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33 | Finding the Cores of Three- and Four-Dimensionalism

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I. Introduction

Things are composed of many parts and have a variety of properties. Further, they persist through time while their parts and properties change. For example, I have parts such as hands, cells, and atoms, which compose my body, and properties such as *having a certain weight* and *being sitting*. I will continue to exist despite countless replacements of and changes in these parts and properties.

   Three-dimensionalism (3D-ism) and *four-dimensionalism* (4D-ism) are fundamentally opposing theories about how things persist through time. Intuitively, their differences seem clear. According to the standard 3D-ism, I only have spatial parts such as hands and a head. I am "*wholly present*" at all times when I exist, and I change through time by having different parts and properties relative to different times. According to the standard 4D-ism, I have not only spatial parts but also *temporal parts* such as me-at-the-present-time and me-at-the-time-when-I-was-born.[1] I am not wholly present

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[1.] My temporal part at a time t is, intuitively, the time slice of me existing at and only at t. More formally, the concept of a temporal part is defined as follows: x is an instantaneous temporal part of y at a time t iff (1) x exists at and only at t, (2) x is a part of y at t, and (3) x overlaps at t with everything that is a part of y at t. In this definition, I follow Sider (2001, 59).

at any point of time; rather, I *extend through* a certain four-dimensional spatio-temporal region. I change through time by having different temporal parts, which have spatial parts and properties *simpliciter*, at different times.

However, despite the vividness of the differences between 3D-ism and 4D-ism, their precise formulations are still a matter of controversy. As the informal overviews of 3D-ism and 4D-ism presented above suggest, they differ in various respects.[2] Different philosophers have offered significantly different formulations of 3D-ism and 4D-ism, depending on what respects they choose to focus on.[3] Consequently, an agreement upon formulation of 3D-ism and 4D-ism is not yet available.

In this report, I shall make a preliminary attempt to find the best formulation of 3D-ism and 4D-ism. In particular, I shall try to specify the "cores" of 3D-ism and 4D-ism, which are essential to any complete definition of them. I shall also then point out an important advantage of my attempt over that proposed in Sider (2001), which has been one of the most prevailing attempts to formulate 3D-ism and 4D-ism.

Throughout this report I will assume a few things. First, I will assume *eternalism*, according to which future and past objects exist as well as present objects. Second, I will assume the existence of instantaneous points of time.

II. Finding the Cores of 3D-ism and 4D-ism

In this section, I shall specify the core components of 3D-ism and 4D-ism.[4] The basic idea of my attempt is this. 3D-ism and 4D-ism are theories about persistence. For any theories of persistence, it is essential to explain how things persist while changing through time. Hence, the fundamental difference between 3D-ism and 4D-ism, as theories of persistence, must be found

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[2.] For the more fine-grained analysis of the differences between the standard 3D-ism and 4D-ism, see Hawthorne (2006, 2008).

[3.] Cf. Donnelly (forthcoming), Hawthorne (2006, 2008), Olson (2006), and Sider (2001).

[4.] In this section, I owe the basic idea to Olson (2006), although many details of our formulations of 3D-ism and 4D-ism are different.

in the difference in their explanations of how things persist through change.

In what follows, I shall take a close look at the details of 3D-ism's and 4D-ism's explanations of persistence through change and try to extract the cores of 3D-ism and 4D-ism from their respective explanations.

1. The Core of 4D-ism

Let me start with 4D-ism. To clarify how 4D-ism explains persistence through change, consider a mundane example. Suppose that I was standing at a time t, and at a later time t' I was sitting. Hence, I changed from *t* to *t'* by having different properties at each of the times.

4D-ism explains my persistence through this change in the following way. According to 4D-ism, the fact that I have the property of *being standing* at *t* can be reduced to the more fundamental fact that my instantaneous temporal part existing at *t* has this property *simpliciter*, i.e. without temporal qualification. Similarly, the fact that I have the property of *being* sitting at *t'* can be reduced to the fact that my instantaneous temporal part at *t'* has the property *simpliciter*. 4D-ism explains that I persist through the change because my temporal parts existing at different times have different properties *simpliciter*.

The heart of 4D-ism's explanation of persistence through change is this: a thing's *temporally qualified property instantiation* is reducible to its *temporal part's atemporal property instantiation*. In other words, any time-relative property instantiation such as a thing's *having a property at t* is reducible to non-time-relative (or atemporal) instantiation such as its temporal part's *having a property*. This reduction of temporally qualified property instantiation is the distinguishing feature of 4D-ism's explanation. Therefore, if my basic idea presented above is correct, this point must be incorporated in the core components of 4D-ism. Hence the first essential component of 4D-ism must be the following.

> (4D-1) A thing's temporally qualified property instantiation is reducible to its temporal part's atemporal property instantiation in the following way: a thing, *x*, have a property, *P*, at *t* iff *x*'s temporal part at *t* has *P*.

However, (4D-1) is not enough for 4D-ism. Things have huge varieties

of properties at different times. This reduction works in general only if there are temporal parts existing at any time at which things exist and have properties. Therefore, 4D-ism must require the plentitude of temporal parts to guarantee that any temporally qualified property instantiation is reducible according to (4D-1). Hence, the following thesis must be included in the core of 4D-ism too.

> (4D-2) Necessarily, each thing has a temporal part at any time at which it exists.

In sum, 4D-ism must incorporate (4D-1) and (4D-2) as core components to explain persistence through change.[5]

2. The Core of 3D-ism

What is the distinguishing feature of 3D-ism's explanation of persistence through change? Again, let me consider the case where I was standing at a time, *t*, and sitting at a later time, *t'*.

According to 3D-ism, the fact that I have the property *being standing* at *t* must be understood at face value. That is, any temporally qualified property instantiation cannot be reduced to more fundamental facts. Rather, 3D-ism says that a thing's having a property such as *being standing* must always be relativised to a particular time.[6] Hence, my having the property of *being standing* is relativized to *t*. Similarly, my having the property of *being sitting* is relativized to *t'*. And I persist through the change by having the property of *being standing* relative to t and then having the property of *being sitting* relative to *t'*. Therefore, 3D-ism explains a thing's persistence through change by its having different properties relative to different times.

Hence, the most distinguishing feature of the 3D-ism's explanation is the denial of the reductive explanation of temporally qualified property instantiations that (4D-1) provides. Thus if my basic idea presented above is correct, the following thesis should be incorporated in the core of 3D-ism.

[5.] This characterization of 4D-ism almost overlaps the definition of 4D-ism given in Olson (2006; sect. 5) and Zimmerman (2005; sect. 5).

[6.] On the many ways to conceptualize this temporal qualification, see Haslanger (2003).

(3D) A thing's temporally qualified property instantiation cannot be reduced to more fundamental facts.

However, if 3D-ism should incorporate the denial of (4D-1) as its core, what about (4D-2)? Should 3D-ism deny the existence of temporal parts that (4D-2) requires?[7] Obviously, 3D-ism need not admit (4D-2) because 3D-ism need not require the existence of temporal parts to explain persistence through change. However, the fact that one need not admit something does not mean that one must reject it. Further I cannot see any compelling reason to beliere that 3D-ism must prohibit the existence of temporal parts in general. As far as temporal parts are not used for the reduction of temporally qualified property instantiations, the acceptance of temporal parts is inconsequential to 3D-ism. Hence, the acceptance of the existence of temporal parts is optional for 3D-ism. These arguments show that the existence of temporal parts is completely irreverent to the definition of 3D-ism, because its acceptance and its denial are both compatible with 3D-ism. For this reason, I think that the core of 3D-ism need not incorporate any thesis about temporal parts.

III. Advantage

In this section, I shall point out one important advantage of my attempt over that proposed in Sider (2001; ch. 3), which has been one of the most prevailing attempts to formulate 3D-ism and 4D-ism.

The basic idea behind Sider's attempt is that the most fundamental difference between 3D-ism and 4D-ism must be found in their different views on temporal parts. Hence Sider identifies 4D-ism with (4D-2), that is, the claim of the plentitude of temporal parts. On the other hand, he finds it difficult to define 3D-ism as a thesis regarding temporal parts because some versions of 3D-ism must commit to the existence of temporal

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[7.] In fact, many philosophers seem to take for granted that the definition of 3D-ism should incorporate the denial of (4D-2). For example, see Sider (2001; 68) and Olson (2006; 750).

parts according to the natural definition of the concept of a temporal part.[8] However, he does not see this failure as indicative of there being something wrong with his basic idea; rather, he seems to think that this difficulty arises from the elusiveness of 3D-ism itself.

On this point, the advantage of my attempt over Sider's seems clear. If my argument above is correct, we can obtain a clear and precise characterization of the core of 3D-ism by focusing on its explanation of how things persist through change. Further, my attempt also explains what is wrong with Sider's basic idea. As I already argued, the existence of temporal parts is irrelevant to 3D-ism's explanation of how things persist. Thus, any claim about temporal parts cannot be essential components of 3D-ism as a theory of persistence.

IV. Conclusion

So far, I have specified the cores of 3D-ism and 4D-ism. The essential components of 4D-ism are the following.

> (4D-1) A thing's temporally qualified property instantiation is reducible to its temporal part's atemporal property instantiation in the following way: a thing, x, has a property, P, at t iff x's temporal part at t has P.

> (4D-2) Necessarily, each thing has a temporal part at any time at which it exists.

On the other hand, the core of 3D-ism is the following.

> (3D) A thing's temporally qualified property instantiation cannot be reduced to more fundamental facts.

I have also pointed out an important advantage of my attempt over Sider's. In particular, I have argued that my attempt not only provides a clear con-

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[8] Thomson (1983). For more on this point, see Sider (2001; 64-5) and Olson (2006; sect. 1-3)

ceptualization of 3D-ism, which Sider's attempt cannot, but also explain why any attempts focusing on temporal parts must fail to capture a proper distinction between 3D-ism and 4D-ism.

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