Report on a Visit to ICOT

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1 Purpose of the Visit

I was invited to visit ICOT at the initiative of Mukai-san, who was at our institute for Language, Logic & Information in Amsterdam last summer. It then turned out that there were many points of contact between our research and the work at ICOT, so that I decided to go for three main reasons :

- obtaining first-hand knowledge of current research in Japan on computational linguistics,

- explaining my work and that of my colleagues to an expert audience,

- exploring possibilities for further future contacts and collaboration.

The program of my stay here was quite suitable for this purpose:
being composed out of three elements, namely

- a set of five lectures

- a number of organized conversations and demonstrations at various laboratories

- many lively informal contacts

2 Contacts at the Laboratories

2.1 Fifth Laboratory

Discussions here concentrated on the analysis and application of non-monotonic reasoning system.Mr.Inoue explained his research on theorem provers for Circumscription, which is related to some of our concerns in Amsterdam (in particular also, the Logic Programming group at our Center for Mathematics & Computer Science) : how can we make this important reasoning mechanism of McCarthy's efficiently implementable? Then, an interesting application of non-monotonic generation of hypotheses for logical circuits out of specifications of algorithms. This seems promising, although the scope of the present method seemed still somewhat restricted.

Finally, Mr.Hirosawa explained some ideas about generation of only partially correct answers to questions, which might be done with increased efficiency over total correctness. What I learnt from all this is a variety of interesting implementations and applications of non-monotonic reasoning, many of which were new to me.

2.2 Fourth Laboratory

The main-line research here on parallel reduction is more in the field on my Dutch colleagues Herk Barendregt and Bob Hertzberger (who still retain pleasant impressions of their stay at ICOT, as they told me).

Instead, some special topics within my sphere of interest were selected by Yokota-san. Personally, he explained ongoing research on databases (especially, in connection with the DOOD project), which will be of great interest to my colleagues in the database group at Amsterdam. I also think that the connections between rich data-base objects and their logics to current richer semantic the ones in linguistics might be worth investigating.

Then, Mr.Koshimura presented his proof to me of an embedding of Gentzen sequent calculus into the more humanly readable natural deduction format. I agree with his preferences (and we follow the same kind of tactic in Amsterdam when doing linguistic parsing in categorial grammars).

Finally, Miss.Yoshida explained her work on a semantics of streams, related to Pratt's "pom-sets". This is well in line with the interests of my colleagues De Bakker and Bergsira : and I will report back to them.

2.3 First Laboratory

Discussions here concentrated on Circumscription and more general non-monotonic reasoning.

Mr.Sato presented his paper on "rational" conditional inference and probabilistic reasoning, which was illuminating to me, as I have been working on

similar conditional systems. We found some further common ground in the area of Conditional Logic (where my colleague Frank Veldman is also involved), as an example of an interface between this computational work and current linguistics.

Mr.Arima explained his work on 'connotative circumscription', which I found an interesting alternative to the usual form of McCarthy's theory: We entered into subsequent technical discussion already about various modifications and elaborations of his theory.

All this work is immediately relevant to our interests in Amsterdam, and I think we shall keep in touch from now on.

2.4 Second Laboratory

Research here is actually closest to what is being pursued at my own Institute and related groups in Holland.

Dr.Hasida demonstrated the DUALS system to me, which analyzes natural language and answers questions using some very interesting ideas in constraint programming. The latter also make good sense generally in the recently emerging view of logical semantics as a theory of information structure and processing: in particular, the emphasis on many-directional information flow and partiality, nor just in the semantic objects, but also in the semantic procedures.

Next, I was given an extensive demonstration of the LTB-project, via its various components: sentence generation (Mr.Hatano & Mr.Fukushima), lexical analysis(Lax, Mr.Kubo) and syntactic analysis (SAX, Mr.Akasaka). In particular, the aims and scope of this kind of project in Computational Linguistics are comparable to several research efforts going on in my immediate environment in Europe– but what was instructive to me was the methodology, embedded within ICOT's logic programming environment.

Finally, Mukai-san and Mr.Yasukawa discussed their ideas with me concerning a new theoretical foundation of Situation Theory in mathematical theories like differential geometry of manifolds. I think this is an important direction to look at, even though no conclusive results have been found as yet.

Generally speaking, research at the Second Laboratory seemed quite "state-of-the-art" to me, while also showing, at many places, a healthy independence concerning 'orthodoxy' in such paradigms as Situation Semantics, which serve as guidelines, but not as dogmas.

3   Lectures and Accompanying Contacts

I presented five lectures whose topics were as follows :

- Dynamics of Interpretation and Information

- Categorial Grammar in its current state

- Linear Logic and related logical systems

- Non-Monotonicity in Natural Languages and Computation

- Categorial Grammar and Type Theory

The main themes here were:

- Categorial Grammar as a paradigm of 'logic-oriented linguistics',

- General theory of logics of information structure and processing,

- Parallels in the semantic of natural language and programming,

As it turned out, many members of the various audiences had a good background in these matters, and some interesting questions were asked: both during the official period and (especially) afterwards. In particular, it will be interesting to reflect on this in the future, seeing how our Dutch research program of 'dynamic logic' (in a broad sense) fits in with ICOT's logic programming ideology.

4 General Impression

Research at ICOT, in so far as it relates to my own area, seems high-quality and well-attuned to the world community. I am glad to have make a personal contact with many congenial colleagues, and we shall try to keep in touch. In particular, we shall start thinking about a regular exchange of information between our institutes – and perhaps in the future, some international ' League of Institutes' in Japan, the USA and Europe for research on the border-line of Logic,Linguistics and Computer Science.

Whatever happens to ICOT in the future, I think that there are already three concrete positive effects of its activity for 'my' research community:

- It has provided a focus and structure for formerly isolated researchers in this field in Japan,

- It has trained well-qualified young cadre in the area (investment in people always pays in the long run, as I always explain to the European Community officials)

- It has made funding easier for people like us in other continents, through its international prestige.

5 Personal Impressions

My visit has been intellectually useful, but also personally quite pleasant.

I would like to extend my thanks to Iwata-san for 'acclimatizing' a jet-lagged and culture-shocked visitor (as well as his assistants, Miss.Karakawa and Miss.Kawaide), to many members of the management of ICOT (in particular, Dr.Fuchi, Dr,Uchida, Dr.Furukawa, Mr.Hiroshige and Mr.Yoshioka) who graciously received me, and all researchers that I met.

In particular, Mr.Mukai is to be thanked for his warm welcome and attention, and Mr.Tsuda for his constant help.

Finally, I have been genuinely touched by the warmth and hospitality of all Japanese colleagues that I met, during and after office hours.

It is good to know the 'face' of our profession in this country henceforth.

Curriculum Vitae

- JFAK van Benthem
  12 June 1949
  married, two children, Dutch nationality

- master's degrees : Philosophy   (1972, University of Amsterdam)
                     Mathematics (1973, University of Amsterdam)

  Ph. D. degree   : Mathematics (1977, University of Amsterdam)

- 1973 - 1977   : assistant professor (Philosophy, Amsterdam)
  1977 - 1980   : associate professor (Philosophy, University of
                   Groningen)

  1980 - 1986   : full professor (Philosophy, Groningen)
  1986 - present : full professor (Mathematics & Computer Science,
                   Amsterdam)

- research interests :
      Intensional Logic, Model Theory,
      Applications of Logic to Linguistics and Computer Science

  books (a selection) :
      The Logic of Time (1983)
      Model Logic & Classical Logic (1985)
      Essays in Logical Semantics (1986)
      A manual of Intensional Logic (1988)

  papers :
      ± 120 published papers

- other scientific activities (a selection)
      managing editor : Journal of Symbolic Logic / Linguistics &
                        philosophy / Logic & Computation

      chairman : Dutch Research Network of Logic, Language and
                 Information