What is an inertia world?

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The notion of an inertia world was introduced in Dowty 1979 with examples such as (1) in mind.

(1) Pat was writing a symphony when disaster struck.

The idea roughly was that the progressive of an event could be true at a world \( w \) and time \( I \) even if the event did not culminate at \( w \) but did so at every inertia world given by \( I,w \). Considerable energy has subsequently been invested in attacking, defending and refining this approach to the semantics of the progressive.

The subject of my talk is not so much the progressive, but rather what to make of the concept of an inertia world. According to Dowty 1979, inertia worlds “are to be thought of as worlds which are exactly like the given world up to the time in question and in which the future course of events after this time develops in ways most compatible with the past course of events” (page 128). I start by analyzing the notion of inertia implicit in this description, applying it (in the first instance) not on worlds, but on formulas, called fluents in AI. A fluent is inertial if it persists forwards and backwards in time, unless interrupted by a force. Persistence is played out in Fernando 2004 over strings of fluent-sets, which are collected in regular languages, modeling event-types. What is relevant to Dowty’s concerns about the progressive, however, is not so much persistence, but rather the forces that overturn it. Consider (2), where a collision between car and tree is, on a natural reading, averted through Pat’s actions.

(2) Pat stopped the car before it hit the tree.

Rather than simply clip a string off, I retain its unrealized part as a branch, for which I extend the notion of a finite-state machine to a b-finite-state machine. The latter is a finite-state machine plus a binary relation on states, analogous to the accessibility relation of a Kripke model. A good deal of my talk will revolve around b-finite-state machines, which I argue constitute a more natural setting for talk of inertia than do worlds. For those who could
(or would) not do without them, I construct worlds, taking a world to be inertial if its branching is minimal.

The form of branching, \( b \), introduced here diverges from non-deterministic choice \( | \) on regular languages in several important ways, perhaps best understood through an example.

(3) You may leave now or you may leave later.

Two possibilities are described in (3): leaving now, and leaving later. Read deontically, (3) grants the hearer permission to realize either possibility. Read epistemically, (3) denies that the speaker can rule out either possibility. The possibilities may, under \( b \), combine within a single branching string, whereas \( | \) keeps them separate, allowing one to be eliminated independently of the other. This makes \( | \) more congenial (than \( b \)) to an update semantics where “growth of knowledge is understood as a process of elimination” (Veltman 1996, page 228).

\[
\begin{array}{c|ccc}
 b & \text{expansive: more is more} & \text{positive: grant} & \text{distributive (pointwise)} \\
| & \text{eliminative: less is more} & \text{negative: deny} & \text{non-distributive} \\
\end{array}
\]

Branching \( b \) vs non-deterministic choice \( | \)

Notice that what is negated in the second row above is itself negative. But before canceling two negatives (or dismissing the difference between expansiveness and eliminativity as that between formulas and models), we ought to pause and consider Gödel incompleteness: not proving not \( A \) is not the same as proving \( A \) or, for that matter, the consistency of \( A \) (at least not for certain formal notions of provability).

Such complications aside, the contrast between \( | \) and \( b \) may, I think, also shed light on that between epistemic and metaphysical readings of \textit{might}, as analyzed, for instance, in Condoravdi 2001.

(4) Pat might have won the race [for all we know]/[but did not].

(5) Pat might have celebrated/slept/died yesterday [for all we know]/[but did not].

The process of elimination invoked for interpreting an update such as “Pat did not win” had better preserve the metaphysical possibility that “Pat might
have won” if we are to make sense of the “but did not” variant in (4). This is most readily arranged by encoding metaphysical alternatives through b (as opposed to []). Moreover, we may take the positive character of b-branching one step further by insisting that such branching be driven by actions/forces of the kind that disturb inertia. Thus, if we equate states with inertial fluents, we should hardly be surprised that the counterfactual readings of (5) and (2) become awkward in (5)′ and (2)′.

(5)′ Pat might have been celebrating/sleeping/dead yesterday but was not.
(2)′ The car was stationary before it hit the tree.

This data suggests a generalization that is tricky to defend because of the possibility of conditionalization and aspectual coercion. (5)′ improves if we replace “but was not” with say, “had things been different.” And we might construe “was stationary” in (2)′ inceptively, or repackage an event such as “win” as “be a winner,” read “become a winner.” The same sort of complications plague claims such as “only non-statives can occur as imperatives” (Dowty 1979, page 55), made despite well-known counter-examples (“be patient”). In the course of saying what an inertia world might be, I hope to make some of these claims plausible, soft as they are. The basic idea is to proceed from event-types given by fluents, rather than take worlds for granted as primitives.

Some references


