

John Hawthorne, Three-Dimensionalism vs. Four-Dimensionalism

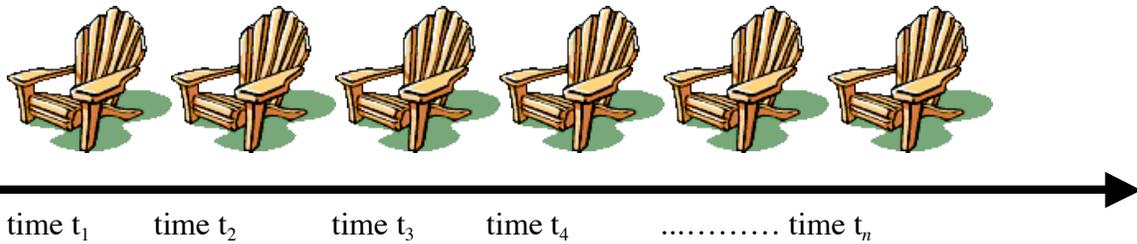
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§ The debate: On the nature of persisting material objects

[Three-Dimensionalism]:

\_\_\_ Objects are three-dimensional (spread out in space), but they persist in time. Persisting things are *wholly present* at each time that they exist.

\_\_\_ Also known as ‘Endurantism’.



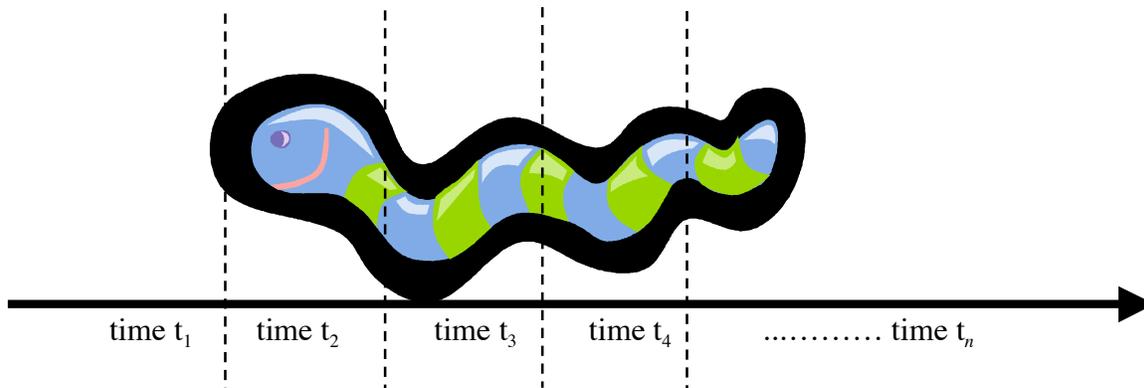
[Four-Dimensionalism]:

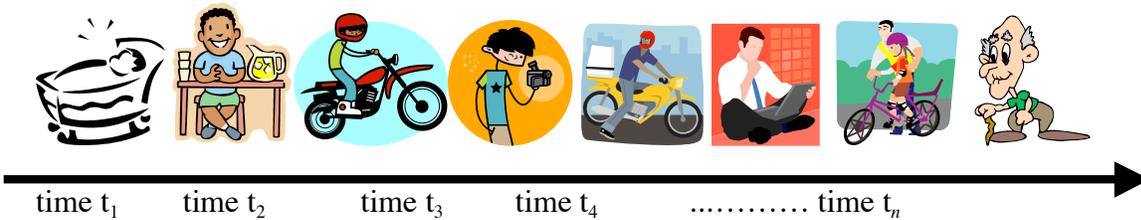
\_\_\_ There is a deep analogy between the structure of ordinary material objects and the structure of the space-time of modern physics.

\_\_\_ Material objects persist in time as temporal stages, temporal parts, etc.

\_\_\_ Also known as ‘Perdurantism’.

(a) Worm theory – temporal parts theory



**(b) Stage Theory – temporal stages theory****§ Space-Time**

1. On the now-standard physical picture, space-time is conceived of as a multi-dimensional object, where one of the dimensions is temporal and the others are spatial.
2. Space-time itself is made up of ultimate constituents – *space-time points* – that are not extended along any dimension and have no smaller parts.
3. Any collection of space-time points makes up exactly one space-time *region*: for any given collection of points, there is a region made up of those points, and if two space-time regions are different, there is some difference in the space-time points that make them up.
4. Each region will have parts corresponding to subsets of the points that make up the original region. Certain of those parts will be temporal parts of the original region, where a temporal part is a part that is temporally smaller than the original but which has the same spatial dimensions as the original during the period that the temporal part exists.

**Main theses of the space-time theory:**

- (i) **Pointiness:** Every space-time region is composed of point-sized parts.
- (ii) **Universality:** Every collection of space-time points composes something.
- (iii) **Uniqueness:** For every collection of space-time points there is exactly one thing that is composed of the space-time points in that collection.
- (iv) **Pointy Object Fundamentality:** Points are ontologically more fundamental than extended region.
- (v) **Pointy Fact Fundamentality:** Facts about points and the relations between them are more fundamental than facts about extended regions.

**§ Varieties of Four-Dimensionalism****(1) Spatiotemporalism**

\_\_\_ Material objects are in fact identical with space-time regions they occupy. The occupant of the space-time region has exactly the same contours of the region itself, so why bother having two objects with exactly the same boundary?

Objections:

1. **Modal differences:** It is natural to think of space-time as having their spatiotemporal profile *essentially*, but of their occupants as having their spatiotemporal profile accidentally. Hence occupants  $\neq$  region.
2. **Substitution failure:** Certain predicates can be true of the occupant but not true of the region. Hence occupant  $\neq$  region. (e.g. I walked to the fish and chip shop last night.  $\neq$  The space-time region that I occupy walked to the fish and chip shop last night.)
3. **The problem of “coincidence”:** Contemporary physics seems to wish to allow for cases where two particles have the same location, even cases where the particles have the same location for the entirety of their careers. Identifying each particle with the space-time region that it occupies will, owing to the transitivity of identity, have the result of identifying the particles with each other, contrary to the description of the case integral to the physical theory.

## (2) Four-Dimensionalism without Spatiotemporalism

\_\_\_ The relation of physical objects to their parts is strongly analogous to the relation between spatiotemporal regions and their parts:

\_\_\_ **Pointiness:** Physical objects are thought to be built out of simple material parts that have zero spatial and temporal extent, and any collection of such simples is held to make up one and only one material object.

Objections:

- (i) Clay and statue: In the case of a lump of clay and a statue that come in and out of existence at the same time, it would seem that the two will have to be identified. But there are well-known arguments against such an identity claim.
- (ii) E.g. We say “That statue is well made”, but we don’t say “That lump of clay is well made.”
- (iii) E.g. “The lump but not the statue could have survived crushing.”



**One wonders exactly what the motivation is supposed to be for the recommended departure from ordinary, natural ways of thinking.**

## § Three-Dimensionalism

### (1) Rejection of the Uniqueness Thesis → the “Plentitude” Thesis

\_\_\_ The defender of Plentitude holds that everything is made of point-sized things, and that every collection of point-sized things makes up something, but allows that there may be a number of things made of the very same point-sized things. So even when the lump of clay and the statue have exactly the same point-sized parts, they are not identical.

#### \* liberalism in ontology: what counts as an object?

Suppose one is willing to countenance the objects that commonsense recognizes.... It seems very arbitrary to then disallow the other myriad objects posited by the combination of Pointiness and Universality.

Examples:

\_\_\_ In being willing to countenance archipelagos (a group of many islands), one embraces scattered objects. Why not also embrace of “archipelago” of my car and the Eiffel Tower”?

\_\_\_ In being willing to countenance record collections that used to consist entirely of jazz albums and now consists entirely of heavy metal albums, ... one is willing to countenance objects that are materially constituted by one collection of atoms at one time and an entirely different collection of atoms at another time.

\_\_\_ Nor is there any temporal limit on how short the objects of commonsense are. We could imagine a circle of clouds existing for only an instant. We could imagine a person only existing for an instant – just imagine him destroyed right after the first moment of existence.

### (2) Rejection of the Fundamentality Thesis

**Q: Which is more fundamental – point-sized individuals or spatiotemporally extended material objects?**

**Hawthorn’s reasons in favor of extended objects:**

1. It is certainly not natural in general to think of a shorter-lived temporal part of an object as more fundamental than the object itself.
2. The analogy from spatial extension (that points are more fundamental than lines) does not apply to temporal extension.
3. The analogy of events also does not apply to “short-lived objects.”

In conclusion, self-proclaimed four-dimensionalists typically adopt a picture that reckons instantaneous objects to be more fundamental than long-lived ones, and facts about instantaneous objects more fundamental than facts about long-lived ones. But the virtues of this picture are far from transparent.

### (3) The slogan: “Objects are wholly present at whatever time they exist”

#### What it doesn't rule out:

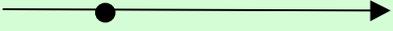
1. I take it that *the slogan does not rule out the thesis of temporal parts*. [Note: This is Hawthorne's different interpretation of Three-Dimensionalism.]
2. It is not intended to rule out the hypothesis that the lump is currently coincident with a statue that will only ever be made of that lump and will pass out of existence before the lump.
3. The slogan is intended to be perfectly consistent with the thesis that objects can gain and lose parts: that I am wholly present now does not mean that if I will or did have a part, I have that part now.

#### What it does say:

1. **Taking tense seriously:** We are familiar and comfortable with statements involving the past, present and future tense. Tense does not merely serve to encode our local perspective of the world, but provides the appropriate framework for the most revealing depiction of reality. There is thus a deep Disanalogy between space and time: I am spread out in space, but I am not spread out in time.
2. **Existence at a point in time:** The reason why a line is a bad model for one's temporal existence is that, while all the points in the line concretely exist, one cannot coherently say this of all the points in time. And the reason why the moving point is a much better model is that, for any time during which the point is moving, it feels like the natural description of the state of the world is that the point exists at such and such a place but used to be and will be at such and such other places.

#### Two visual models between 4-D and 3-D in terms of persistence in time:

(i) **extended in time:**   
 \_\_\_ The **Four-dimensionalist** thinks of his temporal reality on the model of line. Just as the line is spread out in space with various parts, so the object represented by the line is spread out in time, with various parts corresponding to the parts of time it occupies.

(ii) **extensionless: existing at one point in time:**   
 \_\_\_ The **Three-dimensionalist** thinks of himself now as the tip of the pen that produces the line. The tip moves along space as it produces a line but never occupies more than a single point – it is never spread out across various times. This model is of a moving extensionless point that traces out the path of the line.

## § Conclusion

### **Three-Dimensionalism involves:**

- (a) a denial of *Uniqueness*
- (b) a denial of Pointy Object and Pointy Fact *Fundamentality*
- (c) the claim that objects are wholly present (in some sense given below) at each time that they exist.

### **Different readings of “wholly present” for Three-Dimensionalism**

1. ‘wholly present’ = ‘wholly occupies’: A region  $r$  is wholly occupied by an object iff the region exactly occupied by the object is part of  $r$ .
2. ‘wholly present’ = ‘wholly located’: Persistent objects are wholly located at different times (different instantaneous regions).
3. ‘wholly present’ = ‘being intrinsic to a time’: An object is wholly located at a spatiotemporal region iff it is intrinsic to how things are at that region that that very object exists at it.