



January 2010

On the Possibility of Four-Dimensional Objects

Eli Cohn
info@ubiquitypress.com

Follow this and additional works at: <https://digitalcommons.cwu.edu/ijurca>

Recommended Citation

Cohn, Eli (2010) "On the Possibility of Four-Dimensional Objects," *International Journal of Undergraduate Research and Creative Activities*: Vol. 2: Iss. 2, Article 5.

Available at: <https://digitalcommons.cwu.edu/ijurca/vol2/iss2/5>

This Article is brought to you for free and open access by ScholarWorks@CWU. It has been accepted for inclusion in *International Journal of Undergraduate Research and Creative Activities* by an authorized editor of ScholarWorks@CWU. For more information, please contact scholarworks@cwu.edu.

On the Possibility of Four-Dimensional Objects

Eli Cohn

Lewis & Clark College

Published online: 26 July 2010

© Eli Cohn 2010

In this paper I will be examining the possibility of four-dimensional objects on Mark Heller's view.¹ I will begin by explaining Heller's "unpleasant alternatives" argument to three-dimensional objects and why he believes these unpleasant alternatives should lead us to accept a view of four-dimensional objects. I will then examine a challenge to Heller's view based on an earlier argument by Peter van Inwagen.² I will show two ways to interpret van Inwagen and will argue that, based on the strong interpretation of van Inwagen, we should reject Heller's idea that material objects are four-dimensional.

Heller provides an argument that is designed to show that, given our ordinary conception of physical objects as three-dimensional, we must accept at least one unpleasant conclusion in our ontology. I will start by showing Heller's argument, then explaining it step by step. The argument begins with two assumptions and follows with five premises leading to a contradiction. The argument appears as follows:

- (1) Suppose there is such an object as my body. Call it 'Body.'
- (2) Suppose that there is a physical object that consists in my body except my left hand. Call this object 'Body-minus.'

Now assume there is a time, t (the present), where my left hand is cut off:

- (3) The thing that, before t , is Body-minus = the thing that, after t , is Body minus.
- (4) The thing that, after t , is Body = the thing that, before t , is Body.
- (5) The thing that, after t , is Body-minus = the thing that, after t , is Body.
- (6) The thing that, before t , is Body-minus = the thing that, before t , is Body.
- (7) The thing that, before t , is Body-minus \neq the thing that, before t , is Body.

And quite obviously (6) and (7) are contradictory. But this argument is deserving of a great deal of explanation. Some of the premises are motivated by what Heller calls the “unpleasant alternatives” to three-dimensional objects. So, I will begin by explaining each premise and its motivation.

Premise (1) should seem obvious and undeniable. To deny premise (1) would be to accept unpleasant alternative (a): that there is no physical object as my body. I have no desire to argue for such a position, and so I will accept (1). Denying (2) would be to accept unpleasant alternative (b): there is no physical object in the space that we would typically say is now exactly occupied by all of me other than my left hand. Premise (2) is rejected by Peter van Inwagen, and his argument will be discussed below. For that reason I will only say now that I find (2) highly controversial and I will accept it now only as a means of explaining the remainder of Heller’s argument. These two assumptions motivate premise (3). Given (2) there is an object that, before my left hand is cut off, is Body-minus. Further, this object occupies the same physical space after my left hand is cut off. Thus, there is an object called Body-minus that exists before time t that is identical to the object called Body-minus that exists after time t .

To get premise (4) we turn again to unpleasant alternatives. To deny (4) is equivalent to accepting unpleasant alternative (c): no physical object can undergo a loss of parts. There are a variety of examples that provide good reason to accept (4) and deny (c). Most notable is the one being used by Heller, that of a body. I currently have a body. If I lose a part, say, a finger, I still have a body. Moreover these bodies are the same. Examples of other physical objects will yield the same conclusion. Take the example of trees losing their leaves in fall. Every time a tree loses a leaf it loses a physical object. This does not mean that the tree ceases to exist or that the tree has changed identities in some deep metaphysical sense. Thus, we have good reason to accept (4).³

Premise (5) is also motivated by an unpleasant alternative. We can either accept (5) or unpleasant alternative (d): there can be distinct physical objects exactly occupying the same space at the same time. (5) will be the focus of Heller’s argument for four-dimensional objects which I will be discussing shortly. Premise (5) appears correct. After my left hand is cut off all that is left of my Body is the physical space occupied by Body-minus. That is, my Body after t is nothing over and above what we were calling Body-minus before t . The two occupy the same physical space. What we do not want to claim is that, given that Body and Body-minus now occupy the same physical space, that Body and Body-minus are still distinct physical objects. This is why we want to reject unpleasant alternative (d).

We arrive at premise (6) by means of the transitivity of identity. This is our final unpleasant alternative. We can either accept (6) or unpleasant alternative (e): identity is not transitive. (6) is derived from the transitivity of claims made in parts of (4) and (5). (4) was the claim that the thing that, before t , is Body = the thing that, after t , is Body.

(5) claims that the thing that, after t , is Body = the thing that, after t , is Body-minus. Thus we arrive at (6), the claim that the thing that, before t , is Body = the thing that, after t , is Body-minus.⁴ To deny (6) is to deny the transitivity of identity.⁵ Finally we arrive at (7), which is a direct contradiction of (6). That is, before t , Body-minus and Body were not identical objects. How could they be, since they were different sizes? Since we arrive at this contradiction we have to reject at least one of the premises. Heller's idea is that denying any premise will have unpleasant consequences. I will now explain Heller's solution to the problem, and then move on to van Inwagen's solution.

Heller posits four-dimensional objects to avoid the contradiction implied by the argument. Heller believes that by thinking of objects as four-dimensional rather than three dimensional, we can deny both premise (5) and unpleasant alternative (d). I will give only a brief explanation of why Heller believes this is the case, then will focus on van Inwagen for the remainder of the paper. First I want to explain what it means to say objects are four-dimensional rather than three-dimensional. When we think of three-dimensional objects we think about objects that exist only in physical space. When we think of four-dimensional objects we think of objects that exist in space-time. Take the example of a clay sculpture made by an artist. The sculpture, call it 'Burt,' is never fired. The sculpture is created by the artist at one P.M., at which point he leaves the room. When he returns to the room an hour later, he does not like the sculpture and destroys it to start over. On a three-dimensional view, Burt exists at different times. Burt exists at 1:00, 1:10, 1:15, etc. until 2:00. On the four-dimensional view Burt exists in space-time from one until two.⁶

Heller believes that four-dimensional objects can help us avoid the contradiction created by the above argument. Unfortunately, Heller's solution to the contradiction involves thinking of Body-minus as a distinct object before t . I confess that I do not fully understand this claim, but I will nonetheless try to do justice to Heller's argument. The basic idea is that by adopting four-dimensional objects we can deny both unpleasant alternative (d) and premise (5) of the argument. We can deny (d) as we can on a three-dimensional account of physical objects. No one wants to claim that there can be two distinct physical objects occupying exactly the same space at the same time. But, we can also deny (5) on the four-dimensional account because we do not have to claim that, after t , Body-minus is identical to Body. On this account Body-minus and Body were distinct objects before t and remain distinct objects after t . While after t they may have the same spatial shape at no time do they have the same spatio-temporal shape. If space was all that mattered they would be identical. But in fact both Body and Body-minus are much larger than the mere space they fill, since they fill a temporal dimension as well.

Van Inwagen has a different way of solving the above contradiction. His solution involves denying (2), one of the assumptions that generates the rest of the argument. As a result he must accept unpleasant alternative (b): that there is a physical object in the

space that we would typically say is now exactly occupied by all of me other than my left hand. Put more simply, van Inwagen denies the existence of Body-minus before t . To reject this is to reject what van Inwagen calls the Doctrine of Arbitrary Undetached Parts, or DAUP. Van Inwagen defines DAUP as follows: "For every material object M , if R is the region of space occupied by M at time t , and if sub- R is *any* occupiable sub-region of R *whatever*, there exists a material object that occupies the region sub- R at t ."⁷ To again put it simply, DAUP is the claim that Body-minus exists. Van Inwagen intends to deny DAUP.

Van Inwagen provides a two-step argument to deny DAUP. First, he shows that DAUP entails a thesis which he refers to as Mereological Near-Essentialism, or MNE. Second, he will show that MNE is false. These two steps together entail the falsity of DAUP. MNE states that it is impossible for an object to lose any of its parts. We can see what this means by returning to the example of a tree shedding its leaves. According to MNE when a tree sheds a leaf it ceases to be that same tree. To show that DAUP entails MNE van Inwagen has us imagine a case in which DAUP is true and MNE false. We can use the example of Body and Body-minus here. Supposing DAUP is true there exist both objects, Body and Body-minus before t . Now suppose your left hand is, in fact, removed from the rest of your body. At this point Body and Body-minus appear to be identical physical objects. At least, according to van Inwagen, if any account believes Body and Body-minus are two distinct objects at this point then the account does not understand what it means to be a material object.⁸ But now we have only one object where there used to be two objects. Only Body now exists where there was once both Body and Body-minus. Two things that were once two separate objects are now one object. Therefore our only option is to deny our supposition that MNE is false. For if MNE was false then Body would have ceased to exist. But Body has not ceased to exist, so MNE must be true given the truth of DAUP.

As van Inwagen notes the fact that DAUP entails MNE is not enough in itself to deny DAUP. We must further show that there is good reason to believe that MNE is false. Upon showing that MNE is false we will also have the falsity of DAUP because of the entailment relation. But, as we have already noted (though not explicitly) there is good reason to deny MNE. All this amounts to is the claim that there are objects that can survive a loss of parts. Both of my prior examples, people and trees, can show that objects can survive the loss of parts. I can survive the loss of a body part, a tree can survive the loss of a leaf, a cake can survive the removal of a slice, etc. Given this we have good reason to reject DAUP.

Given the falsity of DAUP we have another way of getting out of the contradiction in Heller's argument. We can simply deny (2). We do not have to suppose the existence of Body-minus before time t . As a result the rest of the argument will not follow. Premise (6) becomes incoherent, because there is no reason to suspect that there is, in fact, anything that is Body-minus before t . Because (6) is incoherent it cannot be considered

a serious problem that (6) contradicts with (7). So, we now have two apparently plausible solutions to the contradiction in Heller's argument.

Piecing out which solution to the contradiction we should accept is a complicated task. Problems arise because neither Heller nor van Inwagen appears to provide a very solid argument for or against premise (2). In fact, Heller never states why (b) is an unpleasant alternative at all. Van Inwagen takes the opposite view regarding (b). In his paper he states that not-(b) is something like an unpleasant alternative to four-dimensional objects. He does not phrase the claim in those terms, rather he says that:

Someone *might* say that [Body] and [Body-minus] are two material objects that now have the same size, shape, position, weight, orientation in space...these two objects being numerically distinct simply in virtue of their having different histories. But this *I* cannot conceive of; if the meaning of 'material object' is such as to allow the conceptual possibility of this, then I do not understand 'material object.'⁹

We can see that van Inwagen does not explicitly use the term 'unpleasant alternative.' But this quote at least *prima facie* amounts to an equivalent claim. Just as Heller claims that (b) is an unpleasant alternative to three-dimensional objects, van Inwagen is claiming that not-(b) is an unpleasant alternative to four-dimensional objects.

At first glance the arguments regarding three and four-dimensional objects are reduced to intuition. If you hold the intuition that Body-minus exists before t , then you are inclined to view objects as four-dimensional. If you hold the intuition that Body-minus does not exist before t , then you are inclined to view objects as three-dimensional. There is a way to avoid this concern. I believe there are two ways to interpret van Inwagen, and this intuitive concern only arises on the first interpretation. On the first interpretation, call it the weak interpretation, van Inwagen provides no argument against four-dimensional objects. If we accept the weak interpretation we will fall into the intuitive debate. If we adopt the weak interpretation, then van Inwagen is begging the question against Heller by claiming without argument that not-(b) is an unpleasant alternative to four-dimensional objects. Heller, in turn, begs the question against van Inwagen by claiming without argument that (b) is an unpleasant alternative to three-dimensional objects.

There is also a strong interpretation of van Inwagen. On the strong interpretation van Inwagen has crafted an argument against Heller. The argument will take the form of a *reductio*, and can be parsed out as follows. Suppose there is an object, Body-minus that exists before t . In accepting this claim we must also accept DAUP since the claim that Body-minus exists before t is essentially just a rephrasing of DAUP. Both claim that, given a material object in space, there exists a separate material object filling a part of that space. Thus, upon assuming Body-minus exists before t we also assume the truth of

DAUP. However, we have already argued that DAUP is false because DAUP entails MNE and MNE is false. Because the claim that Body-minus exists before t entails DAUP and DAUP is false, the claim that Body-minus exists before t is also false. Therefore, by adopting the strong interpretation of van Inwagen we can develop a solid argument to the effect that not-(b) is an unpleasant alternative to four-dimensional objects.

This leaves the question of which interpretation of van Inwagen we should accept. There are two good reasons to accept the strong interpretation. First is the principle of charity. We can either interpret van Inwagen as begging the question against Heller or as providing a concrete argument against Heller. The principle of charity requires that we interpret van Inwagen as providing an argument against Heller. The second reason we should accept the strong interpretation is because it allows us to resolve the intuitive dispute discussed earlier. By accepting the strong interpretation we can say that van Inwagen is correct in rejecting Heller's notion that (b) is an unpleasant alternative. Instead, (b) is a claim we should accept that fits well into our ordinary concept of objects as three-dimensional.

We are not yet finished, however. Just because van Inwagen is correct regarding (b) does not necessarily mean his solution to Heller's contradiction is better than Heller's own solution. But by viewing the arguments more closely we see that van Inwagen's argument does in fact rule out the possibility of four-dimensional objects. Again we can use a *reductio*. Suppose Heller's solution to the contradiction is correct. That is, suppose material objects are four-dimensional and therefore we can deny both premise (5) and unpleasant alternative (d). If this is correct (if objects are four-dimensional) then we accept premise (2). But, as we saw in our earlier *reductio*, (2) is false because (2) entails DAUP, and DAUP is false.¹⁰ Because (2) is false and Heller's argument accepts (2), Heller's argument must also be false.

The main focus of this paper has been to explain the debate surrounding four-dimensional objects. I began by explaining Heller's argument designed to show a contradiction in thinking of material objects as three-dimensional. Heller believes that by thinking of objects as three-dimensional, we must accept at least one unpleasant consequence. Peter van Inwagen has supplied an opposing view. He has claimed that four-dimensional objects suffer from an unpleasant consequence. Namely, four-dimensional objects have the consequence that Body-minus exists before t . Both Heller and van Inwagen present initially plausible solutions to Heller's contradiction. I then offered two potential interpretations of van Inwagen and argued that we should adopt the strong interpretation. I have concluded by arguing briefly that, based on this strong interpretation, Heller's solution to the contradiction is false. As a result, we should accept van Inwagen's solution to the contradiction, and reject the possibility of four-dimensional objects.

References

Chisholm, Roderick (1973). "Parts as Essential to Their Wholes," *Review of Metaphysics* 28, pp.581-603.

Geach, Peter (1967-8). "Identity," *Review of Metaphysics* 21, pp.3-12.

Heller, Mark (1990). *The Ontology of Physical Objects*. Cambridge: Cambridge University Press.

Van Inwagen, Peter (1981). "The Doctrine of Arbitrary Undetached Parts," *Pacific Philosophy Quarterly* 62, pp.123-37.

¹ Heller, 1990.

² Van Inwagen, 1981.

³ Roderick Chisholm has notably denied (4). See Chisholm, 1973.

⁴ It may be easier to see this through symbols. (4) claims that $X = Y$, and (5) claims that $Y = Z$. Thus we get (6), $X = Z$.

⁵ Attempted by Peter Geach. See Geach, 1967-8.

⁶ As Heller notes, on a three-dimensional view "we might still say that it exists from [one until two], but only because we would say that it exists *at* every time between [one and two]. Instead of thinking of an object as existing at various times, we should, adopting the four-dimensional stance, think of it as existing within regions of time" Heller, 314.

⁷ Van Inwagen, 123.

⁸ Note that this appears to beg the question against Heller. I will set this point aside for now.

⁹ Van Inwagen, 125 (his emphasis).

¹⁰ This was discussed earlier regarding unpleasant alternative (b), not premise (2). These two claims are directly related because (b) is an unpleasant alternative that arises from accepting (2). Thus, we can exchange (2) for (b) here.