

Report on a Visit to ICOT

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1 Introduction

I was invited to ICOT because of my work on situation theory. Tutiya-san of Chiba University contacted Yasukawa-san and Mukai-san of the Third Laboratory to inform them of my interest in visiting ICOT to discuss matters of common interest. Yasukawa-san knew of me through a paper on situation theory that I had written, whereas Mukai-san had previously met me in California. Needless to say, I was quite honored to receive and most pleased to accept ICOT's very generous invitation to visit.

Situation theory is intended to serve as the logical foundation of *situation semantics*; both theories are mentioned prominently in the description of research in ICOT on natural language processing systems (e.g., p. 81 in "The Research and Development of Natural Language Processing Systems in the Intermediate Stage of the FGCS Project", Uchida et al, November 1988). There is considerable interest at ICOT in the situation semantics/theory enterprise, as demonstrated by the Japanese situation theory and semantics meetings regularly held here, and by the fact that the third annual international conference on situation theory and its applications will take place in Tokyo. It is not surprising then that a visitor such as Johan van Benthem should not fail to notice such interest. In page three of his "Report on a Visit to ICOT," the logician from the University of Amsterdam writes

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.

On the surface, there is nothing disturbing about the remark on situation semantics. However, as a student who has invested considerable time and energy on situation semantics/theory, I have for some time now been concerned that from a lack of attention to developing an "orthodoxy," the theory might degenerate into a vacuous form, consisting only of vague slogans with perhaps broad appeal, but no definite or discernible meaning. "Such paradigms" could not seriously "serve as guidelines," only as excuses for fuzzy and confused thinking that is fundamentally unprincipled (and unscientific). I believe that such sentiments are shared by some people at ICOT, and it was a pleasure to be among them for over a month. Furthermore, I was happy to learn about and discuss various research efforts at ICOT.

2 Summary of visit

I gave three talks at ICOT. The first was an overview of certain works on the mathematics of situation theory. I am not aware of any other paper or lecture with this as its purpose, and I learned much in preparing for and giving the talk. For my second talk, I gave my first public lecture on a notion that I feel should be considered basic in situation theory, namely, that of a support-map. I was very gratified by the reception these talks received, and I decided to write an ICOT technical report based on these lectures. On my last day at ICOT, I gave an informal talk relating various other developments in logic dealing with types, propositions and operations – particularly, Feferman's *explicit mathematics*.

From July 5th to the 7th, Yasukawa-san and I travelled to Kyoto to visit Hayashi-san of Ryukoku University. We spent a very stimulating and pleasant day with the professor, discussing situation theory/semantics and other matters broadly related to logic (including ICOT). I found the experience both professionally and personally very rewarding. I also enjoyed the discussions Yasukawa-san and I had during the trip.

On July 16, I delivered, on the invitation of Tutiya-san, a lecture entitled "A mathematical introduction to situation theory for laymen" through which I was able to make further contacts with philosophers in Tokyo. Again, the experience was most pleasant, as was the preceding afternoon I spent with Mukai-san in Kamakura, sight-seeing while discussing situation theory and semantics.

3 Contacts with the Third Laboratory

Regarding my contacts with the Third Laboratory, I should say first that the laboratory provided an unusually sympathetic atmosphere in which I could carry out

research on situation theory. In particular, I have in mind Mukai-san's interest in developing situation theory along lines consistent with modern physics and mathematics, and Yasukawa-san's interests in possible connections with forcing and toposes.

As for work more directly connected with fifth generation computer technology, I enjoyed a very interesting discussion with Yokota-san about the language *Juan* that he and others are developing. There are problems with its semantics involving the definition of lattice operations, and compositionality. Aczel's Anti-Foundation Axiom (AFA), especially in its labelled version (called LAFA), may be of use in formalizing some aspects of the language.

I also had a number of interesting discussions with Yasukawa-san about the language *Quint*, concerning both its syntax and semantics. I regret that we did not have more time to further discuss the language and, in particular, the relevance of notions from situation theory to it.

4 Contacts with other Laboratories

Yasukawa-san very kindly arranged a number of introductory sessions for me through which I could become familiar with some ongoing research at ICOT.

Aiba-san, introduced me to some of the research on constraint logic programming in the Fourth Laboratory. He described the computational domains (complex numbers for algebraic computation, boolean algebras, and linear programming), and spoke about the challenge and problem of parallelization.

Fujita-san of the Fifth Laboratory described research on theorem-proving, and applications, explaining in some detail the parallel logic machine under development, and mentioning the interest in algorithmic learning and non-monotonic reasoning.

Tanaka-san, of the Sixth Laboratory, coordinated a presentation of research at ICOT on natural language. Hagiwara-san described research on developing a parallel natural language system model on PIM; Sono-san talked about designing a knowledge base for Japanese; and Kubo-san spoke about discourse processing based on LTB (language tool box). Following these presentations, I discussed, in response to questions, some of the research at CSLI, and talked at length about my view of the current status of the situation semantics/theory enterprise.

5 Conclusion

Researchers with reputations and experiences far exceeding that of this lowly graduate student have written in support of the excellence and prestige of ICOT. I must confess

that as a (more or less) young researcher with primarily theoretical interests, I am not qualified to make any judgments directly concerning the programming/engineering efforts being made at ICOT. Indeed, I have from time to time felt somewhat uneasy about my relation (irrelevance?) to the rather concrete problems that (quite understandably given ICOT's charter) seem to preoccupy most researchers here.

As discussed in my ICOT technical report, however, I feel that situation theory has important insights to offer in understanding the nature of information at a fundamental level. The theory should be particularly helpful in giving a coherent account of everyday reasoning, where shifts in situations cannot be ignored. Moreover, Yasukawa-san described to me some very interesting ideas applying the notion of a situation to the programming language *Quint*. Whether or not the notion of a "situation" is computationally problematic, and ought to be eliminated in real computer applications, I leave ICOT with the firm conviction that there ought to be more to the information revolution than fast computers. Basic research must be supported, and certain endeavours, however questionable their practical pay-offs may be, are worth pursuing. These include works whose ultimate thrust might be somewhat humbling, tempering, as they do, our enthusiasm about the power of machine computation.

6 Thanks much

I am extremely grateful to the Third Laboratory for making my visit possible, and showing much kindness and support throughout my stay. In this regard, I am particularly indebted to Yasukawa-san and Mukai-san for their exceptional patience. Other members of the laboratory that I should also like to mention are Yokota-san and Hashida-san, as well as Hagiwara-san, Nagano-san Tani-san, Tojo-san, and Tsuda-san for their warm and friendly welcome.

I would like to express my sincere gratitude to Iwata-san and Karakawa-san for their uncommonly kind help in getting this helpless foreigner comfortably settled (at least for five weeks) in Tokyo. There are many others whom I should thank, and among the "many others," I feel that it is only proper for me to name some of the management of ICOT: Fuchi-san, Furukawa-san, Hiroshige-san, Uchida-san, and Yoshioka-san.

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1985 California Institute of Technology
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EXPERIENCE:

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