

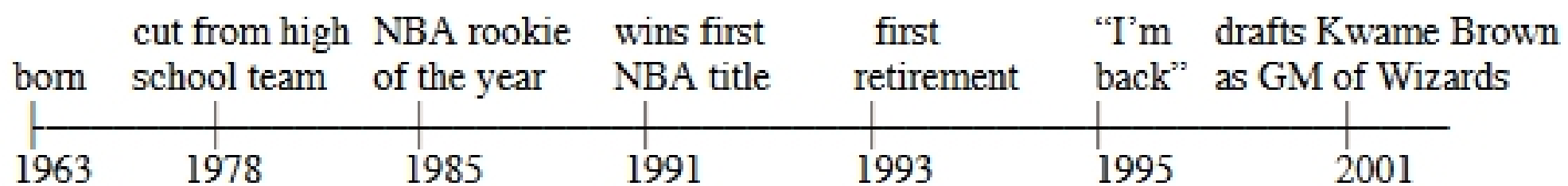
Temporal Parts¹

1. What are temporal parts?

I will argue that temporal parts theory is true, but first we need to get clear on what exactly this theory says. Let's start with the idea that *time is like space*.

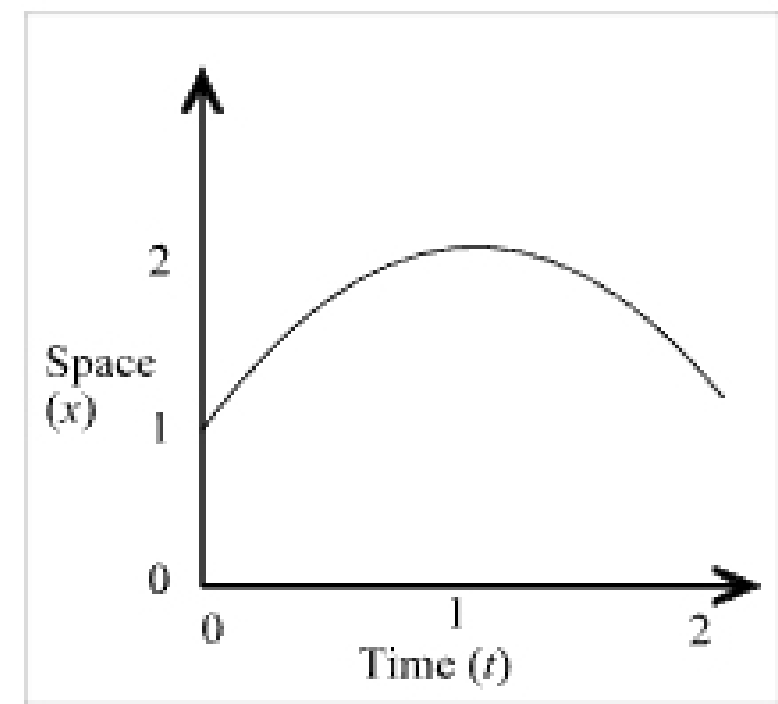
Everyone has seen timelines, in magazines and encyclopedias:

Michael Jordan's life



For some reason, time is easier to comprehend when represented by a spatial diagram. A timeline is such a diagram. The spatial line on this page represents a stretch of time — Jordan's life.

Diagrams of motion from high school physics take this a step further, by representing one dimension of space in addition to time. The diagram on the right represents a moving particle. The horizontal axis represents time; the vertical axis, space. Since the diagram contains only a single spatial axis, it can represent only one spatial dimension of the particle's motion (motion in the x direction). The curved line on the diagram represents the motion of the particle, which begins at spatial location $x=1$ at time $t=0$, moves to location $x=2$ by time $t=1$, then moves back to location $x=1$ by time $t=2$.

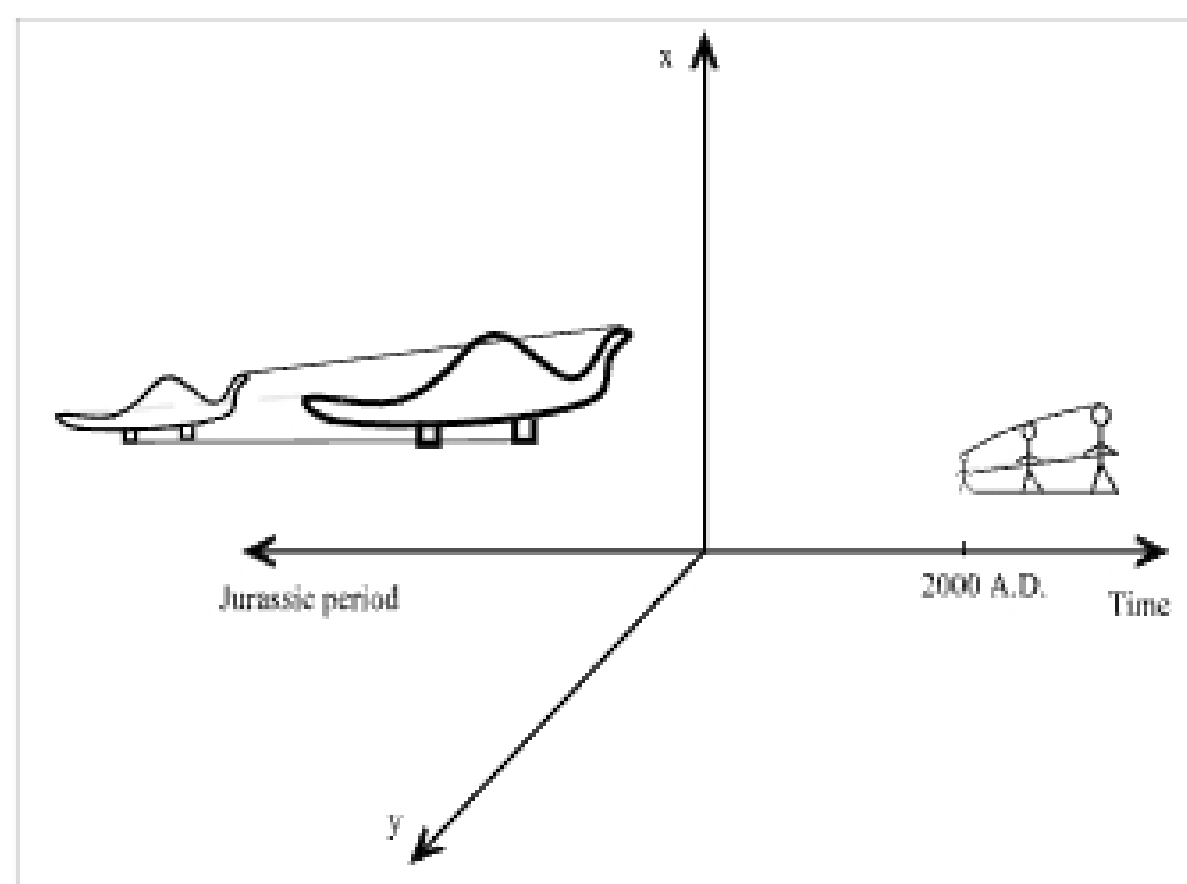


Spacetime diagrams take this a step further, by representing more spatial dimensions alongside time. The spacetime diagram below includes two spatial dimensions in its depiction of a dinosaur from the Jurassic period and a person born in 2000 A.D.

All these diagrams represent time as just another dimension, alongside the spatial dimensions. Given how convenient this method of representation is, many philosophers and scientists have wondered whether time itself is in some sense just another dimension. The question amounts to whether, and to what extent, time is like space.

Temporal parts theory is the claim that time is like space in one particular respect, namely, with respect to *parts*. First think about parts in space. A spatially extended object such




¹ Parts of this chapter are based on chapter 3 of Conee and Sider 2005. Thanks to Cian Dorr for the idea of introducing spacetime diagrams with timelines, and to Eliza Block, John Hawthorne, Irem Kurtsal Steen, and Dean Zimmerman for helpful comments.




Space-Time Diagram

as a person has *spatial parts*: her head, arms, etc. Likewise, according to temporal parts theory, a temporally extended object has *temporal parts*. Following the analogy, since spatial parts are smaller than the whole object in spatial dimensions, temporal parts are smaller than the whole object in the temporal dimension. They are shorter-lived. The spacetime diagram makes this clear. The whole person is the following

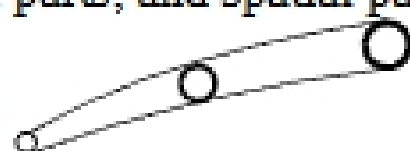
object: . He is

spread out from left to right because he lasts over time; he begins to exist in 2000 A.D., and lasts for a number of years beyond that. The parts of the diagram, ,  and , represent some of his temporal parts.





A person's temporal part at a time is exactly the same, spatially, as the person at that time, but it exists only for a moment. Thus, the early temporal part  looks, feels and smells like a baby, but it lasts only for an instant. If you watch the baby for awhile, you will first be looking at one temporal part, then another much like it, then another much like the last one, and so on. If you watch long enough, you will notice that the later temporal parts are slightly bigger than the earlier ones. This is because the baby is growing. Accordingly, the leftmost temporal parts represented on the diagram are smaller than the rightmost temporal parts. For comparison, imagine looking at a person's wrist. Now move your gaze slowly up the person's arm, toward the shoulder. The arm in your field of vision "grows", from wrist size to shoulder size, since your eyes pass over different spatial parts of the person, first smaller parts (the wrist), then larger parts (the shoulder).



Temporal parts have spatial parts, and spatial parts have temporal parts. Consider the

head of the person in the diagram:



. This representation of the head

extends from left to right because heads, like persons, last over time. The head — a spatial part of the person — thus has temporal parts: ,  and . Like the person, the head grows; its earlier temporal parts are smaller than its later ones. Now, consider one of these temporal parts of the head, the last one for example: . It is part of the last pictured temporal part of the

person: . In fact, it is a spatial part of this temporal part of the person. (Notice that the very same object, namely , is both a temporal part of a spatial part and also a spatial part of a

temporal part.)

The existence of temporal parts is just one way that I believe time to be like space. Here are two others (the nature of time is discussed more fully in chapter 5). 1. Time is like space regarding the *reality of distant objects*. Spatially distant objects, such as objects on Mars, are just as real as objects here on Earth. The fact that Mars is far away doesn't make it any less real; it just makes it harder to learn facts about it (we need a telescope). Likewise, I think, temporally distant objects, such as dinosaurs, are just as real as objects we experience now. The fact that a dinosaur is far away in time doesn't make it any less real; it just makes it harder to learn facts about it (we need to examine fossils). The belief that temporally distant objects are real is sometimes called "eternalism". (The main opposing view, "presentism", says that only objects in the present time exist.) 2. Time is like space regarding the *relativity of here and now*. When speaking to my brother in Chicago, if I say "here it is sunny" and he says "here it is raining", we do not really disagree. What is called "here" changes depending on who is speaking: I mean New Jersey, he means Chicago. There is no one true *here*. I think that the word 'now' works analogously. Imagine the dinosaur in the spacetime diagram above saying "It is now the Jurassic Period". I, on the other hand, say "It is now 2006". According to the relativity of 'now', the dinosaur and I do not really disagree. There is no one true *now*. What is called "now" changes depending on who is speaking: I mean 2006, the dinosaur means the Jurassic Period. The combination of this theory of the function of 'now' and eternalism is often called the "B-theory of time".

It is important to distinguish between the different facets of the space-time analogy, since some philosophers accept some facets while rejecting others.² Some accept the B-theory while denying the existence of temporal parts; and some embrace temporal parts while denying that time is like space in one or more ways. What I will defend here, however, is the "B-theory" version of temporal parts theory.

So: is temporal parts theory true? Do temporal parts *really exist* — do persons and other physical objects really have parts that last only for an instant? Temporal parts theory is a very general and speculative theory about the world, about what objects exist and what they are like. It is speculative because the question of its truth is hard to settle by observation or experiment.³ Crudely put, objects look the same, whether or not they are made of temporal parts. Experiment and observation would be unnecessary if all rival theories were internally inconsistent; then we could deduce temporal parts theory from pure logic alone. Unfortunately this is not the case; there are internally consistent opposing theories.

² The task of keeping the facets clearly distinguished is made more difficult by badly-chosen terminology: some philosophers use the term 'four-dimensionalism' for the doctrine of temporal parts alone, even though the term suggests the stronger claim that time and space are analogous in more ways. Another (better) bit of jargon is the following. To say that objects *perdure* is to say that they have temporal parts; to say that objects *endure* is to say that they do *not* have temporal parts.

³ I do not say "impossible to settle"; science sometimes bears on metaphysical questions in unforeseen ways.