

Commentary
Ted Sider
Temporal Parts

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1.

The problem of change and the question of material constitution are two key ingredients of classical and contemporary debates in metaphysics and they are the main themes of this paper.

Sider has presented three arguments for a B-theory version of temporal parts theory. The idea behind temporal parts is that one object persists through time as well as it persists through space, that is, different properties can be applied to an object at different places, as well as different properties can be applied to an object at different times. According to McTaggart (1908), events in the B-series can be ordered according to the relational predicates “comes before” and “comes after”, while the A-series implies a distinction between the non-relational predicates: “being past”, “being present” and “being future”. It is well-known that the B-series is a tenseless view about the nature of time, while the A-series is not. Usually the B-theory of time is associated to the ontology of temporal parts. Sider argues that the B-theory of time is equivalent to *eternalism* plus the thesis that “now” is like “here” inasmuch as they both have an indexical function. So, time is like space, and temporal parts exist as well as spatial parts. In case of future events, *eternalists* seem to hold the view that future already exists and deny the intuitive idea that future is an open

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temporal dimension. The opposite view to eternalism is *presentism*, i.e. the idea that only present objects exist, while objects in the past and in the future do not exist.

Sider adds some examples in order to support the thesis that time is like space, notably regarding the reality of distant objects. Imagine that an object exists on Mars; although that object is spatially far from our actual world, nevertheless one can say that it exists. According to Sider, the same idea can be applied to temporally distant objects, i.e. even if the Jurassic era is temporally far from us and clearly the existence of dinosaurs cannot be physically tested, nevertheless dinosaurs exist to the same extent as the present objects that we perceive.

However, we point out that there are other relevant cases which are not handled by Sider's examples. Consider, for instance, a star in a distant region of the universe for which we do not have any physically direct proof. In this case, it is worth noting that the way to prove the existence of such a star is different from the ones for the dinosaur and the object on Mars. In our view it is paramount to draw some distinctions between different kinds of empirical proofs in order to refine the alleged similarity between time and space. A proof is *actual* if it involves a conclusive verification, while it is *potential* if it is in principle available. A proof is *direct* if what is proven can be ostensively shown, while it is *indirect* if it requires technical instruments of observation. In Sider's examples there is no direct actual proof involved, but the objects of his examples may allow an actual and indirect proof, while it is not the case for the example we provided (see Table 1).

In the next section we will introduce the three arguments for temporal parts provided by Sider.

2.

The first argument for temporal parts is called *argument from temporary intrinsics*. Such an argument is due to David Lewis (1986) who maintains that certain properties like shape are *intrinsic* since they do not require the existence of further objects in order to be fulfilled, while other properties require a relation with other objects. The latter can also be named *extrinsic* properties. As a way of example, "being round" for a table is an intrinsic property, while "being on the right of the chair" is an extrinsic property.

Lewis holds such a view because of the following metaphysical intuition: shape-like properties are intrinsic, for the instantiation of shape-like properties is not relative to time. If so, then shape-like properties have to be explained in terms of properties of temporal parts. Sider makes a good point observing that accepting extrinsic properties does not lead to a holistic perspective on the existence of objects in the external world since it does not require that *every* object is interconnected with all the other existing ones. Hence, the ontology based on extrinsic properties is not so odd.

How much reliable is Lewis's metaphysical intuition? In our opinion everyone who is acquainted with Abbott's novel *Flatland* can show good arguments against Lewis's intuition. Shape-like properties depend on your choice of geometry. In a flat land where nobody can observe the third dimension, all spheres will be considered to be like circles. This example shows that shape-like properties are not intrinsic since they may vary in different geometrical settings. If so, the distinction between intrinsic and extrinsic properties merely based on the existence (or not) of a relation with other objects is not reliable. Despite the unreliability of Lewis's intuition, one may hold temporal parts theory without the problematic distinction between intrinsic and extrinsic properties.

We switch now to the second argument for temporal parts which is based on the *paradox of material constitution*. Such a paradox arises when two different objects intuitively seem to be spatially coincident but yet related to their parts in different way. One example of the paradox of the material constitution is the following: imagine a sculptor that begins to shape a piece of clay on Monday, and she finishes her job on Tuesday. Now consider the paradox presented by Sider (2008):

P1: the piece of clay that existed Monday continues to exist on Tuesday after being given statue shape.

P2: The sculptor creates a statue, which exist on Tuesday but not on Monday.

P3: If P1 and P2 are correct, then the statue and the piece of clay are two different material objects that on Tuesday are made up of exactly the same matter. They are not the same object because of Leibniz's Law: the piece of clay, but not the statue, exists on Monday.

C: Therefore, different material objects can be made up of the same matter at a single time.

This argument comes to be paradoxical because the premises (P₁, P₂, P₃) are apparently sound while the conclusion C seems unacceptable. A further

example is the following: Consider now a certain cat, Tibbles, and its torso, Tib. Unfortunately for Tibbles, on Tuesday its tail is chopped off and the tail's matter is destroyed. We now argue as follows:

P4: Tibbles exists on Tuesday, since a cat can survive the destruction of its tail.

P5: Tib exists on Tuesday, since chopping off the tail did not affect Tib at all; it merely removed an external object that was once attached to Tib.

P6: If P4 and P5 are correct, then on Tuesday, Tibbles and Tib are two different material objects made of the same matter. They are not the same object because of Leibniz's Law: Tibbles, but not Tib, had a tail as a part before Tuesday.

C: Therefore, different material objects can be made up of the same matter at a single time.

Many attempts to solve the problem of constitution have been proposed. As noted by Sider, each of them accepts or rejects different points in the examples presented above (see Table 2). The *Constitution view* merely accepts cohabitation – i.e. two different objects occupying (parts of) the same space – and does not provide a reply to the paradox. *Mereological essentialism* is the perspective according to which parts are essential to the whole and a new object cannot be made of the same matter of other pre-existing objects. In other words, the only object that exists is the quantity of matter. Hence, a statue is not created as a new object as it is a mere mode of presentation of the same essence (matter) of the piece of clay. According to the *dominant sort theory* there is always a sort that prevails upon the others. As a result, cohabitation is rejected. On Monday the only existing object is the piece of clay, while on Tuesday the only existing object is the statue. Another view on the problem of material constitution follows from *nihilism*. According to this perspective, the ultimate constituents of matter are elementary particles and there is no sort at all¹.

Finally the last view on the problem of material constitution is provided by *temporal parts theory*. According to this theory, held by Sider, objects are aggregates of temporal parts, also named “spacetime worms”. For instance, the statue is the collection of temporal parts which are a proper subset of the temporal parts of the piece of clay, since the piece of clay existed before the constitution of the statue and exists also after the disintegration of the statue.

¹ Table 3 explains under how many sorts we trace objects according to the four perspectives.

Hence, the statue and the piece of clay are two different objects, because they contain different temporal parts, even if they cohabit in some of them.

Sider maintains the view that we need to take into account the following concepts: the *tracing scenario* and the *tracing target*. The tracing scenario consists both of a series of times and of the objects existing at each of those times (tracing objects). In the case of the statue and the piece of clay, the tracing times are those when the piece of clay is shaped into the statue, while the tracing objects at each moment are the parts of the piece of clay. The tracing target of a scenario is a certain object *x* iff: a) the scenario «contains exactly the moments at which *x* exists» (p. 158), and b) «at each moment of *S* [the scenario], *x* is exactly composed of the tracing objects for that moment» (p. 158). In the aforementioned example, the scenario contains all the moments at which the statue exists and at each moment the statue is composed of the tracing objects (the parts of the piece of clay). So, the tracing target of this scenario is the statue.

Sider's fundamental claim is: every tracing scenario has a target. According to him, anyone who denies that all scenarios have targets must draw a line somewhere, between the scenarios that have targets and those that do not. Such a line, though, turns out to be very difficult to draw, for two reasons. First, the line must not be anthropocentric, and second, there is to take into account a problem of vagueness (this is the third argument for temporal parts). In Sider's opinion, anyone who claims that only some scenarios have targets believes that only ordinary objects exist and only those can be targets. If so, then strange objects, such as temporal parts, do not exist and they are not tracing targets. Sider points out that such a view is anthropocentric, but he does not discuss further the reasons grounding this view. Moreover, he underlines that, since ordinary concepts such as *statue*, *piece of clay*, *person* are vague, there could be tracing scenarios in which it is vague whether objects such as statues, pieces of clay and persons exist. In such cases, it is unclear whether the scenarios have targets. This is the core of the problem of vagueness associated with tracing scenarios. Temporal parts theory does not have to face issues concerning anthropocentrism and vagueness: all scenarios are considered to have targets and, therefore, ordinary objects are upon a par with strange objects: no line needs to be drawn.

Note that, while supporters of ordinary objects theories usually endorse a theory on what counts for an entity to be an object, Sider provides no one. This lack could be, after all, seen as a shortcoming of his theory. A possible way out

could come from the discussion of the problem of unrestricted composition. In footnote 12, in fact, Sider points out that his fundamental claim is based on the doctrine of unrestricted composition that we will take into account in the next section.

3.

In this final section we will raise some objections to Sider's assumption of unrestricted composition, also known as *universalism*. First and foremost, we want to point out that it is necessary to make a distinction in the ontology of the external world between structured objects and unstructured ones. We will call "structured objects" the objects that do not exist before the process of their construction; viz., the statue does not preexist before it is constructed by following a procedure. On the contrary, the piece of clay preexists to any manipulation, therefore we will call it "unstructured object".

We borrowed this distinction from the different roles that definition has in *Intuitionism* and in the *Platonistic* views of mathematics. In intuitionistic systems the definition creates the object that we want to define, while in Platonism the definition does not create an object because the object preexists to the definition itself (Quine, 1948). Similarly, the statue is the only structured object, while the piece of clay is not. There can be some moments in which the statue and the piece of clay cohabit but this happens just in a weak sense of cohabitation. Note that accepting the cohabitation of a structured object with an unstructured one is different from supporting the constitution view that is insensitive to the paradox of material constitution.

Especially in the case of structured objects, universalism is not a convincing point of view, as one can make objects following a procedure of constitution. Therefore not any aggregations of parts can contribute to constitute an object, but only the ones that are coherent with the possible combinations determined by the rule governing the procedure and the possibility to follow it.

Sider provides an outstanding approach to the ontology of time. Nonetheless, we believe that the issues above are still in need of further discussion.

	Actual proof	Potential Proof
Direct proof		Object on Mars
Indirect proof	Object on Mars /Dinosaur	Dinosaur/Object on Mars/ Distant Star (it may depend on the status of physical knowledge)

Table 1.

	P1	P2	P3	P4	P5	P6	C
Constitution view	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mereological Essentialism	Yes	No	Yes	No	Yes	Yes	No
Dominant sort	No	Yes	Yes	Yes	No	Yes	No
Nihilism	No	No	No	No	No	No	No

Table 2.

Under how many sorts do we trace objects?

Constitution view	All sorts
Mereological essentialism	One sort: quantity of matter
Dominant sort	One sort: dominant sort (it varies cases by cases)
Nihilism	None

Table 3.

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