

Processes and change

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Abstract

I argue that a distinction within the contemporary metaphysics of time may provide us with a new argument in favour of Aristotle's solution to the problem of the instant of change, while preserving both its importance and most of the premisses which give rise to it. The distinction is between processes, temporally extended enduring things, and events, temporally extended perduring things. Processes are temporally extended not by happening over time, or by going on for some time (as do events), but by taking time or unfolding in time. Like enduring substances, they have their temporal parts atemporally and their temporal parts exist in virtue of them, thus extrinsically. But like events, they take up time and have a beginning and an end. Aristotle solves the problem of the instant of change by claiming that while the resulting state has a first instant, the process leading up to it does not. Absent an ontological distinction between processes and states, this solution looks somewhat arbitrary. Interpreting change as processual, I claim, motivates the Aristotelian solution and also helps fleshing out an adverbialist solution to the problem of temporary intrinsics.

The Problem of the Instant of Change

One version of the problem of the instant of change is the following, where s_1 is the state of a 's being F and s_2 is the state of a 's not being F and a is in both states for more than an instant:

- (a) If the last instant of s_1 is identical with the first instant of s_2 , then the principle of non-contradiction is violated.
- (b) If every instant of s_1 precedes the first instant of s_2 (or every instant of s_2 follows the last instant of s_1) and time is not continuous, then there are instants at which a is neither in s_1 nor in s_2 , violating the principle of the excluded middle.
- (c) If every instant of s_1 precedes the first instant of s_2 (or every instant of s_2 follows the last instant of s_1) and time is continuous, then s_1 (or s_2) has no temporal boundary and there is no answer to the question when a ceased to be in s_1 (or started to be in s_2).

Sorabji (1976) argues that the consequent of (c) is tolerable if the state that has no temporal boundary is one of continuous change. Unfortunately, the considerations he adduces only apply (if at all) to his specific example, of continuous motion and rest, and do not generalise.¹ In this special case, the choice which one of s_1 and s_2 is topologically open may be motivated: 'privileging' the state of rest (i.e. holding that it has a boundary) makes sense if it is not itself changing (like motion occurring with increasing velocity) and does not have vectorial qualities (like motion has a direction) (1976: 72–73). We may, however, picture a change between *two* states of continuous change, say two motions: in this case, neither of s_1 and s_2 would have a boundary and at the instant separating the two, a would be in neither of the two motions. Would it then be at rest, or in some other motion? Neither answer seems comfortable.

Sorabji's solution, even if its partiality is conceded, has another drawback: framing the issue as one of justifying a seemingly arbitrary choice, he does not see that the question remains open even when the choice is made. Suppose a ball is at rest, then starts to move. Even if his rest-state does, but his motion state does not possess a temporal boundary, we may still ask *when* the ball *stopped* to move.

A third problem is the missing generality of the proposal. Aristotle quite generally says that one should "take[...] the point of time dividing the earlier and later as always in reality belonging to the later" (*Phys.* VIII 8 263b9–10, 1999: 28). The example he discusses is the transition from a state of becoming not white to a state of being not white, denying that the first has a last, but affirming that the second has a first instant. More generally, terminal states have a first instant (*Phys.* VI 5, 235b6–32). Some commentators tried to justify the 'openness' of the earlier state by grammatical considerations:

¹He is explicit that the model is not to apply to all types of change, but thinks that continuous change at least is covered (1976: 75).

Aristotle sees [the assignment of the ‘point of change’ to the latter period] as required by the facts themselves. Taking recourse [...] to the semantics of perfect predications, Aristotle regards the statement ‘[a] has become not white’ (263b22) as entailing a definite time in which [a] first become not white. That is, ‘[a] has become not white’ implies that at some prior time ‘[a] became not white’ is true, or, perhaps more perspicuously, ‘[a] is not white’ became true... (Graham (1999: 144) ad loc.)

It is not clear why this would ‘privilege’ the openness of the earlier state, however. Could we not change the example so that we first have a state of being white and then a becoming not white, ask the same question and get the result that there must be an earliest time at which something is changing, something Aristotle denies (*Phys.* VI 5 236a15)? Even though he does not accept a last instant of s_1 , he still thinks that it, or at least its temporal extent, has an extremity, which, given the continuity of time and the principle of excluded middle, must be the same as the extremity of s_2 (*Phys.* VI 3 234a5-7).

As far as I can see, this sketch of an Aristotelian answer to the problem of the instant of change leaves us with the following tasks:

- to draw a principled distinction between temporally open and temporally closed things in time;
- to justify the association of change with the temporally open things in time;
- to say when this change occurs;

Before embarking on the search for answers to these questions, however, I’d like to make a detour into contemporary metaphysics and ask how general the problem of the instant of change is. I think that it is indeed very general and that the problems nowadays much more often considered under the label ‘problem of change’ may, given independently plausible assumptions, be subsumed under it.

The problem of temporary intrinsics

In contemporary metaphysics, the problem of change is usually presented in the form of the so-called “problem of temporary intrinsics”. We may present it as a supposedly inconsistent quatuor:

1. If there is change, it is in respect to one and the same thing.
2. If there is change, it is in respect to one and the same property.
3. There is change.
4. Nothing both has and lacks the same property.

Denying each one of the premisses has been said to come at a considerable price: denying (1) violates what some call “the proper subject condition”, denying (2) makes all change extrinsic, denying (3) implies commitment to a certain kind of Parmenideanism, while denying (4) violates the principle of non-contradiction.

So-called ‘perdurantists’ deny (1), holding that when I stand up and change from being bent at t_1 to being straight at t_2 , there are temporal parts of me, at t_1 and at t_2 respectively, that are bent and straight. I count as undergoing the change either by being identical with (some) sum of such temporal parts (so-called ‘worm view’) or by being identical with one of my parts and somehow related to the other (so-called ‘stage view’). Many have objected to the existence of temporal parts, or balked at the reduction of alteration to coming-into-existence and ceasing-to-be. Another and in my view stronger objection to this ‘solution’ of the problem is that it is not an account of *change*:

“...different entities differing in their properties do not amount to change even when, as here, one is later than the other and both are parts of something else ...” (Mellor 1981: 111)

The perdurer has properties which are significantly correlated with [the property of being bent and the property of being straight], e.g. the property of having a part which is bent (and one which is straight), but these properties involve a relation between the perdurer and one of its momentary parts. Even if one were to hold that a perdurer’s relations to its distinct parts are intrinsic (which is not obviously correct), at any rate such properties of the perdurer are not temporary. So what persists is not what has the relevant temporary intrinsic. (Haslanger 1989: 120)

The perdurance theorist may seek to account for our intuition in terms of the candle’s having parts which have the shapes, but alteration requires the candle to have the shapes not derivatively but directly. If the candle never has the shapes itself, it cannot change *its* shape. (Hinchliff 1996: 120)

The problem is a very general one for perdurantism: not only is it unclear if perdurantists explain change (and if they do, in what sense), but the same unclarity surrounds their purported explanation of persistence itself. To

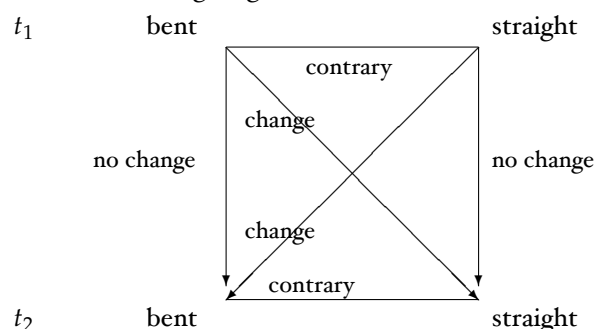
persist, according to the perdurantist, is a matter of either having or successively being identical to a temporal series of temporal parts, instantaneous or short-lived (and qualitatively unchanging) entities. Why should the having of parts or successive identities add up to persistence? We will come back to this problem below.

Endurantists typically deny (2). Such ‘relationalists’, as I will call them, say that the property I lose and the property I gain are not quite the same – the first is somehow ‘indexed’ to t_1 , the second to t_2 , and this in a way such that their exemplification by the very same thing is compatible with (4). The most commonly heard objection, it seems to me, against this ‘solution’ is that indexing the properties in the way required is incompatible with their intrinsicness which is supposed to be important for the problem to arise in the first place (hence its name). Another and in my view stronger objection is that it is not an account of *change*. How are we to understand properties like *being bent at t*? There seem to be three possibilities:

- (i) *being bent at* is a relation between an object and a time;
- (ii) *being bent at t* is a relational property of an object, derived from a relation of that thing to a time;
- (iii) *being bent at t* is a monadic property of objects.

For both (i) and (ii), we need to know what times are supposed to be. In particular, we need to know why *times* (and not, e.g., perceptual points of view) are the kind of things x and y such that having one relation R to x and lacking the same relation to y constitutes change (whereas, e.g., being visible from here but not from there does not). In the absence of such an explanation we have no reason to consider the relational difference as a case of change. The problem with (iii), apart from its air of mystery, is that it does away with contrary properties altogether: we just have two properties, had by the same object, and no justification for taking this multiplicity of properties to be a case of change.

Both the relationalist and the perdurantist ‘solutions’ share a common problem, which I take to be the most serious: they overgeneralise, predicting change even for cases where there is none. Every theory has to explain the differences and similarities in the following diagram:



The perdurantist ‘solution’ predicts that there is change along the diagonal because it postulates two different entities, a and b existing at t_1 but not t_2 and at t_2 but not t_1 respectively and takes these entities to differ *simpliciter*, i.e. to exemplify (a-temporarily) contrary intrinsic properties. But they do so anyway, whether there is change or not! For a exists at t_1 but not at t_2 and b exists at t_2 but not at t_1 .²

The perdurantists may, of course, not take these properties to be intrinsic and be a perdurantist only with respect to qualitative, but not existential change.

The relationalist, including relationalists only for existential change, also lacks a complete explanation of the diagram. This is most obvious for strategy (iii), postulating four different monadic properties at the edges of the square. I thus lacks any resources to explain why the diagonal movement constitutes change while the vertical does not. The problem for strategies (i) and (ii) is the following: they want to explain the coherence of change (along the diagonal) by construing the temporal properties as different relations (or relational properties) the object has to (or with respect to) different times. But if the relations are different, then why can the object not have these different relations to the same time? The contrariness of *being bent-at- t_1* and *being straight-at- t_1* has to be accepted as a brute fact. If it is not the difference in the relations, but rather the difference in the relata that makes the relational properties different, then why is there no change if the object passes from *being bent-at- t_1* to *being bent-at- t_2* ? The properties are different, but the constancy of the object has to be accepted as a brute fact.

²This worry can perhaps be somewhat alleviated if the temporal parts in question are not instantaneous: as long as a does not change, between t_1 and t_2 , in any of its intrinsic properties, “ a -at- t_1 ” and “ a -at- t_2 ” may be taken to be coreferential. But it remains the case that such a theory, whenever there is change with respect to G , will also falsely predict change with respect F .

Variants of Parmenideanism

Adverbialism and its problems

Leaving Parmenideanism aside, this leaves us with denying (4). It is a very natural thought, after all, that non-contradiction does not forbid the exemplification of contrary properties, but rather the exemplification of contrary properties *at the same time* (and in the same respect, I would add). Natural as it is, however, this thought just restates the problem: why does it *help* (and, in what way), to add the temporal qualification?

Suppose we may, at t_1 , truly say of a that it is F . Hence “ a is F ” is true at t_1 and so is “ a is F at t_1 ”. a might cease to be F . It will then be true, at some other time t_2 , that a is not F . “ a is not F at t_2 ” will then be true at t_2 . If there is change, it will also be true at t_1 .³ The problem of change is to explain how this is possible. If both t_1 and t_2 exist, we may say that a bears the relation *being such that it may be truly be said to be F at* only to t_1 , but not to t_2 :

(1) For any a and t , $aF^*t \iff$ “ a is F ” is true at t

The problem with (1) is to understand how F^* can distinguish things from times, i.e. to apply to the same thing and some, but not all times. The problem of temporary intrinsics, in a nutshell, is to explain why adding temporal qualifications makes it possible to consistently ascribe to one and the same thing contrary properties. We have already considered two ways of interpreting the temporal qualification. We can put the temporal qualification into the property, as it were:

(2) For any a and t , $aF^*t \iff a$ is F -at- t

That it is true, at t_1 , to say of a that it is F at t_1 and not F at t_2 is here ‘explained’ by a , at t_1 and t_2 respectively, exemplifying two different properties. But unless *these* properties can be shown to stand in some interesting relation, this is no explanation at all. (2), to repeat, does not explain why the situation where aF^*t_1 but $\neg(aF^*t_2)$ is a situation where a changes. An advocate of the worm view will analyse F^* as follows:⁴

(3) For any a and t , $aF^*t \iff a$ has a temporal part at t which is F

Because F is here ascribed to a temporal part that does not undergo an intrinsic change, the ascription to a of seemingly incompatible properties has been resolved into the ascription of incompatible properties to different parts of a . But why think that ascribing, at t_1 , to a the relation *having as temporal part* to two different things constitutes ascribing change (while, e.g. ascribing the relation *seeing* does not)? Again, we do not get an explanation why the situation where aF^*t_1 but $\neg(aF^*t_2)$ is a situation where a changes.

What other options are there? One may think that the following could work:

(4) For any a and t , $aF^*t \iff$ “ a is F ” is true-at- t

The problem with (4) is to understand how these relational truth-predicates can satisfy the T -schema. At t_1 , after all, it is true that $\neg(F^*t_2)$, hence via (4), that “ a is F ” is not true-at- t_2 . But “ a is F ” is also true-at- t_1 , so at least one of the truth-predicates does not allow for disquotation, if we want to preserve (4).

Non-Priorean adverbialists will prefer another ‘reading’:

(5) For any a and t , $aF^*t \iff a$ is t -ly F

(5) is, of course, a template rather than an analysis. To explain that there is change in the $aF^*t_1 \wedge \neg(aF^*t_2)$ situation, *being t_1 -ly F and not t_2 -ly F* must be understood as ascribing to a some dynamical property, and as entailing that a exists at at least two instants, and is F at one but not the other. How could an analysis of such temporal adverbs look like? A Davidsonian way of spelling out (5) could be:

(6) For any a and t , $aF^*t \iff \exists e$ (e is at t and e makes it a fact that a is F)

The problem with (6) is that it shifts the burden of explanation to the ontology of events and the metaphysics of fact-making. Why should we assume, e.g., that whenever two successive intrinsic properties of some thing a are

³This requires some argument, as a Finean fragmentalist may deny it.

⁴In the way I presented it, the stage theorist does not even address the problem of temporary intrinsics.

incompatible, different events will make these facts exist? What is more: why should not the very same event exist at different times and make it a fact, at some time, that a is F , and also make it a fact, at some other time, that a is not F ? The problem, however, may also turn out to be a virtue. Once the appropriate ontology of events is in place, we can explain the incompatibility of the facts by it's being the case that they they cannot be made (to exist) by one and the same event. The temporal modification inside the state of affairs will then indicate the temporal location of the fact-making event and not ascribe a temporal property to the atemporal fact. Time is 'ontologised', as it were, and change explained. But what could such an ontology of events look like?

How can there be change in time without there being change at a time? Some considerations pertaining not to the metaphysics of persistence, but rather to temporal ontology may provide part of an answer, I think.

Temporal ontology

Temporal ontology is concerned with how things exist in time, that is, with temporal ways of beings or rather ways of being in time.

We may naively think that the whole truth about temporal reality factorises into what is true of temporal objects at given instants, where this may involve relations they may have to things at other instants. Looking at the world from this perspective, the fundamental question seems to concern the relation that enduring objects, say Aristotelian substances, have to their spacetime regions, or, by semantic ascent, whether everything that is true of them may be said to be true of them *at* some instant or other. This is the familiar debate about how substances persist in time, often misleadingly called the 3D/4D controversy.⁵

Take me and my life, and assume that I am wholly present at every instant at which I exist, while my life has temporal parts. In at least one, hopefully unproblematic, sense, both I and my life exist. Different predications are true of us, however: my life may be short, even if I am tall, I may be boring even though my life is not. Most importantly, we all think, I hope, that our lives might have been different. Presumably, some of us even believe that they might have had lived the life of another person, living or dead. Even though we both exist, and are different, I have a very intimate relation to my life: my life began with my birth; if you end my life, you kill me. The interdependence is not only one of existence: if I die young, my life will be short; if my life is boring, it is me who is dissatisfied with it; if I am a philosopher, my life will in part be a philosophical one.

Some philosophers have argued that I am my life, and have either tried to provide truthmakers for predications about me in terms of properties had by and relations among my temporal parts or else 'tense' the true predications about my life so as to make them attributable to me.⁶ Even if such a reductive project were to succeed, however, it would leave the metaphysical question unanswered.

Even if necessarily, each spatio-temporal object has a temporal part at every time at which it exists,⁷ and is, at this time, identical to this temporal part, this still leaves open the crucial question whether the object (i) exists and whether it (ii) persists in virtue of (the existence of) these parts (cf. Hawthorne 2006: 99–100).

Neither is the metaphysical question answered by endurantists. Even if we suppose that the whole truth about my life factors into truths made true by how I am at different instants, we may still ask what accounts for the unity of my life, i.e. what ties together the separate temporal parts into a unified whole. The course of events that is my life is traced out by the substance, so much we assume, but how exactly is this tracing out accomplished? Not all events in which I participate are parts of my life, after all.⁸

⁵Misleadingly, because the dimensionality of objects is a question orthogonal to the question of persistence: four-dimensional objects may well be 'wholly present' along one of their dimensions, while three-dimensional objects may have temporal parts, but still not persist *in virtue of* them.

⁶These two strategies map unto the two most prominent dissolutions of the so-called "problem of temporary intrinsics", discussed above: to explain why the contradiction inherent in " a is both F and not F " is removed by adding "at t_1 and t_2 respectively" (for $t_1 \neq t_2$), perdurantists interpret the sentence as attributing F to a -at- t_1 and $\neg F$ to a -at- t_2 , while endurantists interpret it as attributing *being F at t_1* and *being F at t_2* to the very same a .

⁷This is what Sider (2001: 59) calls "four-dimensionalism" and Sider (2007: 242) calls the "temporal parts theory". His argument in favour of it (the adaptation of David Lewis' argument from vagueness for unrestricted composition for the diachronic case) establishes only a weaker claim which has been called "instantaneous plenitude" (Hawthorne 2006: 87), namely that necessarily, for every time that some spatiotemporal objects exists, there is something coincident with it at that time that exists only at that time. Hofweber & Velleman (2011: 4) think that instantaneous plenitude follows from the very notion of temporal extension and express their conviction that the notion of extended simple is conceptually incoherent.

⁸The 'new' solution to the problem of temporary intrinsics Brower (2010) offers to endurantists does not solve this problem. He takes Socrates to be a part of Socrates-at- t and to be bent at t in virtue of Socrates-at- t being bent *simpliciter* (2010: 893). Socrates will also be, however, part of Socrates-and-Xanthippe-at- t , which is partially annihilated *simpliciter* and so his becoming a widower is as much a non-Cambridge change as is his standing up. Brower will reply that parthood is not enough: to be derivatively bent, Socrates must have the same matter as bent-Socrates-at- t . This answer, however, presupposes the theory of accidental unities, which requires a prior distinction between intrinsic and

Persisting things and their temporal parts: perdurance and unfolding

Unfinished as the contrary reductive projects are, they also both rest on an unargued-for assumption: that temporally extended entities such as my life are resolvable into, or ‘nothing but’ their temporal parts. If things may be temporally extended without perduring, the question about the relative priority of temporal wholes and parts will not help us find out how objects persist, nor will it provide a solution to the ‘problem of change’. I think that there are temporally extended enduring things and will call them “processes”. That we need more than the ordinary four-dimensionalist resources to account for them has already been recognised by the founder of tense logic:

“There is, however, a genuine difficulty, which I do not know how to solve, about the representation of past-tense facts as the former being-the-case of present-tense ones. Since the present is an instant, the only past-tense facts which we can represent by ‘It was the case that *p*’ or ‘It has been the case that *p*’, where *p* is in the present tense, are facts about what was the case at an instance or at a succession of instants. [...] Whatever *goes on for* a period of time can be fitted into this pattern, since *it is going on at* each instant in the period. But what *takes* time eludes this representation.” (Prior 1968a: 7–8 and 2003: 24)

Let us be clear about the difficulty: it does not concern the questions (i) whether spacetime is ‘gunky’ or composed of points (cf. Hawthorne 2007: 271), (ii) whether tense logicians may quantify over extended instants (or help themselves to what Brogaard (2007) calls ‘span operators’), nor (iii) whether instants or intervals are more fundamental. Nor does it concern the issue of (iv) whether some dynamic properties are intrinsic or extrinsic to objects-at-times, though our question will have implications for this debate.⁹ While there is an even tighter link to the issue (v) whether some temporal entities are essentially temporally extended, the question of processes does primarily concern how things persist, not whether they have properties essentially which presuppose temporal extension.¹⁰

What then, is the specifically metaphysical question of processes? Temporally extended, but enduring things like processes are of interest to the metaphysician of time because their conceivability, and even more their metaphysical possibility, shows the conceptual independence of three questions:

1. ontological dependence: whether or not some category of temporally extended thing can exist without its temporal parts;
2. individuating, essential dependence: whether or not some category of temporally extended thing could be what it is without its temporal parts being what they are;
3. ways of taking up time: in virtue of what temporal extension is produced, what the principle is by which some temporally extended thing is so extended;

The first of these questions concerns the nature of time, and of temporal parthood and could be answered, e.g., by an argument for the conceivability, possibility or perhaps even actuality of temporally extended simples. The second question concerns the priority issue that is left open by four-dimensionalism, at least of the Siderian variety. Even of things that are, at any given time, identical to their temporal part existing at that time, we may ask, as we have seen above, whether they are prior or posterior to these temporal part, or rather, to avoid a superficial conflict with the irreflexivity of grounding, whether it is of their nature to stand in the parthood or temporal counterparthood relations that they do.

Even of things that are ontologically dependent on their temporal parts and have them essentially, as part of what they are by their very nature, we may ask *how* they take up time. I will mark two possible answers by the technical terms ‘perdure’ and ‘unfold’. Events, and event-like things (such as wholes, successions or ‘courses’ of events) take up time by perduring, ie. by existing successfully at different instants, where the property (or property-like feature) of *existence* is intrinsic to their respective temporal parts. We may, for present purposes, settle on the following

extrinsic properties (for widower-Socrates is *not* an accidental unity).

⁹The standard arguments for taking instantaneous velocity to be extrinsic – the Ockhamist view (Bigelow & Pargetter 1989: 290), the Russellian view (Zimmerman 1998: 268), and the at-at view (Arntzenius 2000: 187–189) – take it to be determined by taking the limit of a sequence of distance-time pairs – that is, by measuring distance over time as the temporal interval approaches zero – and *thus* to be determined by reference to the location of the object at other times. The instantaneous velocity being extrinsic is thus taken to *consist* in its being relational with respect to other temporal parts of the object. This argument, whatever its worth for perduring objects, is much less plausible for enduring objects.

¹⁰Prior’s talk of such entities “taking time” is perhaps in this respect misleading: while processes like giving a lecture (one of Prior’s examples) may plausibly be taken to be of such a nature that they cannot last only an instant, this itself to be explained by their special and sui generis way to persist, i.e. their *taking up* time rather than *lasting for* some time.

definition:

an object *o* *perdures* $:\Leftrightarrow$ *o* persists during interval *I* in virtue of being such that there exists intrinsically, at every instant *t* of *I*, a thing which is, at *t*, a part of *o*.

Perdurance is to be contrasted with another way for temporally extended things to take up time, which I stipulate to be characteristic of processes:

an object *o* *unfolds* $:\Leftrightarrow$ *o* persists during interval *I* in virtue of being such that it a-temporally has parts which extrinsically exist at every instant *t* of *I*.

Perdurance and unfolding, so defined, differ in two crucial respects:

- temporal vs. atemporal having of temporal parts: Temporal parts, as defined by Sider, are short-lived entities which at the time of their existence are part of the temporally extended whole the persistence of which they ground. Their parthood relation being time-indexed allows the perdurantist to have ‘temporary intrinsics’, i.e. allows for the intrinsic exemplification of temporary properties. Suppose object *o* is red at *t*₁, but not red at *t*₂. To give a non-contradictory account of this situation, it is not enough for the perdurantist to postulate two different temporal parts, only one of which is (timelessly) red, but it is furthermore required that these things are not part of the persisting object *o* *at the same time*. Unfolding things such as processes are different in this respect: they have their temporal parts *simpliciter*, as well as at some given time.
- intrinsic vs. extrinsic temporal existence: To play their rôle in the ‘solution’ (or rather dissolution) of the problem of temporary intrinsics, the temporal parts of the perdurantist are “loose and separate” – their existence at their time does not depend on, nor does it somehow else ‘involve’, the existence of other temporal parts at other times. While it is difficult to cash out this notion of temporal intrinsicness,¹¹ at least their existence must be intrinsic to perdurantist temporal parts if they are to play their rôle as fundamental bearers of (existence-entailing) temporary properties. Processes, on the other hand, have extrinsically existing, top-down or ‘holistically’ determined temporal parts, which are parts, but also *mere* parts, of their unfolding.

Processes are temporally extended not by happening over time, or by going on for some time, but by taking time or unfolding in time.

Let us take grief as an example. According to Goldie (2011), grief is a process where “the unfolding pattern of the emotion over time is explanatorily prior to how/what the emotion is at a time”. The explanatory priority of the pattern implies, but is not exhausted by, grief’s being essentially temporally extended: it also means that the process of grieving does not happen during, or at, its total temporal extent, but rather takes up time in a different way.¹² Goldie (2011: 124) explicitly connects grief’s manner of persisting to Hofweber and Velleman’s example of writing a cheque, the identity of which is only determined by the totality of its temporal extent:

Not only, then, is the process not present in its temporal entirety within the confines of the moment: it is not fully determined by the events of the moment to be the process that it is. (Hofweber & Velleman 2011: 14)

The question of ‘identity-determination’ is orthogonal to the pattern-like character, however: events, arguably, have their identity not determined at any moment of their existence, but are still temporally extended.

According to Goldie, the existence, at a certain time, of grief is also temporally extrinsic: “Any chosen state or event will not be sufficient to determine that ...grieving is taking place” Surprise is temporally extrinsic in this way. Even if ongoing processes are continuants, they’re not ordinary continuants. Ordinary continuants are such that whether or not they have, at a time, a temporary part, depends only on how they are at that time (ie ordinary continuants are those material objects we believe in independently of crazy solutions to some of the puzzles of material composition): but whether or not my talking through section 1 is a proper or an improper part of my giving the talk depends on whether I will make it to section 2.

¹¹This is due to the fact that most of the discussion of intrinsicness has taken the form of a critical examination of several successive definitions by David Lewis, which presuppose the latter’s ‘four-dimensionalism’.

¹²Goldie goes further to suggest that the characteristic unity of a given process of grief is determined (perhaps even: constituted by) some narrative of the griever. While this strikes me as much too constructivist even for the case of grief (the parts of grief need *already* be coherent in order for them to be coherently narratable), it certainly does not apply to all processes.

Processes and change

The temporal parts of processes are sub-processes, which have their identity determined by the process they help constitute. We thus have three ways of having temporal parts:

Substances *produce* their temporal parts by persisting: at every instant of the existence of substance s , there is a temporal part, s -at- t , that derives its existence, its essence and its character from s .

Events *consist* of their temporal parts: the event e occurring at t is (identical with) its temporal part at t : e -at- t_1 and e -at- t_2 is the same event, multiply located.

Processes *are produced* by their temporal parts: process p is produced by a succession of events and derives its existence, its essence and its character from them.

How does this help with change? Processes *are* changes, their temporal parts are events, ordered and mutually incompatible with each other (as the case may be) in virtue of the nature of the process in question. This may sound disappointing, but I think it's the best we can have (or, at least, the best I can give you) (or, at least, the best I can give you right now).

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