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The Relationist and Substantivalist Theories of Time: Foes or Friends?

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Abstract: There are two traditionally rival views about the nature of time: *substantivalism* that takes time to be a substance that exists independently of events located in it, and *relationism* that takes time to be constructed out of events. In this paper, first, I want to make some progress with respect to the debate between these two views, and I do this mainly by examining the strategies they use to face the possibilities of 'empty time' and 'time without change'. As we shall see, the two allegedly very different rival views are much less different than has been thought: their structure is extremely similar, their strategies are extremely similar, and they can both face the possibilities of 'empty time' and 'time without change' *in the same way*. Thus, I argue in favour of a certain kind of equivalence between the two views; I discuss a Strong and a Weak version of this claim; and I provide reasons for endorsing the former. I also discuss the parallel between this pair of views about the nature of time and another analogous pair of views: the bundle theory and the substratum theory about the nature of material objects, with respect to the problem with Identity of Indiscernibles.

1.

A useful and standard way to introduce the substantivalist theory of time is by the use of 'the container' metaphor and the two central arguments in its favour: the possibility of 'empty time' and the possibility of 'time without change'. According to substantivalism, time is like a container in which events and things are placed, a container that exists independently of what is placed in it. While I am typing this sentence the container is not empty but, importantly, it might very well be: a container is perfectly capable of not containing anything. Less metaphorically, time is a substance that exists independently of events and things located in time, and consequently it is such that it allows straightforwardly for the possibility of there being periods of time during which time continues to pass even if no changes occur (so that the universe is 'frozen' during this period of time) or even if nothing at all occupies it (so that time is 'empty' during this period).

Contra substantivalism, the relationist theory of time rejects the idea of time as being independent of events and things placed in it. Rather, relationists claim,

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time is nothing over and above temporal relations among events and things located in it. Thus formulated, relationism sounds probably too circular, so let us try to put it in a different way: if there were no objects and events, there would be no time, for time is not a thing (a substance) but rather a system of relations among events and things. A particular instant of time is thus, according to relationism, a collection of simultaneous events and things (a simultaneity class of events and things), and a time-series is all the collections of simultaneous events in the order in which they occur. It is at least a *prima facie* consequence of this view that it cannot accommodate the idea cherished by substantivalists that there could be 'empty' periods of time or periods of time without change.

The latter is something that will be one of the main points of discussion below. But before I start, let me make some very quick terminological remarks: substantivalism is also often referred to as 'absolutism' (following Newton's absolute space and time theory) or 'platonism' (since Plato was among its prominent defenders). The term 'substance' must be here distinguished clearly from Aristotle's use of it. The Aristotelian theory of substance is something different and is a theory about the nature of ordinary material objects. If any theory of material objects is analogous to substantivalism about time it is not the (Aristotelian) substance theory but rather the substratum theory (or 'bare particulars' theory), which is a point that I shall discuss below. Relationism is also often referred to as 'reductionism about time' for obvious reasons.

As metaphysical theories go, it seems at a first sight, and probably even at a second deeper look, that these two rival views could hardly be more dissimilar and opposite to each other. To put it in terms of the recent debate in meta-ontology, the dispute between the substantivalist and relationist theories of time seems to be a good candidate for a clearly substantive non-verbal and non-trivial one.

Let me be a little more precise. In the recent meta-metaphysical debate, answers to the question whether metaphysical disputes are really substantive or merely verbal gave rise to various meta-metaphysical views: at the two opposite sides of the spectrum we have the *realist view* recently defended by Sider (2001, 2007, 2008) that claims that metaphysical disputes *are* substantive and that metaphysical questions have objective answers, and the opposite *sceptical anti-realist view* defended in different ways by Chalmers (2008) and Yablo (2008) that claims that metaphysical questions do not have objective answers, that they can be formulated and answered in different frameworks and there is no fact of the matter as to which framework is correct; consequently, metaphysical claims lack truth-value. In between these two 'extreme' views lie two 'moderate' ones. Bennett (2008) defends an *epistemicist view* that says that at least some metaphysical questions have genuine objective answers but that often we cannot discover them and that consequently there is often little reason or no reason at all to go for one side rather than the other. Finally, there is the widely debated *moderate anti-realist view*, championed by Hirsch (2005, 2007, 2008), that claims that many metaphysical debates are merely verbal disputes where the disputants seem to claim different things but in fact are making the same claims only formulated in different ways, or different languages.

In this paper, I want to do two things. First, I want to make some progress with respect to the substantivalist and relationist theories of time, and I want to do this mainly by examining the strategies they use to face the possibilities of 'empty time' and 'time without change'. Second, I want to defend one meta-metaphysical and one methodological claim. The meta- metaphysical claim will be that the two allegedly very different rival views are much less different than has been thought: their structure is extremely similar, their strategies are extremely similar, they can both face the possibilities of 'empty time' and 'time without change' *in the same way*, so that, as we will see, some central objections to one side always have a sneaky tendency to reappear for the other side as well. In the face of this, I will then put forward two possible conclusions that can be drawn: either a strong meta-metaphysical claim that these two views turn out to be 'equivalent' or a weaker claim that the two views are so similar and work in such similar ways for all theoretical purposes that there is little reason for choosing one rather than the other. Also, something that I hope will stem from my considerations about the debate between the relationist and the substantivalist theories of time is the importance of doing first-level metaphysics first—the question of verbalness or substantiality of metaphysical debates receives different answers with respect to different debates; there are no correct very general claims about metaphysics as a whole, and the methodological importance of this is that the best way to do meta-metaphysics is to do first-level metaphysics, from which meta-metaphysical claims (such as equivalence claims or claims about 'verbalness' of a dispute) can arise. The priority should be given to the low-level considerations, and meta-metaphysical claims should not be made in a too general way but should come from particular decisions taken case by case on the level of metaphysics.

This being said, let us then now turn our attention to the relationist and substantivalist theories of time.

2.

Let us start with the case of the possibility of time without change, a case that nourishes a large-scale debate between substantivalists and relationists. Let me quickly summarize the well-known Shoemaker (1969) argument that intends to show that such periods of time when all changes in the universe come to a stop, called 'global freezes', are indeed possible. It is not my purpose, as I shall explain below, to defend or reject this argument (rather, I will be interested in its conclusion and its implications for the substantivalism-relationism debate), but it will be helpful to bear it in mind. The purpose of the argument is to show that in a possible world where 'local freezes' occur, its inhabitants can have a good reason to think that 'global freezes' occur (even if, of course, no one can directly experience them). Take a world W divided into three spatial zones A, B, and C. There are local freezes: at regular intervals, in each of the zones all changes come to a stop for a certain period of time, while at least one of the other two zones

remains unfrozen. This happens for one hour every 2 years in zone A, for one hour every 3 years in zone B, and for one hour every 5 years in zone C. Thus, the inhabitants of W who can be aware of local freezes when they occur in a different zone than the one they are located in, and who have made the calculation, have a good reason to believe that every 30 years there is a one-hour global freeze. To make their reason stronger, it can be added into the example that in every zone just one minute before a local freeze occurs some visible changes occur to 'announce' the freeze—for instance, just before a local freeze occurs all things located in the zone in question turn red. Every 30 years, it is then not only a simpler theory (it is simpler to say that local freezes occur with a regularity rather than to say that there is an exception in the regularity every 30 years) but also the fact that everything, in all zones, turns red one minute before the expected global freeze, that indicate that indeed such a global freeze is about to take place. It is thus, in W, reasonable to believe that there are regular one-hour periods where time continues to flow while no change at all occurs.

This argument actually does not *show* that it is possible that there can be time without change, since local freezes are simply presupposed without argument. What is interesting then about this argument is not so much what it shows, but that it provides a useful metaphysical scenario that has traditionally been taken to have important implications with respect to the debate about the nature of time. Indeed, if global freezes are possible (or if we could have good reasons to think that they are possible) then this would show that substantivalism has to be true (since relationism construes time out of changes), whereas if such global freezes were shown to be *im*possible this would leave room for both substantivalism and relationism to be true.

What I intend to do now is to show that in *both* cases, *both* theories can equally well do the job. Just as it would be a mistake to think that the *im*possibility of global freezes shows that relationism is true (since substantivalism can accommodate this possibility as well), it is also a mistake to believe that the possibility of global freezes shows that relationism is false, since as we shall see it can accommodate this possibility *in the same way* substantivalism does. My strategy is thus completely different from the strategy that modifies ('modalizes') relationism by taking other-worldly changes as being constitutive of this-worldly instants (see Forbes 1993); rather I shall show that relationism *as it stands*, without any modification of the theory, can actually deal with the possibility of time without change in the same way substantivalism does.

Let us start by examining the substantivalist's strategy more closely. How exactly does *substantivalism* manage to accommodate the possibility of time without change? Suppose that there is a global freeze and that there is no change going on—how can time continue to flow? The question is, what makes it true that there is a series of non-identical instants one after another, rather than just one single instant? How can the instants in this series (the series of instants that occurs during a global freeze) be distinguished? Well, of course *not* by what changes/events occur at them, since these are all the same. From the *qualitative* point of view, they are indiscernible—if this were the criterion for distinguishing

instants, then there would only be one instant, and no global freeze that lasts for an hour. So what makes different instants different, if they are not qualitatively different? The answer is: they are primitively numerically distinct; they do not need to be qualitatively discernible, since instants in themselves do not have a nature such that they are capable of being qualitatively distinct one from each other; rather they are fundamental non-decomposable primitively numerically distinct entities. Following the container metaphor, during global freezes there is a series of containers that in themselves are qualitatively indistinguishable and that contain qualitatively indistinguishable stuff, but that are primitively numerically distinct.

This is what I will call a 'problem-solver'. Simply put, a problem-solver is something that is a primitive in a theory and that solves a problem. Perhaps, every primitive in every theory is a problem-solver—for why do we introduce primitives in the first place, if not for them to do an explanatory job? And how do they do this explanatory job? By having a primitive capacity to do so. I shall give some more examples below, but for now let us stick with substantivalism and the problem of time without change. How can the theory account for there being global freezes? By having numerically distinct instants that are not distinguished qualitatively, but primitively. The premise that there are primitively numerically distinct instants is thus a 'problem-solver' in the sense that without it the theory would not be able to face the scenario of time without change, and that it succeeds to do so only in virtue of the postulation that it can do so. The latter claim may sound a bit pejorative with respect to substantivalism, but it is not: every theory has its primitives and every primitive is, at least to some extent, a problem-solver. As I see it, the use of problem-solvers is commonplace in all philosophy, and without it we would not get very far—it just is one among the components of the philosopher's toolkit.

Let us now turn our attention to relationism. According to this view, an instant is a simultaneity class of events, more precisely, it is a bundle[1] of events that are put together by the relation of simultaneity, and so it is individuated by these events and this relation. An instant thus has a qualitative nature, unlike under substantivalism, and instants can be in this way distinguished by the events they contain. But when a global freeze occurs, all of the instants during this one-hour period contain the same events, and so are indiscernible; consequently they cannot be qualitatively distinguished any more, and, the objector claims, one has to conclude that there actually is only one instant—and so such a view cannot accommodate the possibility of a one-hour global freeze.

I think that the relationist has a reply readily available at hand here. Consider more closely what the relation of simultaneity is and what it does. Its theoretical role is such that it is a function that takes events as input and gives an instant as output. For each instant there is such a relation, and this relation is not and cannot be one and the very same relation for all instants—otherwise, regardless of there being global freezes or not, there would be no more than one single instant. (If properties and relations are tropes, the situation is even clearer: tropes being non-repeatable entities it would not even be possible for the relation of

simultaneity to be one and the same for different instants, so what we have here are exactly resembling and numerically distinct tropes of simultaneity, one per instant. If properties and relations are universals, there are two *prima facie* possibilities: either the relation of simultaneity is one and the very same relation for all instants, or it is a different universal for each instant. As suggested, the former possibility yields difficulties even if no global freeze occurs—the case of a global freeze is just the most salient case where these difficulties become the most apparent—so it is the latter that should be endorsed anyway. Alternatively, claiming that there are numerically different *instances* of *one* universal of simultaneity could perhaps also do the job.[2] What is important for me here is that there is always something numerically different for each instant that is responsible for tying up together the events to make up the instant.)

Thus the structure of the relationist theory of time is the following (Figure 1):

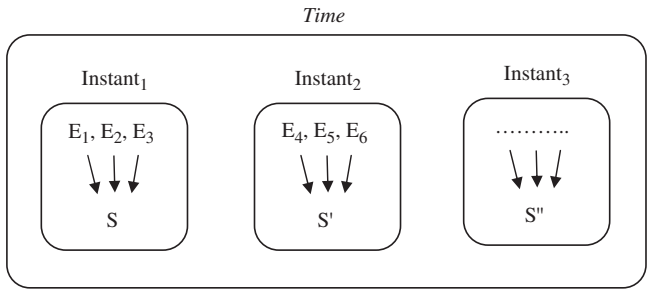


Figure 1: Structure of the relationist theory of time

Each instant is made out of events tied together by a relation of simultaneity that is different from one instant to another. Time is then a series of such instants.

Now, what exactly happens when a global freeze occurs? The events that compose the various instants that occur during the freeze are the same, since no changes occur. But that does *not* at all prevent relationism from accommodating the claim that there is a series of numerically different instants: a series of instants that lasts one hour where each instant contains the same events E_1, E_2, ... E_n *but* tied together by a different relation of simultaneity, as is anyway the case even when no freezes take place. The instants will thus be distinguished not qualitatively but numerically by the relation of simultaneity that individuates them as well as the events do. And how is the relation of simultaneity distinguished from one instant to another? The question is: how is it (and not *why* is it, we have seen why above) that the relation of simultaneity for an instant is distinguished from the relation of simultaneity for another? How is it not one and the same relation? As in the case of substantivalism, the answer is primitivist: it is primitively the case that the various relations of simultaneity can be said to be numerically distinct (but of course not qualitatively distinct) one from each other.[3] As before, this is a 'problem-solver'.

Furthermore, it is a problem-solver that strictly parallels the one that substantivalism uses: both views can only face the 'time without change' scenario by using a primitive machinery that distinguishes numerically different instants during a global freeze. Functionally, both problem-solvers used in both views are, with respect to the problem of time without change, equivalent. One side calls it a 'substance' (a 'container', a 'time') and the other calls it a 'relation of simultaneity'; but when you look at what they are *doing* in the theory that employs them, it is actually really hard to tell them apart. In other words, in one case the problem-solver is such that events are said to be 'placed' in it, or 'contained' in it; and in the other case the problem-solver is such that events are said to be 'tied together' by it—but, such metaphors aside, the functional role of these problem-solvers, with respect to the problem of time without change, is the same. Both have the primitive function of making different instants different, numerically, and both can thus equally well do the job of accommodating the possibility of global freezes. And it is no wonder that they can both do the job since they are primitives and any primitive can be given any power one wants to give it, especially if one's opponent in the debate does the same. What I have in mind here is a view about the nature of primitives in metaphysics such as the problem-solvers involved here that takes very seriously the *functional role* they play in the theory. By its very nature, a primitive being primitive, it is non-analysable and we are not really given any information concerning its nature; we are told *what it does* rather than *what it is*. So it is what it does that counts—after all, that's what any primitive is introduced for in a theory in the first place (otherwise there would be little justification for having it). Thus, primitives are individuated by what they do, what their functional role in a theory is, and as a consequence two primitives that do the same job just turn out to be equivalent, for all theoretical purposes. I have shown above that with respect to the case of time without change, the relationist and the substantivalist primitive machinery does the same job at the same place in the same way (that is, in a primitive way). Now, this does not mean that the two theories themselves are equivalent, since there may be other places where they are different. Indeed, below I shall examine the case of 'empty time' that may perhaps be such a place. But before I go any further, I would like now to make a short detour and consider what is an interestingly analogous metaphysical debate.

3.

Our case of relationism, substantivalism and the problem of time without change parallels the case of the bundle theory, the substratum theory (about the nature of material objects) and the problem with Identity of Indiscernibles (see Black 1952). This is not surprising: the bundle theory is a relationist theory about objects in a way that is analogous to the relationist theory about instants, and the substratum theory is also structurally analogous to substantivalism about time. The problem concerning time without change is the question about how to account for numerical

diversity of times (instants) that 'have' the same events, that is, at which the very same events occur during a period of time without change, and in a parallel way the problem with Identity of Indiscernibles in the debate between the bundle theory and the substratum theory is the question about how to account for numerical diversity of objects that have the same properties (that are qualitative duplicates)—both problems thus yield essentially the same difficulty. The dialectical situation is also the same in both cases: exactly as the problem of time without change was supposed to be an objection to relationism, the problem with Identity of Indiscernibles is supposed to be an objection to one version of the bundle theory: the Bundle Theory with (Immanent) Universals (BTU). Now, I am going to suggest that these similarities extend even further and that: exactly as in the case of relationism and substantivalism, both BTU and its opponent STU (the Substratum Theory with Universals) can face any cases involving indiscernible objects *in the same way*.[4]

To account for what an ordinary object (a table, a person, ...) is, STU uses a structure that parallels the substantivalists': there is some sort of substance that is required to support what is in need of being supported—the object's properties. This substance is usually called a 'substratum', a 'bare particular', a 'naked particular', an 'underlying subject'—but these different labels do not stand for different analyses of what this substratum (that's the term I shall be using) is, rather it is typically taken by STU-theorists to be primitive, unanalyzed and under-defined.

Friends of BTU typically claim that postulating such a substratum is unnecessary and uneconomical and that a better and more elegant strategy is to account for ordinary particulars only in terms of their properties (those that friends of STU take to be 'had' by the substratum) tied together by a special n-adic property often called 'compresence' (that's the one I shall be using), 'consubstantiation', 'co-instantiation', 'togetherness', or 'collocation'. Again, these different labels do not hide different analyses of what this relation is, since it is also typically taken by friends of BTU to be primitive and unanalyzed.

I guess that this is something that should ring a bell, after the discussion of relationism and substantivalism above. When it comes to accounting for what makes a particular a particular, both BTU and STU contain a primitive problem-solver, a *unifying device* that does the job of taking properties to make up objects—that's its main theoretical role. To paraphrase Locke, in both the case of compresence and in the case of the substratum, we are not really told by BTU and STU, respectively, anything very informative about their nature, so they are a 'we-know-not-what', but they are a 'we-know-very-well-what-it-does', that is, we know their theoretical role. Defending in detail this claim is something that I have done elsewhere;[5] now I just want to show how the case of the problem with Identity of Indiscernibles parallels the one involving time without change.

The principle of Identity of Indiscernibles says that if two objects have all exactly the same properties they are identical,[6] that is, there is only one object. This principle is often claimed to be false (or only contingently true) since it seems plausible, at least to the objector, that there could be two objects that are qualitative duplicates, such as the two famous spheres in a Max Black universe (see Black 1952). If this is a genuine possibility, we should reject the principle. BTU, however,

seems to be committed to its truth and consequently, since it implies a falsehood, it is to be rejected—that's, in short, how the standard objection goes. Indeed, according to BTU, an ordinary object is a bundle of properties and if the properties are the same (numerically the same, since they are universals) then it seems unavoidable that the two bundles are numerically the same as well.

Now, I am *not* going to ask how BTU can (try to) get out of trouble. In the vast literature covering this issue many different strategies have been examined, defended, or rejected such as appealing to location properties ('being on the left of Sphere A'), or haecceistic properties ('being identical to Sphere B'), or rejecting the plausibility of any Black-like scenario in the first place. Rather, I shall now ask: how does STU avoid any trouble? Why does this objection not even arise against STU? After all, since STU's properties are universals exactly as under BTU, two indiscernible objects also have literally and numerically the same properties and so cannot be distinguished qualitatively. The answer here is obvious: the two indiscernible objects are not distinguished qualitatively (since they *are* qualitative duplicates, that's the hypothesis) but merely numerically, and the element in the theory that allows for this is the substratum: the substratum does *not* contribute to the qualitative nature of the object and so it *can* be a numerically different one in different objects without spoiling the two object's qualitative identity. But then how are the two different *substrata* distinguished, since they cannot be qualitatively distinguished (neither in the sense that they exemplify different properties, since they don't, nor in the sense that they are in themselves qualitatively distinct, since by definition they aren't)? The answer is of course that they are *primitively* numerically distinct. They are, exactly as the substantivalist's instants, problem-solvers: they primitively allow us to solve the problem of how we can have two objects that are qualitatively identical but numerically distinct. This problem-solving capacity of STU's primitive unifying device is to be taken seriously: *only* thanks to it can friends of STU claim that problems with Identity of Indiscernibles do not arise against their view.

But then, analogously to the case of relationism and the problem of time without change, BTU can face the alleged objection from Identity of Indiscernibles in the same way STU does. Exactly as with the substratum, the primitive relation of compresence does not contribute to the qualitative nature of the object and so it *can* be a numerically different one in different objects without spoiling the two object's qualitative identity—and so it can account for numerical diversity of qualitative duplicates. The BTU's relation of compresence is a unifying device whose primary function is to take properties to make up objects; it is a primitive problem-solver with respect to the question about what makes a particular a particular, in the same way the substratum is; and in the case where a need arises to account for the numerical diversity of indiscernible objects it can of course fulfil the same theoretical role the substratum does as well—it takes no more than the claim that each object's properties are bundled together by a primitively numerically different compresence relation. One way to put it is that if such a strategy is acceptable in the case of substrata, it would be most unfair not to allow the BTU theorist to make exactly the same move, if she wishes to do so.[7]

So, as in the case of relationism and substantivalism, the two theories here do have the same means of avoiding any worries with Identity of Indiscernibles; both contain a problem-solving 'unifying device' that allows them to do so in the same way; and calling this device different names ('substratum' and 'compresence') does not seem to make a difference other than merely terminological. Stick to a neutral vocabulary (like 'unifying device') and reformulate the two views, with respect to the objection from Identity of Indiscernibles: both will be able to say that Sphere A and Sphere B can be distinguished by there being a primitively distinguished unifying device for A and for B.

There are (at least) two ways to see what sort of conclusion can be drawn from these considerations about relationism, substantivalism, BTU, STU, and their respective theoretical challenges. A strong claim would insist on the idea that I put forward in §2, that these problem-solving primitives are literally numerically identical entities, they are one and the very same thing, since they are theoretical entities that are introduced by the metaphysician to do a job; consequently they are *individuated by their theoretical role*, and if this role is the same, they just turn out to be one and the same thing under different names. The Strong Conclusion to be drawn from this is that it becomes really hard to see what difference there is between relationism and substantivalism and between BTU and STU, since they both use one and the same primitive problem-solver at many crucial places and they are also otherwise structurally extremely similar—thus, it is true for both pairs of views that the two allegedly competing sides are actually metaphysically equivalent.

But one may think that playing the same theoretical role is not enough to justify *metaphysical* equivalence. On this view, it is correct to draw a Weak Conclusion of *theoretical* equivalence, that is, equivalence with respect to what the two allegedly competing theories can *do* and with respect to how they face their theoretical challenges, but this does not extend to the stronger claim about what they *are*. A substratum or a substance-instant, this view insists, just are not the same things as a bundling relation or a relation of simultaneity, even if they do the same job within the theory. They are individuated by their nature, not just by their theoretical role, and their nature is not the same. Thus the Weak Conclusion claims that the two sides of the two debates are not metaphysically equivalent but that it is *epistemically under-determined* which one we should choose since they both do the same job in the same way.

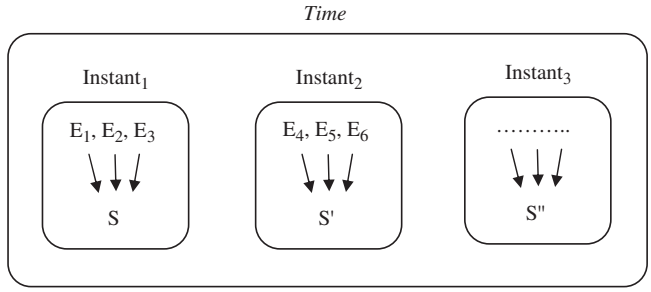
I shall not pursue here the meta-metaphysical issue as to which of these two conclusions is the correct one (although I can note that I have sympathies with the Strong Conclusion); rather I shall now continue to do some more lower-level metaphysics and discuss the case of 'empty time'.

4.

Up to now, we have seen the case of relationism and substantivalism with respect to the problem of time without change, and we have seen that both views

behave fundamentally in the same way. In this final section, I shall now consider the case of 'empty time' that is different from the case of time without change (an empty time or an empty period of time is time at which nothing instantiates any properties, there just does not exist anything at such a time or period of time, while in the case of time without change there things and/or events do exist, it's just that they are the same at different instants during a period of time without change). *Prima facie*, we have here again a place where relationism and substantivalism do *not* behave in the same way (and that also parallels a similar case in the bundle theory and substratum theory debate, as we shall see). But, although the conclusion will be less straightforward than before, I will also argue that at the end of the day both relationism and substantivalism also *can* treat the problem of 'empty time' in the same way.

Let us quickly remember the structure of the relationist theory, in the normal case when times are not empty:



On this schema 'S' stands for the relation of simultaneity, a different one per instant. Now, the objection goes, such a theory cannot accommodate the possibility of there being 'empty time', that is, of there being a series of instants at which *no* events occur (as opposed to the problem of time without change where the challenge was to accommodate the possibility of the *same* events occurring at different instants). Indeed, it seems that relationism just needs some events to be there, since events are constitutive of what instants are.

Before I go any further, let me first ask: how does *substantivalism* accommodate the possibility of empty time? There are two possibilities, one of them being certainly more natural for a substantivalist to embrace than the other. To distinguish them, let us see what the substantivalist view looks like in the normal case when time is not empty, and let us quickly examine the not-so-natural option first. According to this version of substantivalism, instants are 'thick', that is, the substantivalist's picture is the following

When conceived of as 'thick', instants are such that they are made of a substance and of the events that are had by this substance—thus, instants are not just the substance, they are the whole. If instants were 'thick' in this way, the picture would actually look exactly as the relationist one (see Figure 2 below). On

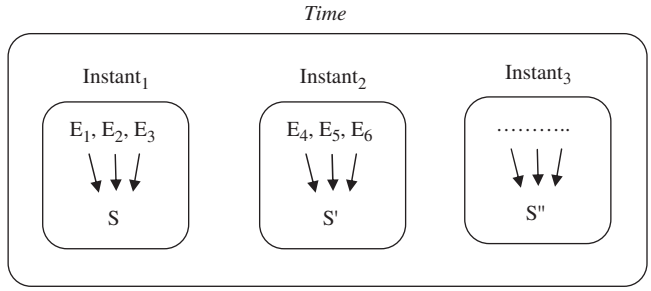


Figure 2: Structure of the 'thick' substantivalist theory of time

purpose, I have chosen the same letter 'S' to stand here for 'substance-instant', in order to make it clear that if this were the substantivalist conception, there would really be no difference with respect to the structure of the theory between this view and relationism. Instants would be construed out of S and events, and calling S different names ('substance' for the substantivalist or 'simultaneity' for the relationist) would hardly make any difference other than a terminological one.

But most likely, substantivalists would not be happy with such a picture of their view, rather it would be more natural for substantivalism to see instants as 'thin', in the following way:

According to this picture (see Figure 3 below), instants are *not* made out of events, they *are* the 'Ss' of the pictures above. If the substantivalist wants to, she *can* speak of 'thick' instants of course (that is, S-Instant$_n$+E$_k$, E$_l$, E$_m$, . . .), but this is not her primitive and fundamental notion of an instant, rather she sees instants

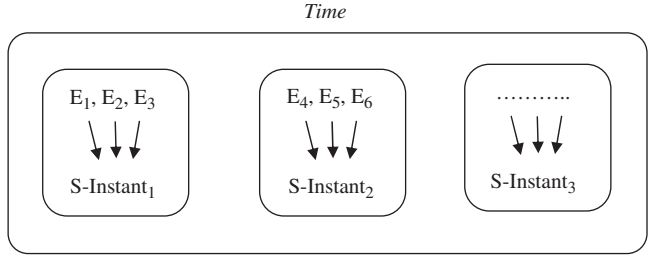


Figure 3: Structure of the 'thin' substantivalist theory of time

as being thin and ontologically independent of events, and this is how her view can easily and straightforwardly accommodate the possibility of there being a series of instants at which *no* events occur at all, that is, the possibility of empty time (so that in the figure above there would be no 'E$_1$, E$_2$, E$_3$, E$_4$, . . .' events, there would be just S-Instants). Of course, as I have already said when discussing the problem of time without change, substantivalism can accommodate this possibility only with the central help of its now familiar problem-solver: primitively numerically distinct instants. Indeed, the various instants included in

the series that forms an interval of empty time cannot of course be distinguished qualitatively, since they are thin and have no qualitative nature at all, and since no events occur at them, so they have to be distinguished primitively (numerically).

The substantivalist has to defend the plausibility of such a view, exactly as the substratum theorist has to defend the plausibility of there being propertyless substrata, supposing that she wishes to do so, instead of thinking of substrata either as thick (substratum+properties) or as being thin but necessarily such that they exemplify some properties. The latter possibility is also relevant for the substantivalist: if she wishes to accommodate the possibility of empty time, she must not only defend the view that instants are not made out of events, but also the stronger view that instants are not necessarily such that some events occur at them. Suppose she can do this. Actually, she very easily can. The notion of an instant (as the notion of a substratum) is *her* primitive; it is a primitive postulate of her theory to which she can give any powers she likes: this is what primitive functions in any theory are for, and this one can be a function that can play the role of a lonely empty instant or the role of an instant that necessarily contains some events—this all depends on whether one wants to accommodate the possibility of empty time or not. *It works likes this*: first, it has to be decided, for independent reasons, whether it is a good thing or not to accommodate the possibility of empty time, and *then* it will be decided whether such a function is incorporated in the notion of a substantivalist's instant or not, and it can easily be said to be both ways. Instants are, after all, primitive theoretical postulates and problem-solvers, and one can simply define them to be one way or the other—the important question being thus not the one about what the theory *can* or *cannot* accommodate but about what we *want* it to be able to accommodate. The powers of our primitives are entirely in our power; they are problem-solvers that are not defined by what they *are* (since, being primitives, their nature is unanalyzable so we don't know much about what they are), but by what they *do*, that is, by what function they play in a theory, and this is something that is up to the theorist to decide.

Now, my point is that if that's what substantivalism can do, relationism can do it as well. Suppose that the relationist wishes to accommodate the possibility of empty time. She, too, has a problem-solver in her theory that can, as we have seen in §2, account for numerical difference between instants in the case of time without change. This part of the problem—accounting for numerical diversity of instants that form a series that is an interval of empty time—is then easily done in the same way. Now the second part of the problem remains, which is the capacity of the theory's problem-solver to exist 'alone' without any events. Granted, it does *sound* better to say that a *substance* like a substantivalist's instant can stand alone without there being any events than to say that a *relation* like the relationist's relation of simultaneity can stand alone without any events as its relata. But, as I have suggested above, these labels, like 'substance', 'substratum', 'simultaneity', and 'compresence' are no more than useful metaphors in the same way 'a container' was a useful metaphor in the opening paragraph of this paper. These metaphors help us understand better what is being said to us, and that is

something important of course. But what I want to emphasize is that at bottom the referents of these metaphors are functional primitives postulated by a theorist for her theory to work, they are problem-solvers whose nature is not analyzed but stipulated, and whose *role* in the theory is what counts. If it makes sense to claim that an instant can be empty, like a container can be empty, if it makes sense to claim that a substratum can exist without exemplifying any properties, then it can also make sense to claim that the relation of simultaneity can tie no events at all, or that the relation of compresence can tie no properties at all, perhaps in a similar way one would construe an empty set.

This parallels the general objection raised against the bundle theory, namely that while substrata are ontologically independent, the relation of compresence, as with all relations, is dependent on its relata. 'Independent' here probably means that it can exist independently from the other elements (properties)—and bear in mind that a strong version of this claim is needed, namely not just that the substratum can exist independently of this and this property but that it can exist 'alone' independently of having any properties at all. It is often said that substrata can satisfy such a requirement, while the relation of compresence can't because relations and properties cannot 'float free'. It is precisely this unfortunately familiar prejudice against the bundle theory that I have addressed above. What I call prejudice here, Hawthorne and Cover call simply 'incredulous stare' (while speaking about the bundle theory combined with universals):

> Perhaps some philosophers will claim to find it just self-evident that universals are had by something. We don't have much to say to such philosophers. We do note, however, that the polemic against the bundle theory has rarely taken the form 'It is simply self-evident that anything quality-like is directly or indirectly predicated of something that isn't like a quality [. . .]'. If opponents of [. . .] the Bundle Theory wish to retreat to this form of an incredulous stare, so be it. (Hawthorne and Cover 1998: 207)

Yet a different way to address this issue can be found in Gallen Strawson's paper on the substance theory and the bundle theory of the Self:

> But if there is a process, there must be something—an object or substance—in which it goes on. If something happens, there must be something to which it happens, something which is not just the happening itself'. This expresses our ordinary understanding of things, but physicists are increasingly content with the view that physical reality is itself a kind of pure process—even if it remains hard to know exactly what this idea amounts to. The view that there is some ultimate stuff to which things happen has increasingly ceded to the idea that the existence of anything worthy of the name 'ultimate stuff' consists in the existence of fields of energy—consists, in other words, in the existence of a kind of pure process which is not usefully thought of as something which is happening to a thing distinct from it. (Strawson 1997: 427)

This being said, let me come back to my preferred way of addressing this issue, to insist that our metaphors do play an important role here. Here is how I think that it works: first, for intuitive reasons or for independent philosophical reasons, a theorist more-or-less explicitly decides *whether* it is a desirable feature of her theory or not to allow for the possibility of empty time; second, she has to decide *how* to accommodate it and does this by incorporating in her primitive problem-solver the power to do so; and third, she has to make her problem-solver graspable by others and express it in a way that conveys well the concept she has in mind—here the metaphors play an important role, since by calling her problem-solver a 'substance' the theorist conveys probably better the idea that time is independent of events and, consequently, that there can be time without events, than if she calls it 'a relation of simultaneity'; although, as we have seen, both options are no more than different ways of expressing oneself and both can equally well accommodate the possibility of empty time. The choice between substantivalism and relationism, with respect to the problem of time without change and the problem of empty time is thus a choice between alternative ways of formulating the same thing, where nothing really depends on the formulation, except that of course one formulation can be better than another in order to express in a more understandable way what one wants to say.[8]

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NOTES

[1] *Not* a set, since instant are not abstract entities, on this view.

[2] This is similar to a strategy that Paul (forthcoming) explores with respect to the Bundle Theory of objects, when she says: '[. . .] properties are shared, while property instances are primitively individuated. On this approach the explanation of the possibility of the qualitative indiscernibility of the spheres in W is based on an underlying identity of properties, while the numerical difference between the spheres reductively supervenes upon the numerical difference of the property instances in each bundle'.

[3] To illustrate this point, take the case where properties and relations are tropes—in this case, what I say parallels the claim that one trope of simultaneity is exactly similar to but primitively numerically different from another trope of simultaneity.

[4] In Benovsky 2008 I discussed at length and in detail several versions of the Bundle Theory and the Substratum Theory, to argue that an equivalence claim can also be drawn with respect to these two allegedly competing views. Here I shall only quickly discuss the case of BTU, STU and Identity of Indiscernibles that parallels the discussion about relationism and substantivalism above.

[5] Benovsky 2008.

[6] [Id.Ind.] $(\forall x)\ (\forall y)\ ((\forall F)\ (Fx \leftrightarrow Fy) \rightarrow (x = y))$

[7] She does not *have* to, of course—it is, importantly to what I want to say, *in her power* to decide what her primitive is. See for instance Hawthorne 1995 for an example of an alternative (but I think much more problematic, see Vallicella 1997) strategy.

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