

Time from the Inside Out

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Abstract

My objective is to offer at least a rough sketch of a new model for understanding time. Since many people are quite content with the model they have, I will try to show why a new model might be desirable or necessary. The exposition will be broken down into three parts. In the first part, I'll try to show that no one has ever experienced time as such. In the second part, I shall argue that one good reason for this is that there is no such thing as time as such. Finally, in the third part, I'll try to reassemble what's left of the conception of time after all this demolition, and I'll offer a positive model (albeit rather vague) of what I prefer to call "temporality". The exposition will follow lines familiar to contemporary students of time, but will, I hope, lead to conclusions that are at least modestly novel.

Key words: time, temporality, metaphysics

My main objective is to present at least a rough sketch of a new model for understanding time. Since many people are quite content with the model they have, I will try to show why a new model might be desirable or necessary. As it happens, looking at the problems involved in more commonplace conceptions of time leads one naturally to look in certain directions for solutions, and such an introduction can therefore explain why my proposed model looks the way it does.

With all this in mind, the following exposition will be broken down into three parts. In the first part, I'll try to show that no one has ever experienced time as such. In the second part, I shall argue that one good reason for this is that there *is* no such thing as time as such. Finally, in the third part, I'll try to reassemble what's left of the conception of time after all this demolition, and I'll offer a positive model (albeit

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rather vague) of what I prefer to call “temporality”. The exposition will follow lines familiar to contemporary students of time, but will, I hope, lead to conclusions that are at least modestly novel.

1. The Experience of Time

Some authors have talked about time as if it is one of our most elementary and universal experiences¹. But what would an experience of time, as such, be like?

We experience changes, no doubt. We experience also “invariances”; that is, we experience things not changing while change goes on all around. Thus we experience events. Do we experience time, though?

Events, on the usual view, happen *in* time. For most contemporary writers, this way of speaking is not to be taken literally. Even just a bit of reflection makes it difficult to think of time as a container of some kind, within which events (or non-events) happen (or fail to happen). Even if time *were* a container, it is clear that no one has ever directly experienced this container as such. Thus if the container view were correct, it would certainly be true that we don’t experience time, and no further defense of the present point would be required.

Somewhat more respectable is the idea that time is a *measure* of events or invariances. Such a view does not require that we imagine time to be a container, but it still leaves us with the conclusion that we do not experience time directly; this is because we do not experience any such measure. This “metric” view of time would seem to suggest that time is an intellectual creation, but we would want to be careful here. Are numbers and measures really *creations*? The matter is notoriously debatable.

We experience clocks; we hear them ticking, or we see the colon between the hours and minutes flashing to indicate that the digital watch is running, perhaps there’s a sweep of a second hand indicating to us that time is “passing”, or we look up to notice that my-god-it’s-4:20-already-last-I-looked-it-was-3:00!! But in all these situations, what we experience directly is one particular event or another. We do not experience time itself, although the particular events just considered do involve clocks. Such examples can easily mislead. We no more experience time directly while watching clock events than we do when watching sporting events. It’s just more likely that we’re also thinking about time in the first case². Clocks measure time. But what

¹ One such is P.C.W. Davies, who in “Time and Reality” (in Richard Healey (ed.), *Reduction, Time and Reality*, (Cambridge: Cambridge University Press, 2010), p.63) says that “Time is our most elementary experience of the world”.

² And, of course, time plays a crucial role at specific moments in sporting events, so it might seem *at those moments* that we experience time directly, in much the same way as we might feel while looking at clocks. I’m arguing that this isn’t so much a part of our experience as it is a part of our cognitive response to experience.

does time measure (if it is to be understood *as* a measure)? The things that measure time are not *themselves* time. Destroying them or stopping them would not destroy or stop time.

We manifestly experience events, changes, invariances. We experience things that might, to use the usual figure of speech, occur in time, or which themselves measure time, but — if it is to be understood as something independent of events and invariances — we do not experience time as such.

Some might contend that I'm missing the most important point. What is experienced, it might be argued, is the *temporality* of things that happen in the world. Indeed, it might reasonably be held that this is just what is meant when it is said that time is one of our most elementary and universal experiences.

As it happens, I don't mind this claim. Indeed, I shall argue for something like it below. But "temporality", in so far as it may directly be experienced, is not what time is taken to be on the most common view. For the moment, it is necessary to dismantle that usual view a bit more in order to show what I mean.

What might be meant by "temporality" in this context? On the usual view of time, we might expect the following: time is something like an ordered sequence of instants, or perhaps of durations, and the temporality of events — which we are right now examining for direct experienceability — is the fact of the location or spread of these events in that sequence.

I claim our experience of events is not, in general, like this. Some special experienced events *are* related to one another sequentially, but this is the exception, rather than the rule.

An example might help to explain what I mean. Suppose that I am relating to you what happened to me this morning upon waking. Let us say, even, that I begin to tell the story to you in the following sequential order: the first thing I was aware of was the electric heater going on. I figured at the time that it must be 6:00, since that's what I set the timer for. I lay there for a few minutes, then rolled over and looked at the clock. 6:19, it said. That seemed wrong, and I mentioned to Tory how the timer must be off. But she said that the heater *had* gone on for the first time at 6:00, and had gone off after about ten minutes. So now I realized that what had awakened me was the heater going back on after being off for a while. In the meantime, while our conversation was going on, I've not yet mentioned that there were strange noises coming from the next room — Erica was watching cartoons, I think, but I didn't really pay attention to it until I got straight about the heater. And somewhere in there the water had stopped running: Keith finished whatever he was doing in the bathroom. And while all of this was happening, I could feel it getting warmer in the bedroom.

Now, what I want to claim is that some of the things in this story were experienced as sequentially related, while others were not. Some of the events are

temporally nested, as it were, in others; or perhaps they are next to one another. I do *not* experience one temporal cross section of all the events, then another, then another. The sequential character of some of the events, as experienced, is undeniable. These are special, however, and the narrative is constructed in such a way as to expose the sequentiality of these events³.

To say that some events may be experienced sequentially is not to say that all are, however. It is not even true that those that *are* experienced sequentially *need* be. Let's look at these two claims one at a time.

In the above story, there is the sequence that goes wake up, notice heater, roll over, look at clock, talk to Tory. But there's also the set of experiences that goes look at clock, hear TV, hear water stopping. These are not experienced sequentially. I was aware of the TV the whole time, but didn't pay attention to it until later. I wasn't really aware just when the water stopped until I thought about it after paying attention to the cartoon, because I was wondering whether the bathroom was free. That's when I realized that the water had stopped some time before. Thus it is implausible to argue that my experience of these things reflects some sequential character of the events I experience. It need not. Perhaps it rarely does.

Interestingly, it's equally implausible to maintain that the non-sequential nesting of the set of experiences just highlighted — look at clock, hear TV, hear water stopping — is an artifact of memory alone, faulty or otherwise. The *awareness* of TV cartoons and water stopping was present at some level throughout the event; only on reflection were these things placed in sequence. Sometimes, as in the case of the water stopping, I can't be very precise about just when I experienced it in relation to heater going on and off or audible cartoon sounds in the next room. All I know is that it was earlier than now, because now my attention has turned to whether the bathroom is free. Just as for private investigators establishing sequences of events leading up to a crime, we sometimes need to *establish* the sequence of our own experiences using available evidence. The sequence as such need not be experienced directly. But there's an even more interesting claim to be examined: that even those collections of events that may be ordered in a sequence need not be.

As it happens, I misled you in these last few paragraphs. I said that I didn't pay attention to the cartoon noise until after I had got the business about the heater straightened out. To tell you the truth, I'm not sure when the cartoons broke through into my attention. I know I vaguely heard the TV the whole time in the background, but just didn't attend to it right away. But further: I only realize this *now*, as I'm trying to get clearer in my own mind about how things went. I didn't *mean* to mislead. What I'm now clearer about, in this case, is not the real order of experience;

³ This point has been made with great force and eloquence by Daniel Dennett, *Consciousness Explained* (Boston: Little, Brown and Company, 1991), especially pp. 144–53.

it's that I don't know for sure what that order was.

Indeed, if Tory were to tell me now that I've got the whole order of events mixed up, I wouldn't be too astounded. I do know this, though: I must have heard the heater before I looked at the clock, since otherwise I wouldn't have been surprised when I looked at the clock. I infer something about the order as I tell you (and myself) this story, since the story (and the experience) would make no sense without that order. The logic of our narratives, whether communicated to others or not, contributes a lot to their sequencing.

Thus it sometimes seems that certain events must be related to one another in a particular order. But this is, at least in part, an illusion. The necessity in question is logical necessity. It has nothing to do with experience. It is because I looked at the clock in surprise that I must say that the heater went on first. I need not experience the events as sequential. Indeed, if the heater had not been on a timer, or if I had forgotten that fact, I would not have been surprised, and I might not have experienced those events this morning as sequential, or at least as occurring in the *same* sequence.

There are many controversial issues imbedded in the last several paragraphs. But let us for the moment avoid all of these save one: I am trying to support the conclusion that our experience of events is not fundamentally an experience of the sequentiality of events. And it is not at all an experience of the location of events on some temporal line. It may be true that we can experience sequentiality among some events, but we do not experience events generally as sequential. Even the events that we might experience sequentially need not be experienced in this way⁴.

The conclusion I'm urging is that we have no direct experience of time itself. What's more, although we do experience changes, events, and invariances, these things are not generally experienced as occurring in sequence, and things that can be so experienced need not be. Thus if one understands the temporality of events as the fact of the location of events in some sequence, the direct perception of temporality is only available for some events in relation to others. We do not experience temporality in any non-relational way. I suggest that given our experience alone, then, time must, at best, be inferred. We do not experience time as such.

2. "Physical" Time

It might be thought, however, that whether we "directly experience" time or not is neither here nor there (neither now nor then). There are lots of things that I don't directly experience, but which I have good reason to believe in. I don't want

⁴ For a similar point, see Nelson Goodman, *Ways of Worldmaking* (Indianapolis: Hackett Publishing Company, 1978), pp. 12–14.

to argue with the general claim that sometimes — often, even — we ought to believe in things that we don't, or even can't, experience. In particular, as regards time, it might be thought that although we do not experience it, there are all kinds of reasons to postulate its existence.

Although the matter is not often put quite like this, I should like to claim that relativity theory makes this a vain hope. On relativistic grounds, one could assert that there is no such thing as time, if time is construed as a canonical ordered sequence along which events may fall. It should be no wonder, then, that we don't experience it.

What the special theory of relativity says that pertains to this matter is as follows: the order in which distant events occur is a matter about which there is no truth. Two events, ten light-years apart, may appear to be simultaneous from a frame of reference half-way between them. But from reference frames in other positions, or from frames that are in motion relative to the first frame, things will appear different. The theory does not just draw the conclusion that things merely *appear* different from these different frames, though; it is a consequence of the special theory of relativity that there is no reason to say that one frame of reference is absolutely preferable to another. Thus no answer is preferable as to the “real” order of the events. If we ask “Which event took place first?” the answer must be “There is no truth of the matter.”⁵

What is curious about relativity theory is that although this result is often expressed as being true of “distant” events, this is a misleading way of putting it. What is meant is that the result holds of all events separated from one another, no matter how small the distance. If there is *any* “distance”, simultaneity is impossible to define unambiguously. The formulae that lead to this apparently odd result do not distinguish between large distances and small ones. What is true of the large distances is also true, albeit to a less noticeable and less significant extent, of small distances. The limit, where things collide, whether they be subatomic particles or busses, is

⁵ Putting the matter in characteristically bold terms, Richard Muller says “... in relativity theory, time can flip ...” Richard A. Muller, *Now: The Physics of Time* (New York: W.W. Norton, 2017), p. 37. Intuition might seem to suggest that for three moving points in space, A, B, and C, such that events occurring at A and B are observed at C, it should be possible — given the relative movements of the three points and times of observation — to work out the truth of the matter as to the “real” order of the events. This is a mistake. What is possible is to work out, quite objectively, how things look from C. But the current point is that this is only one of an infinite number of possible reference frames, and there are as many correct answers to questions about the precise temporal relation between events at A and B as there are reference frames. None of these correct answers is more “real” than the others. For illuminating discussion, see Muller, pp. 36–38, 293–94, and 312–13. See also Carlo Rovelli, *The Order of Time* (New York: Riverhead Books, 2018), esp. pp. 41–45, and Craig Callender, *What Makes Time Special?* (Oxford: Oxford University Press, 2017) esp. pp. 42–49.

where things are said by physicists to happen simultaneously, unequivocally, from all reference frames. But what is simultaneous in a collision? The previously colliding things aren't distinct anymore.

Apart from this limit, however, there is no frame of reference that is favored. There is no truth of the matter about simultaneity except in the limiting case. There is no absolute time, there is only local — or “proper” — time. There is no canonical sequencing of events. If time is supposed to be some canonical sequencing principle, then there is no time, according to the special theory of relativity⁶.

We do not need to resort to the authority of physicists on this matter, however. A few thoughts about what events are, and about the relativity of event definition, should show why there is good reason to deny both that events occur in some canonical sequence and that the universe might be defined in terms of a collection of events, in sequence.

Imagine the following situation: I am standing up, with my hand clenched and raised to shoulder level. I move my hand vigorously forward and down. Now: imagine it all together, as an event. A silly event, perhaps, but imagine it anyway.

Now let me add detail: my hand is clenched around a knife, and you are standing in front of me. My question is this: what is the correct objective description of this event? Is it an attack? An act of attempted murder? Or is it just me moving my arm? Lots hangs on which description is correct, since I have a right to move my arm, but no right to attack you. So all we have to do is figure out which description of this event is correct.

It is my claim that you will search in vain. There is no “correct” or “objective” description. Try another situation: it's early morning again, but this time you and I are outside. The sky is clear, we are waiting to see the sun. Slowly it emerges from below the horizon and climbs into the sky. But on the other hand, of course, it does no such thing. It just sits out there, 93,000,000 miles away or so, as the Earth turns upon its axis. On yet another hand, it is moving in a grand orbit around the center of our galaxy. “The sun, rising” is the description of an event. We all know

⁶ Students of Minkowski spacetime might express the matter this way: while there is no complete ordering of events (what I have been referring to as “time as such” or “time itself”), there are partial orderings which do the work I have assigned to “temporality”. As attractive as the Minkowski framework is, my present purpose is to nudge intuition, and my sense is that premature introduction of mathematical modeling might subvert that end. For what it's worth, though, the special theory is clearly only the beginning of the story. The general theory of relativity addresses connections between the spacetime structure of the universe with its very geometry, and quantum entanglement adds further complexity to attempts to understand temporality. For an intriguing survey, see Muller, *Now*. See also Seth Lloyd, *Programming the Universe: A Quantum Computer Scientist Takes on the Cosmos* (New York: Vintage Books, 2007).

that description doesn't really mean what it seems to mean. But what is the correct description? What is the event that has occurred?

Contemporary physics will not help us find an answer to this question, except to suggest that the question is misconceived. Does the Earth really move around the sun? Only from a frame of reference at rest relative to the sun. Is that a privileged frame of reference? No. There is no privileged frame of reference, unless you count our descriptive and explanatory purposes as capable of bestowing privilege. Some frames of reference, and some ways of describing things and events, are objectively better for certain purposes. And others are objectively better for other purposes. None are best, regardless of purpose.

This is not just a fact about motions. It is a fact about descriptions. Descriptions are goal- and purpose-sensitive. What is noticed, even before it is described, is noticed because it is of some significance or importance to the noticer. The way a novel thing is first described reflects those aspects of the thing that are perceived as important or notable⁷. Even our sensory apparati are “designed” by evolution to pick up a selection of the array of information that is available in the environment. Each organism, humans included, picks up only information from the environment that might, at least in principle, be useful.

Our conceptual apparatus is committed to attending to universals. We think and speak in terms of trees and rocks and buildings — universals all — and can think or talk about particular things only as “*this tree*”, or “*this rock*”; that is, as particular specimens of universals. Even proper names are abstractions, in the sense that they designate invariance amid change. The universals themselves, though, are specified in terms of significant features common to groups of particulars.

The discussion of the last two paragraphs relies upon words like importance, usefulness, significance. The information that is picked up from our environment through perception, that is communicated through language, that is formulated in scientific theory, is only a portion of the total information that is available. It is an array of information deemed important, either biologically, conceptually, or personally. The events out there are individuated or identified under universals as a function of our purposes. Some of these purposes are common to the species, and some are specific to particular cultures. In many instances, the events we perceive are defined in terms

⁷ The pervasiveness of this aspect of not only description but perception itself is nicely summarized by Andy Clark in *Surfing Uncertainty: Prediction, Action, and the Embodied Mind* (Oxford: Oxford University Press, 2015). The now classical source of “ecological” perceptual study is J.J. Gibson, *The Ecological Approach to Visual Perception* (Boston: Houghton Mifflin, 1979). For an attempt to deploy a Gibsonian strategy more broadly, see John T. Sanders, “Affordances: An Ecological Approach to First Philosophy”, in Gail Weiss and Honi Fern Haber (eds.), *Perspectives on Embodiment: The Intersections of Nature and Culture* (New York and London: Routledge, 1999), pp. 121–41.

that indicate their significance specifically to us as individuals. What you see as falling in love may be seen by your spouse as an act of cruel and vicious betrayal. Where you see a destructive storm, others might see the answer to a prayer.

I am arguing that there is no objective way of defining or characterizing events. This doesn't mean that the *existence* of things and events in the world is somehow dependent on us. Far from it. We are intimately involved with the world as we parse our experience of it for relevance. It's the parsing, though, that individuates objects and events as to their relevance to our needs and purposes.

"Events" are thus picked out of the world of experience as a function of their importance; there's nothing *intrinsic* to them that serves to distinguish them from their background (i.e., the rest of the world) except as defined by our "purposes". If you are not fully convinced, consider a more modest relativism. If events *could* be defined in some objective way, they could all be regarded as having a beginning, a middle, and an end. Events thus construed might be understood as comprising the world, but they could not do this in a temporally sequential way. Instead, events so understood would make up the world in such a way as to overlap one another, to nest within one another, to envelop one another. So even if there were some objective way that events in the world are (that is, if there were some describer-independent description that was the right description), it would still be the case that events don't occur in a canonical sequence imposed by the physical world, and it would still be the case that the universe could not aptly be described or defined as a sequence of events.

On this view, sequences that are observed in nature are special. Descriptions of what happens are characteristically shaped to expose the sequential character of some of what goes on. As historians and philosophers of history have occasionally pointed out, narrative and description impose upon the world, yet they are not arbitrary. It is better to think of them as "conventional" or, as I would prefer, as "utilitarian".

The story about clocks is similar. Clocks are conventional. They, like sequential orderings generally, serve certain purposes. They are tools, and this is easier to see for clocks than for sequential orderings, since they are so obviously designed. But do clocks measure time? In a manner of speaking, they do. But this is only a manner of speaking. It is like the sentence "This topic of discussion warms the cockles of my heart." The sentence is true, but it does not commit me to the existence of little things called cockles located somewhere on my heart.

How does the general thesis about the relativity of event description relate to questions about time and temporal sequence? It does not follow, of course, from the relativity of description to purpose that there is no such thing as time or objective temporal sequence. Little about the character of the world follows directly from facts about description. But put together with what relativity theory says about how the world works, these facts about description offer reasons to think that our common

intuitions about time relate to our common needs and purposes. Once scientific experience penetrates to needs and purposes wider and deeper than common ones, the merely approximate character of intuition is revealed; indeed, common sense is revealed as misleading or even wrong in such wider and deeper contexts⁸.

Clocks may tick. They may flash numbers in sequence. They may point at numbers in sequence. The events that are carefully designed to occur in and on clocks are designed to be a measure of other events. And we choose the tool that best serves our purposes.

In the first section of this paper, I contended that we don't have direct experience of time; in this second section, my claim has been that there *exists* nothing in the world that would fill the role that time would have to fill on the usual conception.

3. Time from the Inside Out

Where does all this leave time? Well, we don't experience it directly, and it doesn't have an objective existence. But what is it that this paper is about?

It's about time, of course; but I want to avoid certain implications of the word "time". It would be better to talk about "temporality", if we could. This may sound like a silly move, so I'll try to explain why I wish we could make it.

What would you answer if someone asked if "largeness" existed? What if someone wanted you to write a paper about largeness? How would you find words to explain what you know? Largeness "exists" in the sense that some things are large, certainly, but largeness isn't a thing. It's not even a property that a thing can have apart from comparison with other things. It's a relational property.

I'm contending that time is like this. But unlike largeness, time has got this cute little name that makes it seem like a thing, not a relational property. So I want to pretend that it has lost that name, and is called "temporality" instead. This stresses at least the fact that what I am talking about is something that events have. It is not something that exists in its own right. It's a property.

To add the relational part of my claim, I have to do a bit more work. I ask you, therefore, to consider time as you experience it, from the inside out, as it were. Consider, in particular, what "now" means.

"Now" may be "these two seconds", "these ten minutes", "these ten years", "this century", etc. What the present is is relative to the purposes for which reference to the present is invoked. Because of this relativity it cannot exclude any part of the past or future in principle⁹.

⁸ Not wrong *simpliciter*, however. Relativized to our local purposes, our intuitions can be as right as they need to be.

⁹ William James, following E.R. Clay, referred to "now" as conceived in this way as the "specious present" (William James, *The Principles of Psychology* (New York:

On this view of temporality, “presents” overlap, and might be said occasionally to nest within one another. Indeed, these “presents” or “nows” are relative, just as “events” were, to the purpose which evokes the gathering of phenomena into the package we call “now”¹⁰. “Nows” and “events” may be said to overlap and nest within one another in the same way, and for the same reasons.

For the purpose of understanding what I am about to say, I need you to understand yourself as at the center of a frame of reference. If you like to think about these things in terms of coordinate systems, imagine that you are at the origin of some multi-dimensional set of coordinates. I will be speaking in the first person, in what follows, but that should not obscure the fact that what I am saying could be said by any of you, located, as you are, at the center of a reference frame.

As the center of a frame of reference, I am always here, now. There is no succession of moments at the center of such a frame. Everything is indexed in terms of its relation to the center . . . in terms of its relation to here and now.

Imagine yourself in some relaxed state of mind. At such a moment, time is just not there; this is true even as things happen around you, as the digital clock pops a new number into place on its display. Time is just not there. The world is, and it is present.

An act of concentration is required if temporality is to be noticed. Without that act of concentration things change, of course; but they are changing-now or not-changing-now. If I smell dinner downstairs I do not smell it in sequence . . . I smell it all now. If a siren wails somewhere outside, or if music is playing, there is no sequence; there is a wail, or a tune, now.

This is the perspective I’m asking you to adopt. It’s a way of looking at things. Try to take this perspective. Select a frame of reference centered in yourself, and see that you are there, now, at all times. The world is always present. Time is simply not there. Things happen, but time itself is nowhere to be found.

Dover, 1890), esp. pp. 609–10). Along similar lines, Henri Bergson’s work on time emphasized the importance of “durée” or duration in understanding human temporal experience (Henri Bergson, *Time and Free Will: An Essay on the Immediate Data of Consciousness*, tr. F.L. Pogson (London: George Allen and Unwin, 1910), esp. pp. 100–01). What is important for my purposes in such conceptions is the explicit denial that “now” need be understood as instantaneous or fleeting. Conceived “from the inside out”, now has — or can have — duration.

¹⁰ Steven F. Savitt suggests that one way of characterizing such relativized “nows” is in terms of elements of an Alexandroff topology for Minkowski spacetime. He argues that nows might best be understood as what he calls “Alexandroff presents”, rather than bubbles. I find his argument extremely suggestive, but for now I am a bit more comfortable, as explained in what follows, with expandable bubbles. See Savitt, “The Transient nows”, in Wayne C. Myrvold and Joy Christian (eds.), *Quantum Reality, Relativistic Causality, and Closing the Epistemic Circle: Essays in Honour of Abner Shimony* (Berlin: Springer, 2009), pp. 349–62.

What is this present? I don't know how to characterize it, except by pointing: take the perspective and see what I mean. It is possible that the measure of the present is the *unchanging*. If this is the case, then the measure of the present would seem to be bound up with the criteria for identity (since identity is determined by that which endures unchanged through change).

I am now speaking aloud in an otherwise quiet room (try it yourself). When I stop speaking, it appears to me that there is no time. I experience no such thing. Those reading this paper in Grand Central Station at rush hour might have no idea at first what I'm talking about. They would be too immersed in change, in impermanence.

For my purposes (here and now as I am), the present is this morning. To the extent that I think about the fact that at 11:00 I may have to be somewhere for a moment, my present becomes restricted. It no longer includes 11:00. That becomes the future. The present becomes more tightly constricted around me.

The more things change, the harder one has to work to find that which endures through change. In a fast-paced world, the present looks like a moment, and here may be someplace inside my body. Sitting on a mountain top allows here and now to get bigger around me. This experience delights some, scares others.

But we are inveterate abstractors. We can stand back from such experiences, we can see how to think of momentary presents even while we are on the mountain. And we can think of big presents even in Grand Central Station. Indeed, we may not even have to do much abstracting to do so. If we think of what goes on at rush hour as a hubbub — as noise, or as constant motion — this too may be considered unchanging. The “present” may be the morning we spend there, watching the activity.

Presents like this, whether big or small, expand out from now toward the past and future. I do not hear first this note, then that; I hear a tune, now. And of course the tune is not momentary. I do not see the cat start to jump, then get half-way to the pile of books on my dresser, then arrive with a crash; I see the whole thing, now. But of course the whole thing took time. The present, for time-keepers at a race, might be one second long; for historians, the present might be a century long. These are examples, not limits. There are no limits to the possible durational extent of the present.

What we have is an environment to explore and move around in. It changes. We change. It changes us. We change it. We displace ourselves in it. It moves and changes around us. What gets specified as “the environment” may itself be small or large as the purposes of our attention may require. But we may think of ourselves as occupying the center of a variable, multi-dimensional bubble, the here-and-now, where the dimensions are the parameters that are necessary to specify endurance and

change in the environment and in ourselves¹¹. There are no points or instants in the kind of world specified in this way. Such bubbles may be small or large. Here-and-nows can overlap, they can nest within other here-and-nows. It is hard to see what could be meant by saying that they succeed one another. Succession is a wrinkle that must be worked in separately, if at all.

From your bubble, you are fixed, permanent. The environment undergoes change. Just now a car is going by the window. Now it's quiet again. Now it's *still* quiet. Now is when all of these things happened. But the car is long gone.

Does the bubble move through the environment? It can. Like when I go outside this room. For some purposes, I would no longer be here if I left this room. For other purposes, I would be here all day, provided only that I don't leave the building; or here all winter, provided only that I don't leave New York State.

Similarly with now. For some purposes, I am now writing a paper about time. For other purposes, I am now a philosopher.

Is this nit-picking? No; because so much depends upon being able to make a distinction between the present and the past, or the present and the future. I am trying to convince you that this distinction is relative not only to the observer, but to the *conceptual purposes* of the observer. I am arguing that no such distinction can be made in any fixed way on other than an arbitrary basis.

The temporality of an event, then, involves (among other things) the possibility of constructing one or more of these “here-now bubbles” around it, or its relation to a now bubble constructed somewhere else. It is the possibility of talking about an event in these terms that constitutes its temporality. Temporal order within and between such bubbles will be constrained by what happens in the world, of course, but will also be constrained by facts of perspective, as these are revealed by physics. Among the most important of these facts are those revealed by relativity theory.

The reason for going to these lengths has two parts. First, traditional sequential and linear accounts of time do not do justice to our experience. Nor do they make much sense in terms of perceptual psychology. Second, traditional accounts are bankrupt when it comes to addressing issues raised by contemporary physics.

The approach offered here, which stresses the locality of temporal reference — i.e., the sense in which temporal reference is local or related to a particular frame of reference — is crafted in such a way as to avoid these problems. “Temporality”

¹¹ Carlo Rovelli deploys the idea of a “now bubble”, but his is intended to explore the issue of physical simultaneity among spatially separated events. Thus his bubbles represent specifically the relatively tiny durational ranges within which we are inclined to say that things happen simultaneously, given that there is no literal truth of the matter when events are separated spatially. See Rovelli, *The Order of Time*, pp. 43ff. The difference between Rovelli's bubbles and those contemplated in this essay should be clear: where his bubbles are designed to illuminate simultaneity, mine attempt to capture contemporaneity in a broader and more variable sense.

of this relativistic kind is directly experienced, and it is relatively more congenial to what contemporary physics says about time. Questions about “time’s movement”, or about the “arrow of time”, become no longer conceptual questions about time, but rather empirical questions about how the world works¹². And this, surely, is as it should be.

All of this is, of course, only the barest beginning of a new approach to understanding time. It is, as yet, extremely ill-formed. Whatever the virtue of this present proposal, though, we must continue the enterprise of reformulating our understanding of temporality in a reasonably coherent metaphysics. For without such metaphysics, our sciences (for all their virtues) make no sense.

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¹² There are obvious conceptual problems, of course, with speaking about the “movement” of time. See, for example, Savitt, “The Transient *nows*”, p. 353: “I do not think that it [is] useful to try to understand the passage of time as a kind of motion, since motion has to be understood as change of position through time.”