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Four-Dimensionalism: An Ontology of Persistence and Time

By Theodore Sider

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[1] In analytical metaphysics, there are three, closely related, debates about time and the nature of change and persistence. The first is about what there is. *Presentists* believe that only present things exist, whereas *eternalists* think that also past and future things exist, even though they do not exist now. The second debate is a debate about persistence: how is it that objects persist, and remain the same while undergoing change? *Perdurantists* say that this is because objects are genuinely four-dimensional, and are composed of temporal parts. Objects persist through time by perduring: the change of an object consists in the fact that it has temporal parts that have different properties. *Endurantists* deny this: objects are wholly present whenever they exist, and are therefore three-dimensional in nature. They persist through time by enduring: a changing object is wholly present at different times, and acquires some new property, which it then has in a special way, related to that particular moment in time. The third debate is the old discussion between an A-theory and a B-theory of time. *A-theorists* hold that change consists in events becoming Present after having been Future, and then becoming Past after having been Present: time is essentially tensed. B-theorists think that events are related by an ordering relation of 'earlier than', but that events have no intrinsic properties like 'being Present' or 'being Past'. Therefore, any tensed statement can be reduced to some tenseless statement, or, at least, has tenseless truth-conditions.

[2] Theodore Sider has written a forceful and lucid defense of the view that objects are four-dimensional in that they have temporal parts. The idea is best illustrated by noticing that change involves *prima facie* inconsistent property-ascriptions. An object may be red, but at some later time, it may be green. How can we ascribe both these properties to the same object? The answer is, of course, that the object has these properties at different times. So, one way of resolving the apparent inconsistency is by relativizing all properties to times. The four-dimensionalist however, chooses not to read the sentence 'S is P at t' as: 'S is P-at-t', but writes it as: 'S-at-t is P'. Property ascriptions are timeless, but we ascribe them to objects-at-times, which are understood as temporal parts of four-dimensional objects. Objects can have different colors at once because their spatial parts are differently colored, but they can also have different colors

because temporal parts are differently colored.

[3] After having cleared the ground with some remarks about ontology and meaning, Sider sets out to introduce the four-dimensional picture in an intuitive way, and provides some informal reasons to adopt it: it solves the puzzle of change, the riddle of coinciding objects, and that of the ship of Theseus. The idea is that the same three-dimensional object may be a temporal part of different four-dimensional objects. A lump of bronze and a statue that it is made of are different objects, because the lump has temporal parts that the statue has not. In the case of Theseus' ship there are two ships of Theseus, which share the temporal parts in which Theseus originally set out his journey to Crete to defeat the Minotaur.

[4] In fact, Sider defends a particular version of perdurantism, called the *stage view*. More common is the *worm view*, according to which ordinary terms refer to the whole four-dimensional object, or spacetime worm. According to the stage view, however, such terms refer to instantaneous stages rather than to worms. Now stages don't persist, but they do have temporal properties like 'being F in two minutes'. Such property-ascriptions are true in virtue of a counterpart-relation that one stage of an object bears to other stages in the same four-dimensional worm: it is the counterpart-stage of two minutes later that actually has F. A stage can stand in different counterpart-relations to different later stages, depending on the worms of which they are stages.

[5] In the second chapter, Sider clears up the relation of the perdurantism-endurantism debate with the other two debates, and argues, first, that it is natural for an eternalist to be a reductionist about tense (in fact, Sider calls the combination of eternalism and reductionism about tense the 'B-theory'). Then he goes on to argue against presentism, for all its competitors (the growing universe theory and eternalism) are consistent with his views about temporal parts, and some arguments in the next chapters assume the truth of eternalism. To the standard arguments against presentism (the truth-maker objection and the argument from special relativity) he adds an original problem: the problem of cross-time spatial relations. How should the presentist represent comparisons between the spatial positions of things at different times? It seems impossible to do so, even with the tense-operators the presentist introduces to be able to express truths about past and future without committing himself to the existence of past and future objects. In Newtonian spacetime, comparisons of positions at different times pose no problem, for there places endure: there is a natural relation of identity of points across time. However, there is no empirical reason whatsoever to ascribe so rich a structure to spacetime. And in spacetimes lacking this structure, it is impossible to state that some present event takes place at the same place as some past event.

[6] So construed, the argument is akin to the argument from special relativity. Because of the relativity of simultaneity in that theory, and the absence of a preferred frame of reference, the structure of Minkowski spacetime is too poor for the presentist's ontology. The presentist has two options open when interpreting special relativity. She may choose one inertial frame as the preferred one, i.e. an inertial frame such that one of its hyperplanes of simultaneity corresponds with the Present, even though she acknowledges that we can never know which frame is

that frame (this is the so-called neo-Lorentzian interpretation of special relativity). The second option she has, is to define some spacelike hypersurface of Minkowski spacetime as being a plane of absolute simultaneity. This hypersurface may not correspond with any hyperplane of simultaneity of any inertial frame. Although both options are perfectly consistent with special relativity, this argument, when strengthened with the foregoing, shows that the presentist needs *full Newtonian spacetime* to make sense of the notion of a present and to give meaning to spatial comparisons between objects at different times. This means that she has to endow spacetime with a lot of structure for *purely metaphysical* reasons. That is indeed a high price to pay, since there is a perfectly coherent alternative interpretation of special relativity on offer: eternalism.

[7] In chapter three, Sider gives a precise statement of his position, and thereby tries to countenance the claims of those who have argued that the dispute is merely a verbal one, or that both positions are metaphysically equivalent. He goes on to challenge three-dimensionalists to state their position precisely, and in the meantime takes it to be the denial of four-dimensionalism. The key role in the definition is played by a relation of parthood that is timelessly ascribed to instantaneous temporal parts of two objects.

[8] Chapter four lists and evaluates a number of arguments for four-dimensionalism, leaving out the most important, to which the fifth chapter is dedicated. Sider discusses Russell's argument from parsimony, Quine's argument from logic, the argument based on the incoherence of the A-theory, the argument from special relativity, the argument based on the analogy of space and time, the argument from temporary intrinsics, an argument from timeless worlds, one from time travel, an argument from spacetime (a version for substantivalism and one for relationism), and, finally, an argument from vagueness. Of these, some are entirely new, but all are precisely formulated and evaluated.

[9] As already said, Sider leaves chapter five for the most important argument for four-dimensionalism, namely that it gives the best unified theory of the paradoxes of coincidence. These paradoxes arise from the *prima facie* plausible view that two objects cannot coincide spatially, and share all of their parts. Some well-known puzzles seem to challenge that view. The first is the case of the lump of bronze and the statue: while being formed into a statue, the lump of bronze does not cease to exist, or so it seems, and a new statue is formed. The second is the case of Tibbles the cat, and Tib, which consists of all parts of Tibbles, except for her tail. When Tibbles loses her tail, Tib and Tibbles coincide. Then there are cases of fission (of which Theseus' ship is an example), fusion and longevity. Sider also considers cases where identity over time is vague or conventional.

[10] The worm theory can explain why coincidence is unobjectionable, for there is nothing strange about two objects having some parts in common. Sider discusses a number of alternatives. One is to accept coinciding three-dimensional objects. Another is to deny that there are coinciding three-dimensional objects, either for the reason that one of the objects falls under a dominant sortal, or because identity can be temporal. Two other alternatives are based on an alternative account of constitution: mereological eliminativism (the view that there are no

composite objects) and mereological essentialism (the doctrine that an object's parts are all essential to it). He criticizes all these views and compares them with four-dimensionalism. The latter view is considered to give the best account of the paradoxes of coincidence. Only then Sider goes on to state his preferred version of four-dimensionalism: the stage view. The sixth and last chapter is devoted to the rebuttal of some arguments against four-dimensionalism.

^[11] One of the most important merits of this book is that it provides a large collection of arguments for and against four-dimensionalism, and contains a fair evaluation of all of them. This is a philosophy book as one would wish them all to be: systematic, illuminating, well-written, and therefore, although not always easy to read, a nut that is worth the effort of cracking.