

Tomasz Placek

Tenses modally introduced: a reductio argument?

There is a conflict between manifest time and time of physics, as structures needed for manifest time cannot exist in space-times of physics. The main elements of the manifest time are (1) a tripartite division of the world into the past, the present (now), and the future, (2) a continuous succession of the nows, and (3) an ontological difference between the fixed (settled) past and present, and the open future.

A little explored road to introduce relativistic-friendly tenses takes the settledness vs. openness for their essential feature, while reading this distinction as modal, i.e., concerning alethic necessity and contingency. On this view, tenses and what their loci are, depend on patterns of chancy local events. Suggestions to link tenses to indeterminism can be found in Whitrow (1961, pp. 295–296), or more recently in Ellis (2006, pp. 1812–13), yet, since the project requires a framework combining time and modality, it has not been rigorously investigated until recently.

Our aim is to first define, in the context of special relativity, the future of a given point-like event, and then use it to intrude the remaining tenses. Having said that the future has an aspect of contingency, there are many ways how to precisify this intuition. Motivated by examples like the Summer solstice 2018 (i.e., an apparently deterministic yet future event), I opt for the following weak reading:

(*) f is in the future of e because there is some event e' before (or identical to) f and a subject matter A such that at e it is contingent that A obtains at the location of e' .

To turn this idea into a rigorous definition, we construct a semantic model based on the so-called Minkowskian Branching Structures (MBS) of Placek & Belnap (2012). An MBS represent alternative possible scenarios, all developing on a stage of Minkowski space-time from some common past (initial

conditions). A possible scenario is thought of as Minkowski space-time plus a physical content, the latter being represented by an attribution of “point properties” to quadruples of real numbers.

The construction of an MBS is governed by two rules: (1) An anti-haecceity thesis requires that any two scenarios must be qualitatively different somewhere. (1) A strong anti-haecceity thesis further postulates that if a quadruple x has different properties assigned in two scenarios, then there is a special point (quadruple) c below x such that the two scenarios agree qualitatively in the past of c but disagree somewhere closely above c .

An MBS is a semantic model for languages with modal and temporal operators. Hence given an event e in an MBS, the definition (*) picks its future, past, and present. Tenses so defined have the following features:

1. the concept of “the present of e ” is (special) relativistically invariant;
2. tenses and causal relations (light cones) are different, e.g., the past of e is typically *not* the backward cone of e ;
3. what the present of e is is contingent: it depends on the localization of chancy events, which in turn depend on localization of qualitative differences (on what might have been);
4. there are two extreme cases for the now: the whole world and an achronal 3-dim space-like surface.

I will leave it to the audience’s evaluation whether such contingent tenses with somewhat weird features are satisfactory for friends of tenses.