ELECTRONIC NEWSLETTER ON
REASONING ABOUT ACTIONS AND CHANGE

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Today

The discussion that started around Peter Grünwald's article continues in fairly broad circles. Today, Murray Shanahan responds to a question earlier in the discussion re the use of causal approaches to ramification in the event calculus. Pat Hayes, in a response to an earlier question by Vladimir Lifschitz, argues for the need to characterize instantaneous changes. (Compare also answer by Jixin Ma to a question re the paper by Knight, Peng and Ma at the Commonsense workshop, [c-fcs-98-183]).

References:

[c-fcs-98-183] Brian Knight, Taoxin Peng, and Jixin Ma. *Reasoning about Change over Time: Actions, Events, and their Effects.* Proc. Formalization of Commonsense Reasoning, 1998, pp. 183-197.

Discussions

Discussions about Articles at Commonsense workshop

Ramifications and sufficient causes

by Peter Grünwald

From: Murray Shanahan to: Erik Sandewall

Erik,

> *Also, I imagine that the event calculus is now able to represent these things, and it would be interesting to hear what the history was there (Murray? Rob?).*

Now that the heat of the debate has died down a little, I would like to give a belated response.

The issue of ramifications and indirect effects is dealt with quite thoroughly in my book Solving the Frame Problem, especially in the context of the event calculus. (Incidentally, the book also deals extensively with the situation calculus, so it's not just an axe-grind for a particular formalism.) A large number of standard benchmark scenarios are discussed. These include the following.

- The dead or alive scenario
- The walking turkey shoot
- The stuffy room scenario
- The chess board scenario (Reiter)

- The "safe from baby" scenario and
- the "wet in lake" scenario (Giunchiglia & Lifschitz)

I believe the treatment of these scenarios covers all the issues in the current debate. (One version of Thielscher's circuit example raises some interesting issues not covered in the book. But this example can be dealt with too.)

In particular, the event calculus formalism presented in the book incorporates a Releases predicate, much like Vladimir's releases predicate and Erik's occlusion, which exempts a fluent from the common sense law of inertia. (The intellectual debt is duly acknowledged in the book.) It also permits state constraints, such as

$$HoldsAt(Alive, t) \text{ if } HoldsAt(Walking, t)$$

as well as more "causal" constraints such as,

$$Initiates(a, Wet, t) \text{ if } Initiates(a, InLake, t).$$

If anyone has a scenario they think the book's formalism can't handle I'd like to hear from them.

> *I do feel however that many papers in our area get published with very incomplete accounts of previous and related work.*

I second that. I didn't devote years of my research time, as well as a lot of sweat and tears to writing that book for no-one to read it. (I know Erik sometimes feels the same way.) On my part, in the book, I tried very hard to give credit to others wherever appropriate, and to build on other's work rather than starting from scratch wherever I could.

> *This is unlikely to change because of the constraints that affect us all: limitations on our time, and on the number of pages allowed for each article.*

I don't agree. We are all guilty of this to some degree, of course, and I tend to be generous in actual refereeing. But deep down I feel that an article that doesn't take scholarship seriously doesn't deserve to get published, in the same way that it wouldn't deserve to get published if it contained mathematical errors.

Murray

From: Pat Hayes to: Erik Sandewall

Vladimir Lifschitz, in reply to Erik Sandewall (ENRAC 27.2 (98022)), asks the following:

> *First, if $s = t$ then your informal reading turns into "p changes its value to become F some time during the interval $[t, t]$." How can p change its value during an interval consisting of one time instant?*

Consider a flash of lightning at night, during which a room is instantaneously illuminated (p) for a single moment. The relevant predicate changes its value twice during such an instant, if the instant is considered to be like a point (having no duration), which seems quite plausible. Even if you insist on making the flash into an interval by separating the times of its beginning and ending, these times are both the temporal locations of instantaneous changes in the illumination-predicate.

In fact, one can make a case that *any* change must involve instantanous changes. Consider the classical example of two adjacent intervals meeting at timepoint t (which in my favorite temporal logic is identical to the interval $[t, t]$), and a light being switched on at t, so that p - being illuminated - becomes true at that timepoint. One might object that such an apparently instantaneous change is in fact always really a continuous one (the electricity begins to flow, the filament becomes hot and begins to glow, etc.) and therefore occupies an non-instantaneous interval. But then consider the beginning point s of *that* interval, and consider the property q of an illumination-change happening. The transition from not-q to q is now instantaneous at s. Clearly, the same strategy is going to work no matter how much you turn up the temporal magnification: there will always be a first point of the relevant interval, and *something* will be different there from the point immediately preceding.

For what its worth, by the way, this is one of the few places where quantum physics seems to agree with naive intuition :-)

Pat Hayes

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