

# How Processes Are in Time

Ligerz, “The Nature of Existence”

Philipp Blum, November 11, 2017

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 1968: 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.<sup>1</sup> 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.<sup>2</sup>

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 (in what it is grounded), 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

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1. The 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 velocity 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. Instantaneous velocity being extrinsic is then 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. It establishes, it seems to me, that velocity is comparative and non-local, but it does not, if location-facts are intrinsic, commit us to the existence of anything else than the moving object. More on instantaneous velocity below.

2. Prior’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.

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, i.e. 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 definition:

**PERD:** an object *o* *perdures* iff *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:

**UNF:** an object *o* *unfolds* iff *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,<sup>3</sup> 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.<sup>4</sup> 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:

3. This 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’.

4. Goldie 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.

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.

## References

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