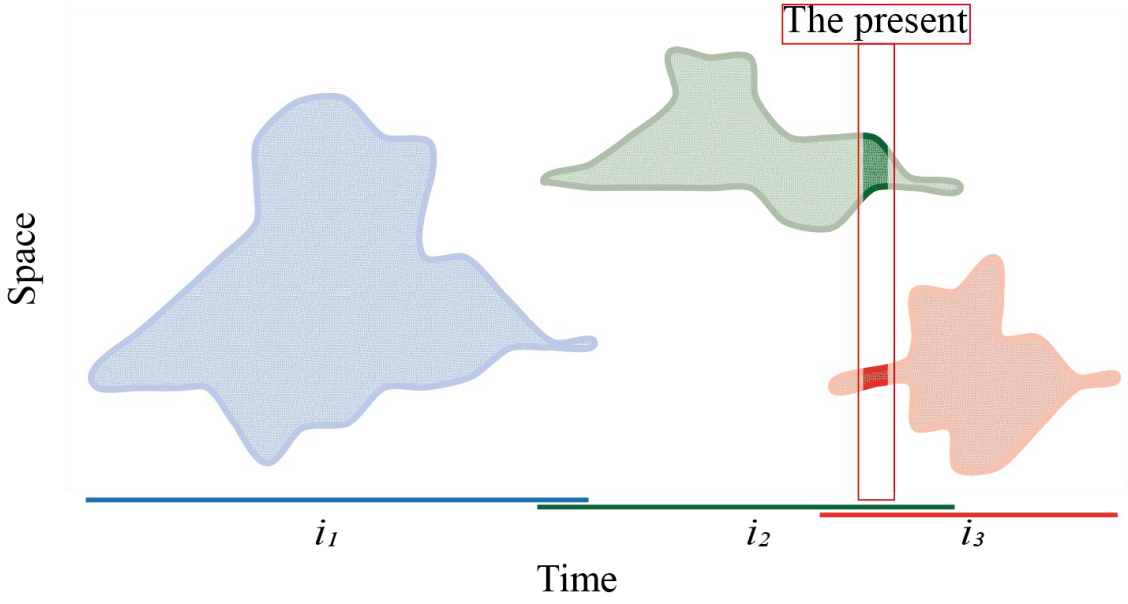
(i) *x* overlaps *R* and every subregion of *R*;

(ii) no part of *x* at *R* (of which *x* isn't a part at *R*) shares a part at *R* with everything that is a part of *x* at *R*; and

(iii) for any *y*s, if the *y*s properly compose *x* at *R* then the *y*s wholly compose *x* at *R*.

The first condition makes sure that the object fills up the *whole* region. The second condition makes sure that the object is *not larger* than the region. The authors illustrate the second condition with the example of a cat, Sam, that takes up the region R_{Sam}, and his paw that takes up *R*'s sub-region R_{paw}. Sam is too big to fit into R_{paw}. The paw is part of Sam, but Sam is not part of the paw (explaining the part of clause (ii) in parentheses). The paw-part at that region shares parts with everything that is part of Sam in that region. The paw is not too big for R_{Sam}, but Sam is too big for R_{paw}. The paw can therefore not be wholly present, but Sam can.

Why should we exclude objects larger than the region—i.e. deny the paw is wholly present at R_{paw}? The problem is that the parts that occupy R_{paw} are not related by the "Life relation" (p. 337, explained below). The parts of the region R_{Sam}, by contrast, do stand in the Life relation to one another, and by doing so, these parts properly compose Sam at R_{Sam}. This kind of properly composing is referred to as "wholly composing", and is contrasted with the kind of composing which the parts of R_{paw} do: they properly compose Sam at R_{paw} by being among (a sub-region of) the parts that are in the Life relation. This is insufficient to wholly compose an object, thus



insufficient for some object being wholly present. Refer to Figure 2 for a representation of enduring objects.

Figure 2. Enduring objects, wholly present at each instant, changing over time. Different objects in blue, red, and green, persisting over intervals i_1, i_2, and i_3, respectively. Only parts in the present exist.

What is the Life relation? Taken from Van Inwagen (1990), it is "the individual life of a concrete biological organism" (p. 83), with detailed analysis left up to the biologist. It is a self-maintaining, "reasonably well-individuated event" with a "continuous path in space-time from the earlier to the present space-time location" (p. 87). Furthermore, it is "jealous": a set of parts' activities cannot constitute more than one life at the same time. Finally, "[a] life takes the energy it finds and turns it to its own purposes" (p. 89). To be wholly present, then, means that there is presently a set of parts that fill a whole spatial region, and only that region, and that stand in the Life relation to one another to make up an object.[9]

Unfortunately, while many refer to the meticulous work of Crisp and Smith, their definition does not appear to be applied by endurantists. Many neglect this biological foundation in favor of something more ontologically neutral, and many neglect the process-oriented nature implicit in the Life relation in favor of a substance or substratum treatment (both shall be evident in the upcoming chapter). The latter points to incompatibility between endurantism and objects as processes.

1.5 Perdurantism and endurantism in action

It should now be clear what it is for an object to persist through time on either account. A perduring object has different spatiotemporal parts, and these parts have special connections, while an enduring object only has parts in the present. To understand the implications of these views, they shall be tried against two frequently discussed paradoxes: fusion and fission.

[9] This definition allows for an object to be wholly present at more than one region in space(-time). It is neutrally formulated as regards parts being time-indexed.

1.5.1 Fusion

Consider the object composed of all the parts of a cat, named Tibbles. Consider another object composed of all the parts of Tibbles except for its tail, call this object Tibb. Following Leibniz' Law, Tibbles and Tibb are numerically distinct: they do not share all their properties. But suppose Tibbles loses its tail in some accident. Both Tibbles and Tibb would seem to persist, and now they share all their properties, so they must be identical.

This is not a conclusion that many would embrace. The endurantists wants to retain an ontology of unified, non-overlapping, wholly present objects. A common response, then, is that Tibbles and Tibb are *constituted* by the same matter, which is to accept that, in a sense, two objects do take up the same location, and these objects stand in the same relation to the one chunk of material that makes them both up.[10] It is not clear, however, that this is an explanation rather than a label for the issue. Furthermore, if one does not accept the substratum theory, this solution is not satisfactory: the response presupposes some essence that is unaffected by the loss of some of its parts. A more successful response is to reject the existence of an object such as Tibb; not positing Unrestricted Composition, it seems the endurantist is not required to allow Tibb's existence in its ontology.

The perdurantist would say that the whole object consists of temporal (and spatial) parts that make up a Tibbles pre-accident—most of which also make up Tibb—and other temporal parts that make up Tibbles post-accident—all of which also make up Tibbles. There is, thus, overlap of the objects. Just as your elbow is unproblematically part of your arm—sharing a spatial part—so the Tibb is unproblematically part of Tibbles—sharing some spatiotemporal parts. This avoids positing that two distinct material objects occupy the same location. For a visual, please refer to Figure 3.

[10] See Sider (2008a) for alternative response options.

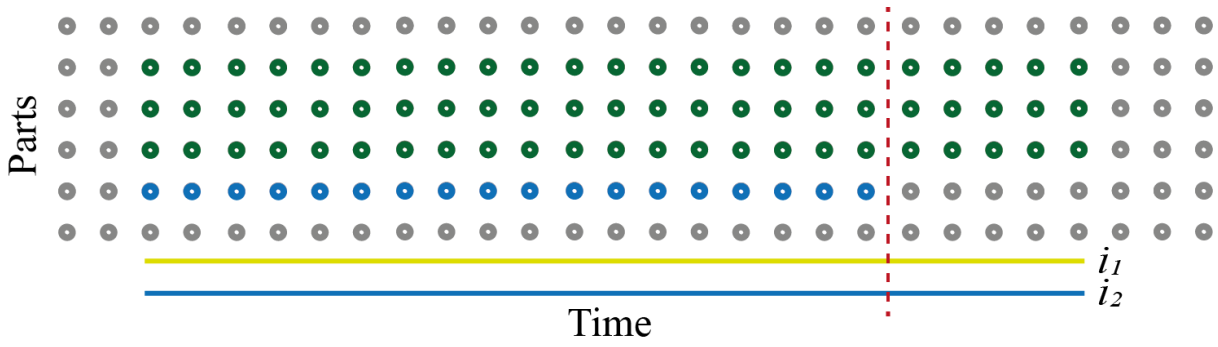


Figure 3. Perdurantist solution to fusion: Blue parts for Tibbles, yellow parts for Tibb, overlapping for their whole existence (in green). Tibbles persists after losing his tail-part at the red dotted line as made up of the same parts as Tibb.

1.5.2 Fission

A popular example of fission is Hobbes' ship of Theseus. Imagine a ship owned by Theseus which, over the course of years, has all its planks, screws, bolts, beams etc. replaced. Call the initial ship Original, and the result of this maintenance Replacement. Imagine additionally, that all the parts that made up Original were not discarded, but stored by Theseus' nemesis, and used to create another ship, piece by piece. Call this ship Reconstructed. It would seem that a ship can undergo deconstruction and reconstruction without being a distinct ship; but simultaneously it would seem that a ship can undergo replacements of parts without resulting in a distinct ship. But quite obviously, Reconstructed and Replacement are not numerically identical! If Theseus would order his ship to be set ablaze, which of the two ought his crew lit?

Endurantists have several response options, two of which will be considered. The first is, again, to rely on the constitution relation, which is not an equivalence relation in contrast to identity. Accordingly, Reconstructed is constituted out of exactly the same parts as, but never identical with, Original. The second is a relative identity account, denying that there is just one type of identity relation. We will see more of this in the next chapter.

Perdurantists would rely on overlap again. Original is actually composed of two space-time worms that share spatiotemporal parts, but branch off into Replacement and Reconstructed upon maintenance. For a visual, please refer to Figure 4.

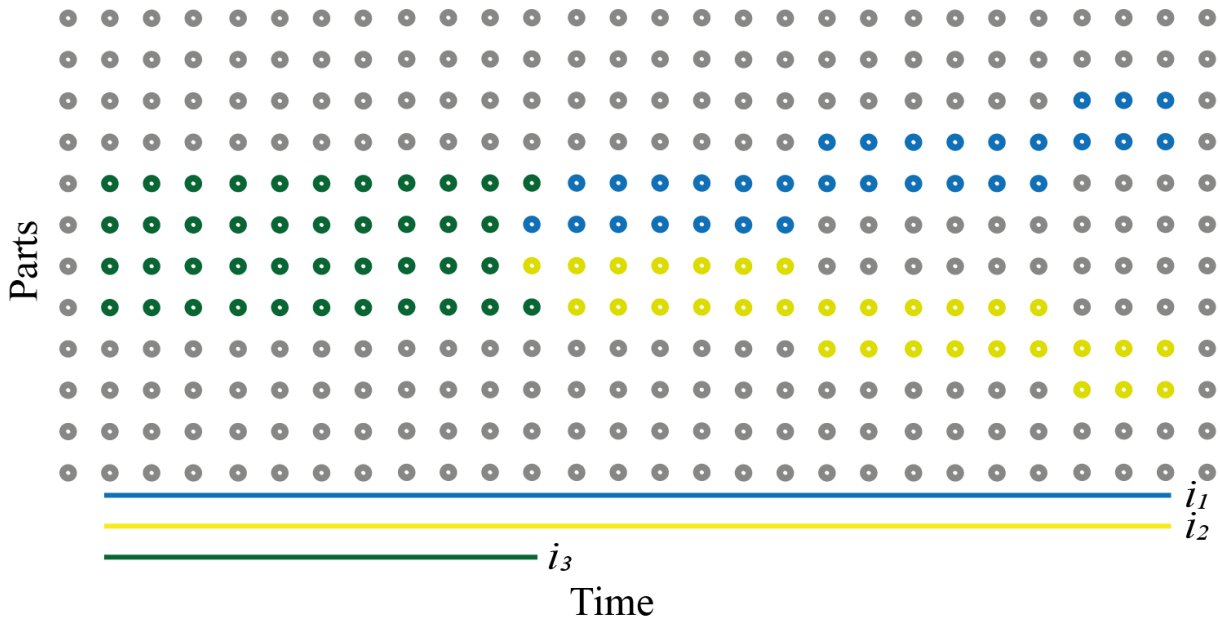


Figure 4. Perdurantist solution to fission. Yellow and blue represent Replacement and Reconstructed, branching off from overlapping during i_3 as Original, in green.

2. Endurantism versus perdurantism in psychology

To progress towards an understanding of the self in either an endurantist or perdurantist framework, we will first consider the way in which the endurantism versus perdurantism debate is usually applied to the field of psychology. This is the field of personal identity over time. First, I will discuss what is for a person to exist in the first place. This is an extension of the temporal parts and wholly present discussion. Then, I will discuss the differences in persistence relations between the endurantist and perdurantist. Then, I will discuss various ways to fill in these relations. Various issues concerning the criteria for these relations will be discussed before coming to my proposal in the third chapter.

2.1 Criteria for existence

Before we can talk about how persons persist over time, the first issue to resolve is how many persons there are in a specific region in the first place. Given Unrestricted Composition, how many individuals are there in a certain region of space-time? Unrestricted Composition yields a (potentially very large) number of candidates for the predicate “person”, or “self”; how do we determine which of the collections of parts carries this?

To illustrate the problem, take Hudson's (2001) scenario. At t_1, there is conception, and a space-time worm comes into existence that we may call Hopeful. At t_2, there is a clump of cells developed enough to host life, and we may call the parts of this clump Vital. At t_3, there is a much more developed collection of parts that has the capacity to feel, rendering the name of this collection Feeler. At t_4, there is an even further developed collection of cells, capable of higher cognitive capacities, and deserving the name Thinker. At t_5, there is a collection of cells in a very good mood, which we will call Cheerful. Then, at t_6, the cheer dissipates, and Cheerful seizes to be. At t_7, Thinker's cognitive capacities decline, and Thinker seizes to be. At t_8, due to neural trauma, Feeler no longer has the capacities to feel, and thus seizes to be. At t_9, Vital loses its capacity to support life, and seizes to exist. Finally, Hopeful drops out of existence at t_{10}, where it has decomposed fully. See Figure 5 for an overview.

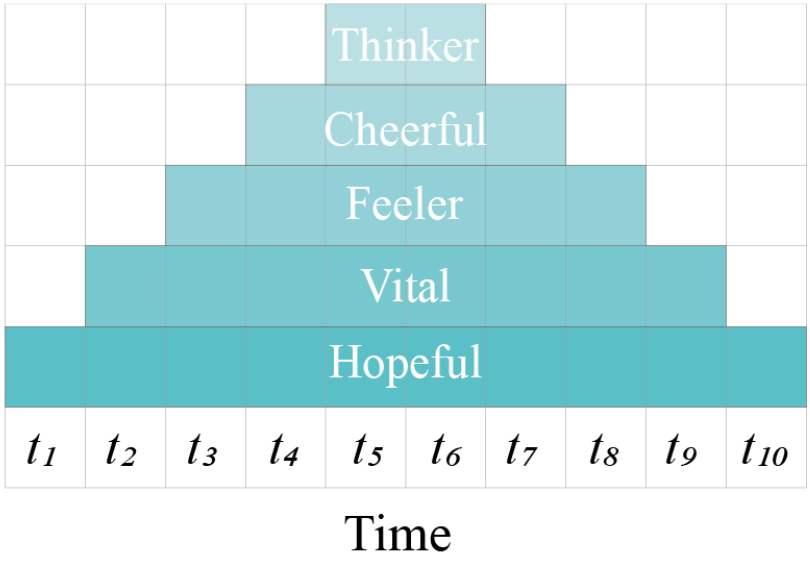


Figure 5. The individuals and their lifespan described by Hudson (2001).

The description has been neutral with regard to whether these are separate individuals, or parts of the same one. How many living organisms—or stronger: how many persons—do we have at t_5? If we want to explain the self, we need to be able to answer this question. Furthermore, while phrased in perdurantist terms, it is a question that both endurantists and perdurantists have to answer. We can ask the perdurantist: Are these phases of a single space-time worm's career?

We can ask the endurantist: Are these descriptions of phases of a single object that persists through time and undergoes change at these *t*'s? It comes down to unity and continuity.

If this is a (very simplified) description of a single human being's lifetime, we want the answer to be that there is just one human being, or person, or self in the story. How to secure this result? On perdurantism, one could say that each individual is a proper (spatio-)temporal part of the individual below it in the figure. Hudson goes on to define a Maximal Individual—a living human organism in (t)his case—as follows (p. 117):

(MI) *x* is a Maximal $F =_{df}$

(i) *x* is an *F*; and

(ii) *x* is not a proper temporal part of any *F*.

So some object that is classified as an individual and that is not a proper, temporal part of any other individual, is the Maximal Individual. Note that Crisp & Smith's definition of wholly present takes (ii), applied to the spatial domain, to be essential as well.

Hudson states that Hopeful has parts where it is uncontroversially not a living human organism—at decomposition—meaning it is not a living human organism for all of its career, but merely a temporary human being.[11] Therefore, it cannot be the Maximal Individual; Hopeful cannot be the referent of "living human being". Further, since Feeler, Thinker, and Cheerful are all *parts of an object* that does seem to be a living human organism for its whole career, they cannot be the Maximal Individual. They are, rather, living-human-organism-*parts*.[12] Vital, then, is the only individual that is a living human organism for all of its career—i.e. it is not a temporary living human organism—and that is not a part of any larger object that

[11] *x* is a temporary $F =_{df}$ *x* has some maximal *F* as a proper temporal part (Hudson, 2001, p. 117).
[12] *x* is an *F*-part $=_{df}$ *x* is a proper temporal part of some maximal *F* (Hudson, 2001, p. 117)

is a living human organism for all of its career—i.e. it is not a living-human-organism-part. We then have the answer that there is just one living human organism in the story, and that is Vital.

2.2 Existence and persons

So far, I have worked out Hudson's Maximality Principle for living human organisms, and I have stated that the endurantism versus perdurantism debate in psychology is generally focused on personal identity, which many do not take to be a physical relation—as shall become clear soon. What would be the result of applying the Maximality Principle—spatial or temporal—to persons, psychologically construed? It seems likely that persons cannot be parts of persons, just as living human organisms cannot be parts of living human organisms. What marks the existence of a person, psychologically speaking? The following two views are common. One could posit that an object is a person if and only if it is the maximal object possessing a set of required cognitive capacities and/or mental states. In that case, Thinker—the whole space-time worm—would be the only person on perdurantism, and every moment of Thinker's life would mark the existence of a wholly present person on endurantism. Alternatively, one could hold that an object is a person if and only if it is the maximal object actually *or potentially* possessing a set of required cognitive capacities and/or mental states. Then, on both endurantism and perdurantism, Hopeful could be the Maximal Individual; the person. However, in combination with Unrestricted Composition, this view yields trouble, since then we end up with a limitless number of objects composed of different parts, which may count as a person so long as some of its parts have the required cognitive capacities and/or mental states. Perdurantism, then, is likely to opt for the former. Endurantism might opt likewise, if they want to avoid granting personhood to lump of cells that does not manage to live for more than a day, even though it could have become a person if it had survived. Although few authors motivate it, most seem to indeed opt for the former alternative. I shall follow in that choice.

The possession of cognitive capacities and/or mental states, then, may serve as a necessary condition for being a person. But they are not sufficient. The proponent is therefore in need of a physical or psychological restriction on the relation between those combinations of parts that form persons. The common route is the psychological continuity approach (PCA), which will be the focus of the current chapter.

2.3 Persistence relations

The previous chapter examined how objects persist over time, and the previous section examined how persons exist at one time. Now, how do persons persist over time? This comes down to the question of personal identity. For endurantism, this is: what does it take for a person, wholly existing at one time, to be identical with a person, wholly existing at another time? There should be some relation holding between the two persons that assures identity. For the perdurantist, the question is: what does it take for parts, existing at one time, and parts existing at a different time, to be parts of the same person? There should be some relation holding between the parts that assures unity.

This relation need not be psychological, but much of the literature does take this path.[13] This is referred to as the R-relation: "an appropriate relation of psychological continuity and connectedness" (Hudson, 2001, p. 131), or psychological connectedness with the right kind of cause, such as quasi-memory, the intention-action relation, or beliefs (Brueckner, 2009; Noonan, 2004). It is important to realize that taking the R-relation to be purely psychological has a number of consequences (Hudson, 2001): ignoring all biological facts; indifference with regards to facts about physical continuity; confining oneself to facts about similarity of mental content, perhaps with addition of facts about mental capacities, dispositions and character; and finally, openness to the possibility of a person that is an entirely non-physical object—as long

[13] My hunch is that this is due to the nature of the concept we are trying to get at. We are not talking about just any object, but persons; you and I. We (re-)identify ourselves from a first-person perspective, typically. Hence, psychological continuity will seem to be the most relevant aspect.

as it meets the requirements of psychological complexity. This latter consequence indicates a functional understanding of personhood. Before discussing possible ways to fill in the R-relation, a s brief discussion on the connection is warranted.

Many follow Parfit (1984) in stating that psychological continuity must entail the holding of overlapping chains of strong connections, where a connection is strong if there is some sufficient number of psychological connections between person-stages or person-parts.[14] The two parts need not have a sufficient number of psychological connections between them directly, as long as there is a sequence of intermittent stages or parts, that do carry strong connections, connecting the stages or parts. A useful analogy is that of fibers in a rope (Lowe, 2009). None of the individual fibers that make up a rope necessarily extend all the way from one end to the other, but since there are many overlapping fibers, and since they overlap differing lengths of the stretch, they manage to form a strong, unified, and continuous object. Let us apply this general idea of psychological continuity to persistence over time to the perdurantist and endurantist frameworks.[15]

For the perdurantist, persistence over time would be a relation of psychological continuity between temporal parts of a person. As mentioned in the previous chapter, persistence for the perdurantist is not a relation of numerical identity between parts. It is commonly referred to as the I-relation, and might be defined as the relation between person-parts due to the existence of a persisting person. Person-parts are I-related if and only if a certain relation of psychological continuity, the R-relation, holds between them.

[14] Parfit suggests 'sufficiently strong' to be at least half of the number of direct connections (p. 205)
[15] Merricks (1999) argues this cannot be done in for endurantism. For replies, see Brueckner (2009), and Rea & Silver (2000).

For the endurantist, by contrast, the persistence question does concern numerical identity, which is to say there is one object rather than more.[16] How could the R-relation be cashed out? Some suggestions have been mentioned, let us have a closer look.

2.4 R-relation candidates

Due to its involvement in the sense of continuity over time, one appealing and indeed the most common candidate is memory (of experiences and events):

> If and only if some person at one time can remember experiences had by some person at another time, these persons are identical.

In this form, it is clearly not satisfying for at least two reasons (Olson, 2009). Firstly, whereas identity is transitive, memory is not. If *x* is identical to *y*, and *y* is identical to *z*, then necessarily, *x* is identical to *z*. But memories do not work that way: ten-year-old me may remember an experience from when I was seven, and twenty-year-old me may remember an experience from when I was ten, but it does not follow that, necessarily, twenty-year-old me remembers an episode from when I was seven. This is the point of Parfit's suggestion of requiring an overlapping chain or connection, rather than direct connections: there is a sequence of overlapping memory connections that runs from seven-year-old me to twenty-year-old me. This way, *x* and *z* can be considered numerically identical without having the direct connection of memory.

The second reason is more threatening: some person's correctly remembering an experience of some person at another time can only be judged if you already know whether these persons are identical. That means we would have to know the answer before we impose

[16] Rather than numerical identity holding between persons wholly present, Brueckner suggests the endurantist make use of the Gricean notion of total temporary states—which are not to be confused with temporal parts. One's total temporary state at time *t* is the set of mental states that one possesses at *t* . Having (a sequence of) a sufficient number of strong connections between distinct total temporary states would then satisfy the psychological continuity requirement for the endurantist. In this way, he hopes to avoid the trouble that the identity relation gets into. Brueckner, 2009, *p.* 29.

the test of who is who. In other words, there is a vicious circle. This objection is frequently met with the suggestion that it is not memory that is required, but 'quasi-memory': memory but without the identity requirement. Whereas regular memory provides us with knowledge of our own past experiences, actions, and thoughts, quasi-memory would provide knowledge of past experiences, actions, and thoughts *not* limited to our own (Noonan, 2004), for instance, the whole of past experiences of all the people in existence since one's birth. Still, one would have special access to regular, personal memory. As Noonan argues, however, this does not avoid circularity either.[17]

Other candidates for the R-relation are continuity in personality traits; intention-action relations; continuity in intentions, beliefs, or desires; and narrative unity (Parfit, 1984; Francescotti, 2010). Intention-action faces the same circularity problem that memory faces (Parfit, 1971). Continuity in intentions, beliefs, and desires faces a problem similar to the first problem raised for memory. It seems that all propositional attitudes face this problem, and there are propositional attitudes that would seem to defy continuity altogether. For instance, one may have a truly enlightening (or disheartening) experience, leading to a sudden change of most of one's beliefs. There would be a discontinuity rather than a "sufficiently strong" connection, and therefore, on this criterion, the person after this certain event would not be counted as identical with the person before. A chain of overlapping connections would not salvage this. Possibly, one would want to conceive of the enlightened person as different from the unenlightened person, but only at a metaphorical level or in what Olson calls "the practical sense" (1999, p. 68). It is unlikely that one would want to hold that the enlightened person is numerically distinct from the unenlightened person, that the unenlightened person has genuinely seized to exist and

[17] Detailed exposition is beyond the scope of this chapter. The interested reader is directed to Noonan (2004), chapter 8.

the enlightened person has suddenly come into existence. The R-relation, then, appears notoriously difficult to fill in, troubling PCA. There are more technical problems as well.

2.5 Problem: Necessity of Identity

Another problem for PCA is based on the Principle of Necessity of Identity, which holds that "genuine identity is never contingent" (Francescotti, 2010, p. 338). PCA purports to say what *must* be the case for one individual to be identical to another; not what *can* be the case for a person to remain the same person over time. It must hold, then that "there is no possible world where *x* is the same person as *y* without bearing R to *y* [and] that if person *x* bears R to *y* in one possible world, then *x* bears R to *y* in every other possible world at which *x* and *y* exist" (Francescotti, 2010, p. 339). Whatever psychological relation—or conjunction or disjunction of relations—we fill in for R, however, it will turn out that it cannot satisfy this requirement. Whereas things could not have been different when it comes to personal identity, things *could* have been different when it comes to life events. All psychological criteria interact with life events, hence, they cannot constitute necessity. Say we take (quasi-)memory as a criterion. It seems that at least some of the events in my life occur contingently: I could have studied archeology instead of philosophy, which would have led to memories of different experiences than I have now. The memory chain connecting pre-university me to current me, then, is based on contingency, and not necessity. For I would not have been a numerically different person in the counterfactual university degree situation. By contrast, it is necessarily the case that the person I am now is connected via identity to the person that existed pre-university. Since memory connects only contingently, it will not suffice. Similar results follow the other mentioned criteria. For instance, I could have had different intentions (based on differences in life events) than those I did have. My current intention need not necessarily be continuous with

the counterfactual intentions. Therefore, the relation holds contingently, not necessarily, and it does not suffice.[18]

There are two ways to evade this critique. The first is to say that a difference in experience does not result in a difference in memory, personality, narrative unity etc. The second is to say that everything is fully determined, i.e. there are only necessities. Until the PCA proponent finds reasons to support these rather unappealing alternatives, this critique seems to weigh heavily against PCA.

2.6 Problem: Reduplication

Proponents of PCA also need to respond to a more general objection, raised by William's reduplication argument (1973). The essence of the argument is that identity between *x* and *y* should not be dependent on any other *z*—call this the Only *x* and *y* Principle (Noonan, 2004, p. 137)—but it does when one posits psychological continuity to be required for personal identity. To illustrate this, we start from Shoemaker's (1963) Brown/Brownson case. Imagine a person called Brown, whose brain or cerebrum[19] is transplanted into the body of a person named Robinson, whose brain in turn is removed and destroyed. Call the resulting individual, unifying Robinson's body with Brown's brain, "Brownson". The other individual on the scene is Brown's brainless body, call it "Brainless". The PCA proponent would have it that whatever is psychologically continuous with *x* is numerically identical with *x.* Assuming that the transplant

[18] While currently presented as a problem for endurantism, as they rely on identity over time, Francescotti argues it holds for perdurantism as well. A detailed discussion is beyond the scope of the section, but briefly, the perdurantist needs temporal parts to be R-related by necessity, and as for the endurantist, none of the suggested candidates can fulfill this demand (p. 343-345).

[19] Olson (1999) would argue the relevant case would be one of cerebrum transplant only, rather than a whole brain transplant. According to his theory, transplanting the brainstem in addition to the cerebrum (i.e. whole brain, more or less) would yield two individuals: a living body with a donated brain, which can think and feel etc., and a lifeless brainless lump of matter, which cannot feel and think etc. Transplanting only the cerebrum will lead to the former individual, plus an individual that *is* alive, but cannot feel and think etc. This is the more interesting case, where biology and psychology come apart. For PCA proponents, they come down to the same thing, but for proponents of the biological approach—which will be discussed later on—they do not. However, the argument here and my argument later will not be centered on the biological criterion, but rather on a psychological and an embodied criterion respectively, which will lead me to reject both the result of Olson's and Shoemaker's version. Hence, the difference between whole-brain and cerebrum-only transplants is negligible for my purposes. The versions will therefore be used interchangeably.

led to psychological continuity, the proponent of the psychological criterion would have to conclude that the person in the donor body and the previous person who donated a brain are identical—i.e. Brown continues as Brownson, not as Brainless.

Take the thought experiment further to create a case of fission. Given evidence that one can live—be psychologically continuous—with one hemisphere removed, we could alter the case to have only one hemisphere transplanted, say the left, and the right eradicated. The conclusion would be the same: the brain donor continues in the donor body. But what would happen if the right hemisphere was not eradicated, but transplanted into a different donor body? Call the continuant with the left hemisphere Lefty, and the continuant with the right hemisphere Righty. Given that the former scenario—only Lefty transplanted—resulted in complete psychological continuity, there is no reason to assume that it would fail for the latter scenario—additionally transplanting Righty.[20] Now, *x* (Brown) is psychologically continuous with *y* (Lefty), and *x* is psychologically continuous with *z* (Righty). But it would seem to be an unwanted conclusion that *z* and *y* are identical, if not for being in different bodies, then for being in ever more different psychological states following the transplantation.[21] The PCA proponent has to explain which of the two would be the continuant person, and also how this decision is to be made non-arbitrarily. The point of the reduplication argument is that it cannot be the case that whether or not *x* is continuous with *y* depends on whether the transplantation into *z* occurs (and whether or not transplantation succeeds). That should be a contingency external to the relation between *x* and *y*.

2.7 Solution: Non-branching constraint

One possible defense is to give up the Only *x* and *y* Principle: deny that the identity relation relies only on facts about the two (potentially) identical objects, and argue that rather, it also

[20] If one is wary of hemisphere separation due to differences in left versus right side, one can easily modify the scenario by envisaging the whole brain copied into a donor body or two donor bodies, respectively.
[21] Also, it is an explicit premise of the thought experiment that *y* and *z* are distinct individuals.

relies on whether or not there are other candidates. This entails building in a non-branching constraint. The best option here is to follow Nozick's (1981) "closest continuer" proposal:[22]

(CC) *x* and *y* are identical $=_{df}$

(i) *y* is psychologically continuous with *x*; and

(ii) there is no other continuant of *x*, existing at the time that *y* does, that is psychologically continuous with *x* to an equal or greater degree as compared to *y*.

However, this provides a dubious answer in the case of the double transplant. Both resulting persons have equal degree of psychological continuity and thus equal claim to being the continuant. Therefore, since there is another continuant of *x* existing at the time that *y* does, namely *z*, and *z* is equally psychologically continuous with *x* as compared to *y*, it follows that *x* and *y* are not identical (and similar for *z*). The conclusion is that there is no continuant.[23]

We might want to think twice about rejecting the Only *x* and *y* Principle. Rejection would entail that both the existence and persistence conditions of persons would depend on the existence of others.[24] Even more absurd, it would mean that a certain history of events would result in the creation of a certain individual in one situation but not in the other, while the history of that individual would be exactly the same between the two situations (Noonan, 2004). In other words, successful transplantation of Righty marks the coming into existence of two individuals: Lefty and Righty, whereas unsuccessful transplantation of Righty yields no new

[22] Parfit suggests the slightly less comprehensive version: 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" (1984, p. 262).
[23] It seems, then, that an argument similar to the reduplication argument can be made here. The original argument objected against *y*'s status of continuant being dependent on the existence of some other candidate, but here, whether or not there is a continuant for *x* at all depends on the existence of competing candidates. The *persistence* conditions of *x* then, in addition to the identity relation, depend on the existence of multiple other objects.
[24] Noonan (2004, p. 133) points out the ensuing absurdity of walking up to Lefty and saying "You are a lucky man; if it wasn't for Righty, you would not have existed at all!", for if the transplantation had not succeeded for Righty, Lefty would have been Brown, and not a new individual.

individuals, but only the continuity of a pre-existing one, Brown. Additionally, whether or not Righty's transplantation was successful, all events that constitute the history of Lefty remain the same. However, in case Righty's transplantation was successful, pre-transplantation events no longer belong to the history of Lefty, for it is now a distinct individual from Brown (Noonan, 2004). These dependencies seem undesirable, so it seems reasonable to want to maintain the Only *x* and *y* Principle. Nevertheless, let us have a look at how the rejection of this principle and introduction of a non-branching constraint would fare.

2.8 Problem: Non-branching constraint

Francescotti (2008) argues first that both the endurantist and perdurantist psychological approach need a non-branching requirement to avoid the conclusion that there is no continuant, and second that neither can coherently include it. Recall that the endurantist relies on numerical identity to ensure persistence over time. If we look at the closest continuant proposal closely, we must conclude that it cannot be defined without circularity: ensuring there is no other continuant of *x*, say *z*, existing at the time that *y* does, *presumes* that *z* is not identical with y. But then, identity is included in the definition of the identity relation.

Recall that he perdurantist does not rely on identity over time, but on the I-relation that holds between parts of one individual. If the perdurantist wants to avoid the conclusion that persons can overlap (a possibility which will be addressed in the subsequent paragraph), s/he should make sure that *x* is not I-related to both *y* and *z*. The constraint could take the following form (Francescotti, 2008, p. 23):

(I_N) person-stages *x* and *y* are I-related $=_{df}$

(i) *x* is R-related to *y*; and

(ii) there is no person-stage *z* such that either:

a. *x* is R-related to *z*, *y* is simultaneous with *z*, and *y* is not identical with *z*; or

b. *y* is R-related to *z*, *x* is simultaneous with *z*, and *x* is not identical with *z*.

Here, (a) disables fission, and (b) disables fusion. The constraint can be complied without circularity: The I-relation is not identity, so the requirement *y* and *z* are not identical can simply be added. Circularity is not a threat.

However, Francescotti argues that including the non-branching constraint would yield unwanted outcomes in a modified version of the fission thought experiment. Suppose the hemispheres remain in the same skull, and that *x* is the state of the whole brain at t_1, *y* is the state of the left hemisphere at t_2, and *z* is the state of the right hemisphere at t_2. A reasonable additional supposition is that the activities of *y* and *z* are R-related at t_2, and that both are R-related to *x* at t_1—in a normal brain, the activities of the hemispheres most likely exhibit a high degree of psychological continuity between each other and over time. Suppose further that each hemisphere is psychologically rich enough to sustain a complete person on its own. Now, the psychological relations between *x*, *y*, and *z* are the same as in the fission case, except now they share a body; we would refer to this as a normal condition for a brain and a person. The desired conclusion in this case, contrary to the fission case, is that there is just one person. However, with the non-branching constraint, the perdurantist would have to conclude otherwise: since *z* and *y* are not identical, (a) is breached, and hence, *x* and *y* are not I-related. It seems, then, that the non-branching constraint leaves both the endurantist and perdurantist PCA proponent in trouble.

2.9 Solution: Overlap

As alluded to, the perdurantist has a way to avoid the non-branching constraint: allowing overlap of persons. This entails agreement with the premises of the argument that *y* and *z* are distinct persons after the fission, but disagreement with the supposition that they were one and the same person before. Rather, *x* would have consisted of two completely overlapping

persons—sharing all their (spatiotemporal) parts pre-fission—that come apart post-fission. Just as people can overlap in time—you and I can exist simultaneously—and just as people can overlap in space—you and I can be at this particular location non-simultaneously—people can overlap in space-time by sharing spatiotemporal parts. Two space-time worms share the spatiotemporal parts at t_1 (as x), but they no longer do at t_2 (as y and z).[25] The persons, then, are not identical—they are different space-time worms—but some of their parts are. The situation is the same as discussed in 1.5.2, and Figure 4. can serve as a representation of overlapping persons as well.

The proposed solution solves not only fission, but also fusion. We could solve a case of fusion for humans analogously to how it was solved for Tibbles/Tibb. Suppose there is some object composed of all the parts of a person, Robert, and some other object composed of all of Robert's parts except his left leg, Rob. While Robert and Rob are distinct for some of their existence—i.e. it would make sense to say of Robert, but not of Rob, that he is a good runner—an accident may lead Robert to lose his left leg, making him identical with Rob. The perdurantist would then say that, while not sharing all their parts pre-accident, Rob and Robert share all their parts (and thus properties) post-accident.

Despite the neatness of the solution, many reject it due to its counterintuitiveness. For instance, if x committed a crime pre-fission, are both y and z post-fission to be punished for it? Furthermore, how can psychological states be completely shared between two persons, pre-fission? And if they are not, how can one set of spatiotemporal parts host two completely psychologically separate persons, and how can these persons come to rely on distinct parts post-fission?[26] Finally, the number of persons hosted by a particular set of temporal parts would depend on the number of fissions in the set's future (and the number of fusions in the set's past).

[25] For excellent discussions of overlap, please refer to Hudson, 2001, chapter 4 (especially §5) and Sider, 2001, chapter 4 and 5.
[26] This could perhaps be resolved by letting go of materialism, although it is not quite straightforward how.

If I say “I am hungry”, to which of the persons am I referring? Are they (we?) all hungry? The proponent would have his work cut out explaining issues like these.

So far, we have discussed what it takes for objects and persons to exist and persist on both endurantism and perdurantism. We have taken the popular psychological route, and have seen that it meets some major difficulties. In the next chapter, the bodily continuity approach (BCA) and its troubles will be examined, and it will be used to construct a novel conception of the self: a perduring, embodied process.

3. Endurantism versus perdurantism and the embodied self

To build up to my proposal, I will first discuss bodily criteria and defend a version of it. I will then integrate by-then the ingredients with perdurantism. Then, I will re-open the discussion on particulars, introducing a processual account as more viable alternative to conceptualize the self, compared to substance and substratum theory. A discussion of embodiment will follow, leading to a full construction of my proposal. I will then try my proposal against various problems that have been raised against the alternative theories. Finally, I will discuss some prominent implications of my proposal.

3.1 Revisiting the bodily criterion

Thus far, we have considered the question of persistence over time as what it takes for a person existing at one time to be identical with a person existing at another time. Olson (1999) argues, however, that to pose it in this way is to exclude from the outset an important candidate answer. It presupposes that each person must persist *as a person*, and always was a person. This precludes us persisting in the case we become human vegetables, dependent on life support, and it precludes us ever having been fetuses. Furthermore, posing it in this way is uninformative when we want to know what happens to us when we lose our cognitive capacities—that is, if the R-relation is understood as the continuity of psychological states, among which are our cognitive capacities. Rather, Olson argues, the question of persistence over time must be

understood as "What are the conditions under which something that is a person at one time is identical with anything at all that exists at another time?" (1999, p. 25). Olson rejects PCA in favor of a biological approach. Together with the physical approach, the biological approach belongs in the family of BCA (Noonan, 2004), which all hold some view necessitating bodily, rather than psychological, continuity for identity. The form of the connection is comparable to PCA in inviting the rope metaphor: the matter that constitutes *y* at t_2 is to be connected to the matter that constitutes *x* at t_1 by "a series of more or less gradual replacements in such a way that it is correct to say that the body of *x* at t_1 is identical with the body of *y* at t_2" (Noonan, 2004, p. 3).

One of the arguments Olson brings forth to support the biological approach is that "person" is not a substance concept; it is not the most fundamental answer to the question "What am I?" The applicable substance concept determines the persistence conditions for all objects of a certain kind. Taking PCA—i.e. holding "person" to be a substance concept—it follows, firstly, that all persons necessarily share the same persistence conditions, and secondly, since no object can change its persistence conditions during its career—that would indicate that we did not identify the substance concept correctly—a person must be a person for all its existence. Recall that personhood requires a functional understanding under the psychological criterion, so that there could in principle be non-human persons (e.g. gods, angels, Martians). Against the first consequence, it could be argued that non-human persons do not necessarily have the same persistence conditions as human persons. Against the second consequence, it could be argued that the fetus and the vegetable (in case I only barely survive some terrible accident) that are physically continuous with me should both be considered identical with the being that lives in between these stages. The alternative would be that there are three entities, one of which is a person.

Being a person, rather, is a phase concept: a kind that an object can belong to for part of its existence. "To say that something is a person is to tell us something about what it can do,

but not to say what it is" (Olson, 1999, p. 32); it is a functional matter, not a substance concept. I am a person for a part of my life, just as I am a student for a part of my life. There are parts of my life where I am not a person, e.g. as a fetus, but that does not mean that at the transition from fetus to person, a new entity comes into existence and another seizes to be—which would be required if it was a substance concept, since the substance concept determines the entity's persistence conditions, and the fetus and person would have different persistence conditions.

Personhood understood as a functional kind, it should be possible that it is realized in a non-biological way, as indeed Olson recognizes.[27] However, he argues, since we are human animals—i.e. "human animal" is the appropriate substance concept for our kind—our persistence conditions are biological. If other kinds of beings were persons, these would have persistence conditions dependent on the substance concept appropriate to them, and thus the kind they belong to.

3.2 Countering the counter: The Transplant Intuition

The main counterargument to BCA relies on the "Transplant Intuition" (Olson, 1999, Noonan, 2004). Recall Shoemaker's Brown/Brownson case. The Transplant Intuition is "the hunch or feeling, the pull towards saying, that one survives in the transplant story as the offshoot who gets one's cerebrum" (Olson, 1999, p. 43), i.e. Brownson, rather than Brainless, is the continuant of Brown, since this individual is psychologically continuous with Brown.

Olson counters by showing the trouble this intuition gets into in cases of fission. The Transplant Intuition would have it that if the right hemisphere was transplanted into some body, the resulting individual would be the continuant. But at the same time, if the left hemisphere was transplanted into a different body, that resulting individual would be equally entitled to being the continuant. There are, then, two ways forth if we want to retain the Transplant

[27] This is a similarity between the bodily and psychological approach: both consider "person" to be a functional term.

Intuition. (i) We give up the Only *x* and *y* Principle, which I have argued against in section 2.8. (ii) We accept that both Lefty and Right existed before the fission, and have always been numerically distinct, i.e. there were always two individuals, persisting together for some of their existence, and persisting apart post-fission.[28] In this case, when Lefty thinks "I will get my hair cut tomorrow", "I" refers to Lefty, whereas when Righty thinks the same thought—which they necessarily do simultaneously, being unified pre-fission—"I" refers to Righty. The unappealing consequence of this stance is that (only) if there is fission in your future, you are not one person. It would mean that some persons are divided, whereas others are not. Not all (human) persons would be alike: some share a body for some time, while others do not.[29] I suggest that neither alternative is appealing enough to hold on to the Transplant Intuition, and hence, we should reject it in case we can find a more sensible alternative.

A final important consideration on the Transplant Intuition brought forth by Olson is that it appears to rely on a rather practical usage of personhood, emphasizing continuity in morals, responsibility, and social ties. But what concerns us, rather, is the metaphysical level; we care about the existence and persistence of objects. What the thought experiments show us, is that the metaphysical and practical level may come apart under abnormal circumstances. Nevertheless, we should not let our practical usage mislead us at the metaphysical level.

If the above is correct, we have reason to reject the Transplant Intuition, which is the strongest argument in favor of PCA and against BCA. Arguing against the Transplant Intuition and PCA is of course not sufficient to accept BCA. Arguments in favor of BCA will be interwoven in the next section.

[28] A perdurantist solution of overlapping persons.
[29] Given that person is a functional concept, and given a disregard of physical circumstances typical for full-blown psychological approaches, this is in principle not a problem. What makes it feel like an unwanted outcome is the intuition that, since we are all human persons, we should all have the same amount of persons 'in' us.

3.3 Body meets perdurantism

It is now time to merge two lines: BCA and perdurantism. To do so, we will consider Olson's biological approach and Hudson's four-dimensionalist approach. To recap, Olson holds that the person has the persistence conditions related to the human animal, and that these rely on the brainstem: the source of all vital functions (or so he says). Olson argues for an endurantist account: it is one and the same human animal that cruises through time. If Olson would be looking at Figure 5. The individuals and their lifespan described by Hudson (2001)., he would say there is one (enduring) human animal, Vital, cruising through t_2-t_9, and the person is a phase of it. His main reason to reject perdurantism seems to be that it could not tell us which parts compose a person due to Unrestricted Composition. Here, Olson and I diverge: I believe that suitable criteria can be constructed that inform us which parts make up an individual that is a person (and self) for part of its existence.

Hudson (2001) favors perdurantism over endurantism[30] and convincingly argues that it is the best solution to the puzzles provided by fission, embedded parts, and the statue and the clay—some of which has been set out above. I side with Hudson on the perdurantism versus endurantism debate. Where Hudson and I diverge, is that I will argue for BCA, whereas he prefers PCA. He posits that all and only parts that *directly contribute* to thought are relevant to which object is a person, call it the criterion of Contribution to Thought. He further posits that these parts are limited to the central nervous system, and therefore that the body—aside from the central nervous system—is not relevant. The ground for his presupposition that only parts that directly contribute to thoughts can be eligible for personhood, is that, given Unrestricted Composition, any object composed of at least some parts with thought—e.g. the object

[30] Actually, he uses the words four-dimensionalism and three-dimensionalism. However, as mentioned, I will follow much of the literature by treating these as roughly interchangeable. Note further that Hudson proposes a Partist solution, which is not quite the same as a four-dimensionalist solution. However, the two are equipollent: any four-dimensionalist statement can be re-phrased into a Partist counterpart and vice versa. While he is a proponent of the Partist view, throughout his book, for simplicity, he conforms to the four-dimensionalist wording. I will not complicate matters by discussing the differences here.

composed of five pens in 2008 and my parts in 2009—would count as a person. That would overpopulate the world rather drastically. Hudson, looking at Figure 5. The individuals and their lifespan described by Hudson (2001)., by Contribution to Thought, counts only Thinker as a person. At t_1-t_3 and t_8-t_{10}, there is no person.

Given an embodied account, however, and contrary to Olson's and Hudson's stance, it does not make sense to say the brainstem or central nervous system (CNS)[31] respectively is all that is necessary. Rather, the whole body is required.

The CNS relies on the body not only for vital functions, but also for information. Hershenov (2001) suggests that Hudson is led astray (and the same may hold for Olson): it is true that an individual can continue to think [live] if parts of it—say, two fingers—are removed, but it is false to conclude on these grounds that only some parts—the CNS—produce thought [life]. Rather, Hershenov takes Van Inwagen's concept of a Life—"the event consisting of the biological activities which distinguishes a living human animal from a dead one" (Hershenov, 2001, p. 214)—and purports that it is Life that contributes to thought, and Life is to be found everywhere in the body.

We need not necessarily bring in the Life requirement to make this point. Hershenov discusses various other reasons to focus on the body. Damasio has argued that a healthy mind requires the brain to constantly monitor the body. Furthermore, Noë makes the strong point that the possibility of altering consciousness via manipulations of the brain does not indicate that consciousness is produced in the brain. Further, where one might argue that dreams indicate that consciousness is not a dynamic bodily production, one should realize that waking perception has a stability that dreams do not. Also, prior embodied experiences of the world feed into dreams. Finally, Olson argues against Hudson's search for what is *directly involved* in the production of thought by asking us to consider the following: Why would a blood vessel

[31] For simplicity, I will henceforth talk about the CNS, but the points will hold equally for the brainstem.

in the brain, but not in the body, contribute directly to thought? If the reason is the supposition that it feeds a neuron whose firing produces a thought, then consider the following: There are neurons in the brain (fed by vessels in the brain) that do not produce thought by firing, but have a function such as cleaning; do these neurons directly contribute to thought? It would seem that only an unprincipled division could come about from this search for direct contribution.

So far, we can conclude that perdurantism handles most of the metaphysical problems better than endurantism does, that psychological criteria bring possibly insurmountable problems, and finally that the body cannot be omitted from view and apparent reasons for doing so are unfounded. I would now like to re-open the discussion on particulars, and introduce a conception better suited for the current purposes.

3.4 Revisiting particulars

Recall that Olson suggested that "person" is a phase concept, and that in order to know what it takes for a person to persist, we ought to look at the substance of which the person is a phase. Recall also that substance theory posits that there is an answer to the question "But what is it that moves, talks, sits in that chair?", that there is some fundamental being that is at the core of each particular. Olson favors endurantism, and given their conception of objects as wholly present, it seems natural to view objects as having a core that cruises through time. Can the perdurantist use the phase concept move as well? While perdurantism and substance theory are not in principle incompatible (recall note (iii) in section 1.1), it is very hard to imagine how the two would come together. Perhaps the object wholly conceived, i.e. the whole space-time worm that is me, is the referent of the substance concept. But when considering the segments, the parts, that make up the object, it is so inherently variable that it seems inappropriate to enquire into the essence, the substance, the substratum at heart. Additionally, given Unrestricted Composition, can one really maintain that every object has an essence, a single core? In my proposed account, I intend to restrict composition somewhat for persons (and selves), but I do

not want human beings to get special ontological treatment. I would not want to argue for a core *only* for human beings.

An appealing alternative is provided by Meincke (2018). She suggests to apply a biological systems approach in combination with a process-ontological stance to personhood. The latter stands in opposition to a thing-ontology, exemplified by both substance and bundle theory which focus on (static) objects as building blocks of the universe and then asks how they persist and change. Process ontology, in contrast, while not denying that there are stabilities in the world, explains existence in terms of processes—in terms of change—that constitute stabilities. Many of the world's processes are chaotic, but some show enough organization to distinguish themselves from the rest. These processes are in constant exchange with their environment, and by controlling those interactions, the dynamic systems persist. A process can be defined following Rescher (1996) as "a coordinated group of changes in the complexion of reality, an organized family of occurrences that are systematically linked to one another either causally or functionally" (p. 38). For living systems, persistence is a matter of metabolizing: they are "constantly rebuilding and maintaining themselves through an exchange of matter with their environment" (Meincke, 2018, p. 369). The form of the process, rather than the matter involved in it, is of importance to persistence.[32] In fact, precisely because different matter is involved in the organism at any time, it is able to persist—hence the importance of metabolism. A person, on this account, is "a higher-order process relying on a manifold of lower-order processes" (Meincke, 2018, p. 369).[33]

[32] "Form" is not used in the sense of Aristotelian form. In that tradition, form is rather static, and causes activity; whereas on the current view, it is also the result of activity, being in constant flux.

[33] For those drawn to the processual approach but not to the bodily criterion, please refer to Inductivo, I. B. L. (2013). A Process Approach to Identity: Inheritance as the Key to the Transtemporal Knot. *International Journal of Sciences: Basic and Applied Research*, *9*, 1. He proposes a processual approach based on something like psychological continuity, where the self is an inheritance-like process of "synthesis of the old self and […] novel self" (p. 69), relying on (memory of) experiences.

In light of the changeable nature of processes, and given the aforementioned tension between change and identity for persistence over time, we might wonder whether identity still is meaningful on this account:

> "There is really something that stays the same over time in some robust sense. This is the specific arrangement of processes—the processual 'form'—and it stays the same over time for exactly as long as it displays some kind of successful activity to maintain itself, something that can be described by biology as part of a scientific investigation into the mechanisms of organic stabilization and destabilization." (Meincke, 2018, p. 373)

An advantage of this view is that it harmonizes identity over time with change. Another is that vagueness is explained naturally. We are generally not bothered about natural processes having vague boundaries (e.g. where are the borders of a hurricane?). Where a "person" starts and ends in the existence of a certain process can likewise be fuzzy, and this does not undermine identity in between these fuzzy borders.

One might already have the sense that this dynamic processual account does not match too well with an endurantist account, but does play well into a perdurantist account. In section 3.6 I will discuss how exactly I would like to apply this for my proposal. Before this, I will further integrate the foregoing discussions with each other and with embodiment.

3.5 The embodied self

My motivation for favoring BCA is that I think an embodied account of the self is the most convincing account of the self, and that I think BCA is best suited to an embodied account of the self. Embodiment does not per se force BCA. It could also take a psychological criterion or a hybrid. Let's consider two readings of embodiment: (i) the fact of *having* a body is fundamental—I will call this the weaker reading; (ii) having *my* body is fundamental to *my* self—I will call this the stronger reading. On the weaker reading, and taking a psychological

approach, transplantation would be possible. Taking BCA would render transplantation impossible: any transplantation would break the bodily continuity, thus breaking persistence. On the stronger reading, transplantation would be impossible on additional grounds: a transplantation would necessarily be to a body that is not mine, hence, my self would discontinue (or change). I will maintain the stronger reading, for I think the weaker reading is insufficient. Not *any* body will do; it is my body, with the skills I have acquired, my movements and mannerisms[34] that make my self. Only my body can provide the sense of unity and continuity required for a sense of self.

Could experience, rather than *embodied* experience, not do the same work? I think it cannot. Many hold the view that experience implies an experiencer, but I have come to doubt that inspired by Strawson (1959). He asks us to imagine a purely auditory world—no vision, smell, touch, proprioception—with one individual in it. Note that having only a single channel of experience, it cannot count as embodied. Still, there is experience. Imagine being this individual, the only information you have is a soundscape. Being in this world, you might occasionally move your body parts and accidentally create a sound, but given that there are no other sensations that make you aware of this—no vision, touch, proprioception—it is very doubtful that you would learn the sensorimotor contingencies and come to associate your movements to the auditory events they have caused. It is very unlikely, then, that you would develop a sense of agency over the produced sounds. Not having any other sensations, it is highly doubtful that you could even have intentions to act, since you would not know what any action would amount to, nor what it would mean to accomplish it successfully. It is highly likely, then, that you would not even develop the idea that there may be self and non-self. There is sound, period. In this case, I argue, experience does not imply an experiencer. The same

[34] Interesting work on the importance of a particular person's movements indicates that we can identify ourselves and our friends based on movement point-light displays (Loula, Prasad, Harber, & Shiffrar, 2005; Yovel, & O'Toole, 2016). These provide scarcely any information about one's physique, but are overwhelmingly rich in information regarding a particular person's movement. I take this as strong support for the strong reading.

argument can be made for the other sensory modalities in isolation. So experience as such is not enough for a sense of self. Embodied experience, however, does not face this objection.

The self is widely held to be experienced as continuous and unified (Gallagher, 2011). Inspired by the phenomenological insights of amongst others Husserl, Hegel, and Merleau-Ponty, there are many recent arguments for the claim that the body can provide the solution for the unity and continuity of experience. In Gallagher's (2006) words:

> "The perceiving body provides a coherence to consciousness across multiple perceptual events. If, for example, we are concerned to define a unity of consciousness across time in a way that will account for the identity of a single, relatively continuous consciousness, we can appeal to a certain coherency produced by the fact that it is one body doing the perceiving. It is not that in consciousness all the various contents of experience cohere with each other in some thematic fashion. Rather, a structural coherency across all perceptually based experiences (including certain types of memory, imagination, and intention) is founded on the continuity of the prenoetic body, which is their point of origin." (p. 141-142)

Embodiment persists over time and provides a perspective. With those two ingredients, we can explain the experiences continuity and unity of the self. Briefly put, embodied experience implies a subject doing the perceiving, a self, and via the body's capacity to produce continuity and unity to a (potentially fragmented) experience, a coherent—i.e. temporally extended and unified—self can be created. The body provides a perspective from where everything is experienced. The body (including brain) stores information, which enables a personal history and understanding of temporally extended experiences (e.g. a melody, a spoken sentence). Experience itself, then, need not be continuous to account for these experiences.

By storing information which we can come back to and use every day—information related to us as an individual with a history—and by providing the opportunity to stand in stable

relations to objects in the environment over time, the body—in interaction with the environment—provides the continuity needed to explain the self. For instance, the length of one's legs stand in a certain relation to steps of certain sizes (e.g. Konczak, Meeuwsen, & Cress, 1992), and they do so stably. One need not require a continuous psychological subject, nor require a continuous consciousness or experience. Since current experience is constructed out of the same pool of ingredients every time (plus novel experience from a certain perspective—the perspective that all the experiences/memories of an individual share), and since one is stably related to the environment via the body, there is continuity after all. This is where BCA outcompetes PCA. Experience and consciousness are not continuous, so psychological connections are much harder to cash out than bodily connections.

On a substance or substratum account, the self as a phase of an enduring entity would be wholly present at each time, and would change through time. Being a phase of a perduring entity, by contrast, the self, wholly considered, would be the whole space-time worm of its existence. On that view, all change is included within the self. That means that the perdurantist, contrary to the endurantist, does not have to explain change in the face of experienced continuity, which I think speaks to its advantage. Yet I would like to take it further, as mentioned in the previous section: the self, being embodied, is a phase of a bodily process. Given the considerations above, an embodied account of the self as a phase of a perduring processual entity subject to BCA seems superior to the alternatives. I shall now set out what this view entails.

3.6 The perduring, processual, embodied self

I have argued that BCA is superior, but I have not explicated how to flesh this out.[35] I draw on Hershenov's (2016) idea that the immanent causal connectedness within biological organisms

[35] Pun intended.

is a suitable criterion—harmonizing with the processual biological systems approach. This entails a rope-like sequence of overlapping biologically causally connected parts, "[t]heir diachronic (as well as synchronic) unity is due to their parts being caught up in the same life processes" (p. 212-3). The self, then, is a phase of the object (or rather, process) that is composed of overlapping chains of biologically connected parts. Throughout this phase, we have selves because of our capacity for embodied experience, but that capacity need not be actualized at every part.[36]

Enter perdurantism. Consider Figure 1. Parts composing perduring objects over time. Different objects in blue, green, and red, persisting over intervals i_1, i_2, and i_3, respectively. Certain parts make up an object for the interval i_1—those shaded in blue. Suppose this is a biological object that has the capacity to have a self. Before and after the parts compose this object, they either compose no object indicated in the figure, or they compose some other object (green and red) in which they stand in the required relation—a biological chain of immanent causation—to compose another biological object. If they acquire the required complexity—sustaining embodied experience—the biological object can have a self.[37] I propose such a biological individual can have a (sense of) self for the maximal period in which it is capable of embodied experience.[38] Note that the individual persists longer than that: it has parts before and—barring exceptionally violent death—after the phase with required complexity. The self—minimally in Olson's practical sense—can change depending on the exact composition of the individual, as long as the immanent causal chain is respected.[39]

It seems to me that the processual approach harmonizes with the dynamic understanding of the self and experience as embodied better than a substance or substratum approach does. It

[36] This qualification is built in to ward off counterarguments relying on sleep and sensory deprivation.
[37] Objects that do not acquire the required complexity will not concern us here, but note that these likely involve miscarried embryos.
[38] I am making use of Hudson's Maximality Principle here.
[39] Note that the proposed account solves the problem with necessity of identity posed by Francescotti. The self is a phase of the body, hence there is a necessary connection.

is close to, but not exactly, a bundle view. The self, I propose, is a phase of the process that makes us a particular biological individual. There is no essential, core you; you are a combination of your parts and properties, and these change in interaction with your environment. You are a process unfolding over time. Rejecting the self in the sense of a core essence remaining over time, my account diverges from more commonsense understandings of the self, and the popular egological theories of the self. Henceforth, I will refer to it as the "(sense of) self" to emphasize that this is a non-substantial notion.

Note that the proposed account, while positing BCA rather than a hybrid or psychological one, is not necessarily reductionistic. It posits that a certain complexity is required before an object can have a (sense of) self. It does not say that all there is to the (sense of) self is physical mechanics (i.e. I do not purport to solve the mind-body problem by this proposal). The complexity I argue to be required, is embodied experience. The biological connection between synchronic and diachronic parts support unity and continuity in embodied experience, respectively, thereby allowing for a (sense of) self. Perdurantism allows the flow of parts to compose an object for some time, and for that object to seize to exist at some other time. It provides a dynamic being and not-being, with a phase of gradual increase in complexity, a phase of the required complexity for having a (sense of) self, and a phase of (usually) gradual decrease in complexity. The borders between the phase of insufficient versus sufficient complexity are vague—for us anyway—but this is to be preferred to it being arbitrary. Endurantism, conversely, positing that objects are wholly present, sets much harder borders on objects, which is not in accordance with the way objects lose and gain (physical) parts all the time. Endurantism does not allow for the vagueness that seems to be in play in the coming into existence and dropping out of existence of bodies and human persons, let alone (sense of) selves. To exemplify, Olson (1999, p. 152) seems to suggest setting the border somewhat arbitrarily at the death of the animal, saying that the body must seize to exist at some point, why not pick a point with a high concentration of change? For endurantism, having a hard border seems to be

much essential than for perdurantism. However, I would disagree that biological objects are in need of such hard borders, since they are constantly gaining and losing parts when alive, and only gradually decay. Additionally, I prefer vagueness over arbitrariness. A much more natural solution would therefore be to embrace the flow of temporal parts, and go with perdurantism.

So far I have talked about biological connections. I am open to the possibility of non-biological connections under some circumstances. I think the perdurantist solution, given Unrestricted Composition (though slightly less unrestricted for human animals), is well suited to accommodate E-cognition: the self not just as embodied, but also embedded, enacted, and extended. I would therefore like to keep open the possibility that certain non-biological parts can participate in the composition of the object for some of its existence. To do so, the requirement may have to be slightly altered: a non-biological addition, which contributes to the embodied experience of the maximal biological individual in a way functionally similar to the biological parts, may be added to the composition of some maximal biologically connected individual with enough complexity that it can have a (sense of) self. I am sure this initial formulation is open to much critique, and it is beyond the scope of the current work to further develop it, but I wanted to be sure to open the avenue for thinking about this.

It is worth noting that my account entails there cannot be overlapping persons: parts can only be immanently causally connected to one biological object at a time—although over time, they may be part of different biological objects. For instance, the lower-most particle of Figure 1. Parts composing perduring objects over time. Different objects in blue, green, and red, persisting over intervals i_1, i_2, and i_3, respectively.is part of the object Blue during one time-slice, and part of object Red during two time-slices. These time-slices, however, do not overlap temporally. When we talk about the (sense of) self, we talk about functions of maximal biological objects, and while composition may be unrestricted in the sense that any combination of parts could be said to form an object, when it comes to identifying the maximal biological object, parts can only belong to *one* at any moment in space-time. Hence, maximal biological

objects do not overlap, and since the (sense of) self is a function of a maximal biological object, selves to not overlap.

Now that I have detailed my proposal, it is time to put it to the test. In the following section, I will apply it to the various puzzles and problems that we have encountered in previous sections and chapters.

3.7 Solving puzzles

Denying overlapping selves, have I discarded the main virtue of perdurantism—its ability to account for various problematic puzzles? Overlap seemed to play a crucial role here. I propose the puzzles—for biological organisms, minimally—can be solved differently, now that we have BCA and the embodied view. As previously mentioned, transplants are not possible on the embodied view. It is simply incoherent to say that transplanting one's CNS into a different body will result in an unaltered (sense of) self, and furthermore, given that the biological chain is broken, the individual would not persist. For the latter reason, modifying the puzzle to have an exact duplicate of one's body will not suffice. Uploading one's brain and brains in a vat would not be possible at all, since they are fundamentally disembodied.[40]

Fusion is evaded by the maximality requirement: there is no human equivalent of a Tibbles/Tibb case (one could doubt whether it could even be constructed for cats), for Tibb is not the maximal biological object.

What about fission? Fission faces the same objections as transplantation, as most fission thought experiments involve transplantation. But in so far as fission would be possible, the biological ties will guide the way for persistence. Suppose there was some technique to cause cell-division resulting in complete duplication of one's biological being. Suppose this preserved

[40] Space limits an interesting discussion on this topic; the interested reader is directed to Putnam (1981) for brains in a vat, Dennett (1978) for uploading brains, Meijsing (2006) for a discussion of virtual reality and (dis)embodiment, and to Thompson & Cosmelli (2011) and Cosmelli & Thompson (2010) for various reasons why the former would be rejected on an embodied account of the self.

the donor's body. We then have a donor and a duplicate. Straightforwardly, the donor would be the continuant, since the biological chain that makes up the donor is much stronger than that making up the duplicate: it does not involve mass cell-division in its chain of persistence, whereas the duplicate's chain, branching off, does. The duplicate, a biological being of the required complexity, would merely be a new person, self, coming into existence as its complexity has reached the required level. Possibly, given the assumption of exact duplication, this being is psychologically continuous with the donor's pre-procedure parts. If so, probably, the duplicate will strongly believe that it is the continuant, it may indeed have no way of telling the difference. However, since we are concerned with ontology more than epistemology, and since we retain BCA, the psychological continuity and the faux-continuant's belief does not face us.

Suppose we alter the technique: the donor is not preserved in the process; the donor is completely split down the middle and rapidly cell-divided into two duplicates. We now have two equally likely candidates for the title of continuant. Are there two continuants? I would say not. It might, then, seem as though I need a non-branching constraint in my theory after all, ensuring that there is a continuant only if there is no other equally likely candidate. That would result in giving up the Only *x* and *y* Principle, while I have argued that persistence should only rely on the two relata under consideration, and not others. However, my reason for denying that there are two continuants is not based on having two equally likely candidates. Rather, I would say there are two equally unlikely candidates. Just as the biological chain tying the pre-division donor to the duplicate in the first scenario is not strong enough to render the duplicate eligible for the title of continuant, neither of the chains tying the duplicates to the pre-division donor is strong enough to render them candidates for the title.

A final problem I would like to propose is the following. In (first-person) virtual reality (VR), one can have the sense of having embodied experience from the perspective and body of a generated avatar (e.g. Maselli & Slater, 2013). These experiences can be very realistic, and

can temporarily alter one's perception of oneself and one's relations to the environment (e.g. Banakou, Groten, & Slater, 2013; Fox, Bailenson, & Tricase, 2013; Normand, Giannopoulos, Spanlang, & Slater, 2011; Peck, Seinfeld, Aglioti, & Slater, 2013). It would seem, then, that the (sense of) self is preserved, while the body one experiences is completely different. This would counter my strong reading of the embodiment thesis, that having *my* body is essential for *my* self.

My response is as follows. When in VR, you still have *your* body, but your visual perception of it is different. In real life, skills can be acquired, and your body can change, and all of that can be incorporated[41] into your (sense of) self, so to say. Change in body is not precluded by the embodiment thesis. Hence, it is not necessarily a problem that one "embodies" an avatar different from oneself in VR, and that this leads to changes in one's (implicit and/or explicit) perception of oneself. In fact, in combination with findings that one's relations to the environment are perceived differently in accordance with the specifics of the embodied avatar point strongly towards importance of embodied experience.

Given that one can feel embodied in the avatar, and that one's perception of oneself can change accordingly, could the self persist as the avatar embodied in VR? Imagine settling into VR, embodying an avatar, and continuing your life like that. What would happen if your body was cut off after some time? Would you persist as a brain embodied in the avatar? If so, that would cast doubt on the importance of the biological criterion, and perhaps embodiment (on the strong, but plausibly also the weak reading) in general.

Without proprioceptive feedback, I would argue, one would lose the sense of agency over the avatar. The body being cut off, proprioceptive feedback of one's actually moving body is lost. Empirical evidence shows that an avatar moving out of sync with one's own actions

[41] Pun intended.

dramatically reduces experience of agency and embodiment (Spanlang et al., 2014). I would argue, then, that the embodied experience would rapidly seize, extinguishing the person.

3.8 Implications

I have mentioned various stakeholders in the introduction. I will now briefly discuss some of the implications of my view. Given the established importance of the body, clinical and legal settings could consider focusing more on those aspects of a person. Psychotherapy could perhaps develop interventions that engage the whole body. Indeed, there is already work looking into this (e.g. Panhofer, Payne, Meekums, & Parke 2011; Röhricht, Gallagher, Geuter, & Hutto, 2014). The metaphor (which turns out to not be so metaphorical) of gaining and losing parts of oneself over time might provide useful in clinical settings.

The most common version of psychotherapy in the past decades is cognitive behavioral therapy, in which it is thought that dysfunctional behavioral patterns and thoughts about the self underlie psychological problems. Therapy is geared towards providing the patient insight into these maladaptive cognitions and alternative strategies to attain identified goals. While already focused both on thoughts and actions, the current proposal would suggest there are opportunities to enrich therapy. The self being considered a process, rather than a substance, might help in identifying where the maladaptive cognitions may have emerged, re-appraise them as not essential to the self but merely a phase that can be abandoned, and thereby setting a dynamic process of change in action. The self considered as embodied, and the emphasis on the interaction with the environment, may further help identify environmental and contextual factors that contribute to the maladaptive cognitions. Additionally, it opens doors for embodied therapy. Two interesting examples here are embodiment in VR to improve neurorehabilitation in patients whose bodies are not yet ready to perform actions that the patient can do in VR; and neural prosthetics to re-embody the partially paralyzed or amputees (Dominey et al., 2016).

A critical reader might have considered dissociative identity disorder as a counterargument for my proposal. I would suggest that dissociation is a breakdown of embodied experience, geared towards and temporally successful in shielding oneself from extreme harm, but over time leading to a disintegrated (sense of) self, disintegrated embodied experience. Memories may be lost and even whole personalities may result from this disintegration. Parts of the (biological) process that enables the continuity and unity for the (sense of) self are not integrated, leading to dissociation. The solution, then, would be to re-integrate the scattered parts, and to re-establish consistently embodied experience. Indeed, Pierce (2014) reports various successful interventions that can be seen as re-instating embodied experience, such as art therapy, sensory integration treatment, and her own focus, dance-movement therapy. While initially seeming to disprove my account due to supposed overlapping of selves in one body, dissociation turns out rather to support it. Hence, another clinical suggestion following my proposal is to enhance re-integration of embodied experiences in pathologies marked by dissociation.

As for legal implications, Benforado (2009) discusses various ways in which courtroom decisions may be affected by embodied experience. Body temperature—affected by air conditioning, food and beverage intake, and clothes—is likely to affect decisions as follows. A warmer climate has been linked to finding others more trustworthy, more lenience and generosity, and more social cohesion. This implies that a judge may rule in your favor if you can manage to increase the room's temperature or are scheduled after a coffee break. A second factor is the experience of weight, which apparently does not require a very high mass. Relatively heavy clothes or interacting with somewhat heavier tools and materials appears to do the trick. The physical weight appears associated with a metaphorical weightiness of a situation, with things being judged as more severe after interaction with heavier weight. If a judge has been carrying a heavy briefcase around, s/he might be more inclined to consider your offense, or perhaps a piece of evidence provided, as more serious. Finally, (physical) cleanliness

has been linked to prudence judgments, where inducing a sense of disgust leads to more severe judgments. A grimy defendant, for instance, could unknowingly turn the judge against himself, and a clever attorney could win the judge in his favor by requesting a detailed description of gruesome events by a witness of the opponent. Equal judgments would thus be promoted by consistency in the embodied environment.

Given that the self should be viewed as perduring, rather than enduring, or so I have argued, both clinical and legal settings would be advised against focusing on the present moment, but rather take the whole stretch of the self into account. A person's history and future should become more prominent than it currently is.

Finally, the self being a phase of a biological process has implications for what can count as having a (sense of) self. I have posited that a certain complexity is required for a biological organism to enable a (sense of) self, and this complexity relies on embodied experience. That means certain animals can, in principle, have a (sense of) self, and simultaneously, that not every temporal part of a human organism has a (sense of) self, and that those that do not reach the required complexity will never have a (sense of) self. In as far as having a (sense of) self has implications for the way we treat other people, the same standards can be argued to apply to animals with the required complexity. Additionally, this would seem to support a pro-choice stance regarding child-bearing.

Conclusion

I have argued that the self is best viewed as an embodied, perduring biological processual entity. That is, the self is a phase of the biological process that is the body. It is a phase of the body for the maximal period of time in which it has the complexity required to sustain embodied experience. The body is constantly undergoing change, and this is what enables it to persist through time. It is best conceived of as a four-dimensional object, meaning is has temporal parts as well as spatial parts; and the body, or self, wholly considered, is the full space-time worm of

its existence. At any instance, only a segment is present. The spatiotemporal parts are linked via biological-processual connections. Various problems that are hard to solve for endurantism (Only *x* and *y* Principle; non-branching; identity; change), perdurantism (Unrestricted Composition versus coherent selves; overlap), the psychological (continuity criterion) and bodily (Transplant Intuition) approaches, and the substance and substratum theory (identity versus change, core essence versus perdurantism) can be accounted for by the unique combination of viewpoints that I have proposed.

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