ELECTRONIC NEWSLETTER ON
REASONING ABOUT ACTIONS AND CHANGE

Issue 99005 Editor: Erik Sandewall 27.3.1999

Today

The ENRAC Newsletter of 16.3 contained the first referee report for Michael Thielscher's submitted reference article about the Fluent Calculus. Today's Newsletter contains Thielscher's answer and the report of the second referee, who in fact disagrees strongly with the first one.

Naturally, referee 1 will have a possibility of responding before the accept/decline decision is made.

Referee number 2 also raises some policy issues about how such situations ought to be treated, and the area editor answers with his view on this topic.

Several additional referee reports have been received lately, and in particular while the present editor travelled to the AAAI Spring Symposium at Stanford. Because of the time required for editing, these reports will appear in forthcoming newsletters during the next few days.

ETAI Publications

Discussion about received articles

Introduction to the Fluent Calculus

by **Michael Thielscher**

Comment from: **The Author**

These are responses to the objections raised by the anonymous reviewer against the approach:

> *However, the 'deletion' here depends on an assumption about unification which isn't logically valid: that if two terms don't unify, they have disjoint referents.*

True. This was the reason for adding the additional equational axioms EUNA, under which the conclusion becomes logically valid.

> *Apart from the logical difficulties, this is computationally trivial (sub-STRIPS) and unoriginal.*

Not true. Even the basic Fluent Calculus goes beyond STRIPS in that it does not assume complete information about world states.

> *It is indequate for realistically complex domains. For example, take the toy blocks world as given, and add 'Above' to the vocabulary, defined recursively in terms of 'On'. The update axiom now needs recursion. Examples like this have been around for a quarter of a century.*

True. This is the origin of the Ramification Problem. The Fluent Calculus uses one of the most expressive of the existing solutions to this problem (reference [13]). As has been illustrated in Section 4.3., the state update axioms rely on some sort of recursion indeed.

> *In general, the FP is only nontrivial when one has a vocabulary such that some aspects of the state description depend on others in ways that vary with the particular situation: in STRIPS terms, not all the vocabulary is part of the core.*

State constraints of this kind are straightforwardly formulated in the Fluent Calculus, and the abovementioned solution to the Ramification Problem handles with those cases.

> *It doesn't have a clear semantics. The account given uses logical terminology, but it doesn't really use first-order logic.*

Not true. The Fluent Calculus has the standard semantics of classical logic. Full first-order logic is being used almost everywhere: in the conditions of state update axioms, when formalizing partial knowledge of situations, in state constraints.

> *The extended unique names assumption is so strong that it renders equality trivial, as the authors take pains to show.*

I don't know what you mean by "trivial." In fact an efficient treatment of equality (AC1-unification) is among the crucial aspects towards an efficient automated reasoning system based on the Fluent Calculus.

Comment from: **The Author**

These are responses to the objections raised by the anonymous reviewer against the presentation as a reference article:

> *I confess it was very hard to finish the first page without getting very puzzled. The text assumes the reader shares nonstandard definitions of technical terms from obscure conference papers, and the illustrative example is very hard to understand.*

The reference you refer to is meant just as a pointer to the publication in which was introduced the concept of state update axioms. In fact the present paper shall serve as a reference article and should be self-contained.

> *Example 1 uses a (binary!) function symbol $\circ$ which applies to (three!) arguments*

I have omitted parentheses because associativity of $\circ$ is among the foundational axioms, as has been indicated in the paragraph preceding that formula.

> *referred to by the expressions $On(A, x)$, $On(x, Table)$ and z, where both x and z are quantified. What does this mean? Presumably On here is a function from blocks and tables, but what are its values?*

Meaning is given by the standard semantics. Just read the formula as a first-order formula with quantifications, predicate symbols (here: the equation sign), function symbols (here: $\circ$, On, A, and $Table$), and variables (here: x and z).

> *Apparently, z here is supposed to be a* fact *(or, still more curious, "facts"), yet we have somehow managed to quantify over it (them?). How can one consistently quantify over facts, written using a logic, in that logic itself? (A rhetorical question, of course: one can't. Ref. Gödel).*

My fault. I shouldn't say "fact" at this point and be more precise about the method used here known as "reification."

> *Thielscher says that asserting $z \neq On(y, A)$ means that z does not have the "form" $On(y, A)$. But suppose we assert that (say) $On(B, A) = C$; now C does not have that form, yet it is equal to it.*

The equation would contradict foundational axiom set EUNA as it stands. If one wishes to express such relations then a modification of EUNA is required.

> *On page 2 we are told that $Holds(f, s)$ is a "macro". What does this mean?*

Holds is not part of the signature; it is used just to ease readability of formulas. Whenever it occurs, it stands for a particular equational formula.

> *Second, the terminology being used should be carefully explained, since the uses here of "fluent" and "situation" (for example) are not those used by many other authors.*

By "situation" I mean exactly what for example Reiter means when he talks about situations in the SitCalc: finite sequences of actions. What I mean by "fluent" has been said formally in Section 2.

Comment from: **Anonymous Referee 2**

To:**Anonymous Referee 1**
Referees should never be refereed (but judged by editors). In this case, since the editor explicitly welcomed contributions to the discussion of the report of Referee 1 in ENRAC of 16 March, I feel that the following remarks are appropriate, or rather necessary. Thereby I will not take up technical issues, since these are the matter of the author, except for generally pointing out that in my understanding the referee mostly failed to do a technically careful job. Eg. his first complaint

> *Example 1 uses a (binary!) function symbol $\circ$ which applies to (three!) arguments ...*

is absolutely void. The binary function symbol $\circ$ *is* used as a binary one and applies to two - not three - arguments. The paper clearly states that $\circ$ is associative so that terms like $f \circ g \circ h$ should not at all confuse a careful referee nor the reader. Similarly with most subsequent points of a technical nature.

Well, referees are not to blamed for making technical mistakes. We all are prone to this human weakness. And authors are able to defend themselves against such mistakes. However, there are issues involved in Referee 1's report which are awkward to be addressed by any author, especially a young one, and which are not in compliance with the behavior expected from fair and responsible referees of international journals. Here I point out three such issues.

1. The referee disqualifies the paper's notation as being taken "from obscure conference papers". The author cites five papers as already mentioned above. Two of them appeared in the AIJ, one is conditionally accepted for publication in the AIJ, the remaining two appeared in the journals New Generation Computing and Annals of Mathematics and Artificial Intelligence. To flash five journal papers of this calibre as "obscure conference papers" amounts to an extremely unfair behavior which should be banned by the community.

2. The referee maintains that "the English is turgid and sometimes hard to follow" without providing even a single example or hint. I challenge Referee 1 to write a paper in a language of his/her choice, and foreign to him/her, as competent as Thielscher did in the present case. The way the referee's complaint is brought forth in this case demonstrates an example of uttermost narrow-mindedness and arrogance inappropriate for a referee of an international journal.

3. The referee disqualifies the entire approach as "computationally trivial (sub-STRIPS) and unoriginal". This remark alone would already have disqualified the competence of Referee 1. There have been many attempts to embed STRIPS in a logical framework and it was not until the discovery in the mid-eighties (prior to Lifschitz' STRIPS semantics paper) of the predecessor of the fluent calculus (the linear connection method, now also referred to as transition logic) that this fundamental issue was solved.

Anonymity of referees is an important and sacred principle. As is the avoidance of public discussions of referees' reports, for which reason I feel very uneasy with this type of discussions (yet encouraged by the editor). The rules of ETAI might be reconsidered in this respect.

Comment from: **Anonymous Referee 2**

The paper is submitted to ETAI as an ETAI Reference Article. As such it does not claim to offer original results (which it does not). Rather I am asked to referee the paper under the published refereeing criteria for this particular ETAI category.

Under these considerations

I recommend acceptance of the paper provided ...

the author follows a few recommendations given below, and adds pointers (with comments) to some further articles which give a full account of the history of the approach and its relation to variants and alternative approaches (and which do exist).

This referee is in a somewhat awkward position since this report was written after having seen the report by Referee 1. Not that that report would have influenced this referee's judgment. But of course it does influence the justification of the judgment which now follows, beginning with responding to the set criteria.

> *1. Does the article represent a tradition or "approach" where there is already a sufficient volume of work in the field?*

Although this is more of an editorial issue, I can confirm that there is a substantial body of work in the literature on the fluent calculus. The five references given in the paper are just a tiny fraction of the volume of work which is even more substantial if closely related approaches are taken into consideration. It is somewhat unfortunate that the paper denies those close relatives of the fluent calculus (including STRIPS but also several others). For this reason the above-mentioned proviso attached to my recommendation in my view is of great importance.

> *2. Does the article concisely specify the assumptions, motivations, and notations used in that approach? Does it correctly capture the assumptions, etc. that have been used and are being used?*

Basically yes, if reification is taken for granted. Since reification is a standard technique in AI it may be taken for granted as done in the paper. However as the experience with Referee 1 demonstrates, this point might as well deserve a few extra sentences and more explicit references to discussions in earlier papers. The examples given are well-selected and tied to the respective formulas with good explanations. The notations are in full compliance with standard practice. This also applies to the by now standard use and distinction of the notions "situation" and "state". As supposed to do, the paper presents the basic definitions for the approach in a concise way.

> *3. Would reading the present article enable one to skip the introductory definitions section of many previously published articles that used the approach?*

Yes.

> *4. Is the article also concise in the sense that it does not contain a lot of material that is unnecessary for the above criteria?*

Absolutely.

> *5. Is the article pedagogical and sufficiently easy to read, but at the same time precise and correct?*

Yes. The author, as a non-native speaker, commands an unusually qualified use of English. Other than a missing "as" in the sentence "In order ..." in the middle of page 3 I could not find the slightest problems with the text. It is easy to read which of course is also a matter of taste and of familiarity. If more redundancy is permissible, more explanations might of course be added.

Comment from: **Area Editor**

At this point (27.3) two referees disagree quite strongly, and the author has given substantial answers to the objections raised by Referee number 1. Naturally now we invite Referee number 1 to express jirs view before the accept/decline decision is taken.

Anonymous Referee 2 also raises some important policy questions in jirs comment to question 3. In particular, je subscribes to the view that "avoidance of public discussions of referee's reports ... is an important and sacred principle", and "referees should never be refereed (but judged by editors)". This has indeed been the traditional practice, but ETAI is not traditional. One of our fundamental innovations is to open up the review process to the largest extent possible, without compromising the quality control that is obtained through anonymous referees that vote to accept or decline an article after the review period.

If all relevant questions and critique comes out during the open review, then it is sufficient for the referees to vote 'pass' or 'fail', and there is not much to debate. (It is always possible to continue the open review debate, of course). However we have had a few cases, including the present one, where an anonymous referee added jirs own contributions to the review debate, and in order to be consistent we must then make it possible to discuss such opinions by referees as well. In a similar vein there is no reason why the policies and decisions of the area editor should not be open to discussion. (However the final decisions are taken by the area editor and not by popular vote).

The system of open debate has been made practically possible through the advent of Internet, e-mail, and web pages for managing on-line debates. It would have been virtually impossible to apply it in the earlier age of conventional print-and-mail communication. In thinking about whether and how to use the new possibility, one must consider both the advantages and the possible disadvantages of the open reviewing approach.

Its advantages have been described extensively before, when the ETAI was started and in its present web pages. The following are some possible objections to the openness:

- "It may hurt the author if the critique by referees is made public". However, this is only so if authors are not allowed the right of effective rebuttal, and if referees are generally assumed to be infallible, so that a negative referee report is taken to mean that the work was below standards. In an open discussion situation, the informed audience can weigh the evidence presented by the referees and the authors.

  On the other hand, think about all those cases where articles have been rejected because the referees disagreed with the author's approach. Open reviewing and refereeing is much better at protecting the authors in such situations.

  In an environment that is characterized by open discussion, an author will obtain much more credit if je defends jemself well against attack, than if je is never tried.

- "But there has always been a good way for new approaches or research paradigms to react if they are blocked out for reasons of methodology: they can start another journal". Yes, but (1) a lot of work may have been lost because it never got that far, (2) spinning off new periodicals does not contribute to an effective exchange of views; it just means that everyone does jirs own thing.

- "It may hurt the field to show these disagreements". I think it hurts the field much more to not deal with them effectively.

These are important questions, both for the ETAI and for the field, and the comments by the readership are cordially invited.

Language remark. The following synthetic pronouns are introduced and will be used e.g. in reference to Anonymous Referees in order to combine concerns for anonymity preservation and for political correctness: *je* subsuming "he" and "she"; *jem* subsuming "him" and "her", and *jirs* subsuming "his", "her", and "hers".

This newsletter is issued whenever there is new news, and is sent by automatic E-mail and without charge to a list of subscribers, in plaintext format. The present postscript issue is a bona fide rendering of the same information in alternative typography. Instruction for contributors and other additional information is found at the following URL:

`http://www.ida.liu.se/ext/etai/actions/njl/`