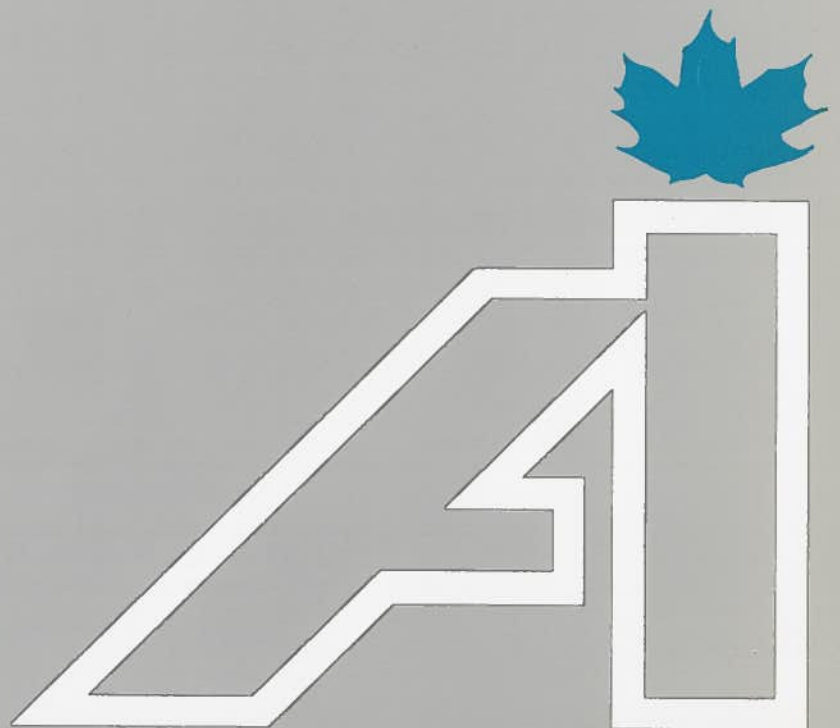


# CANADIAN ARTIFICIAL INTELLIGENCE

March 1986  
Issue number 7

An official publication of  
CSCSI/SCEIO Canadian  
Society for Computational  
Studies of Intelligence/  
Société canadienne pour  
l'étude de l'intelligence  
par ordinateur.





The Symbolics 3600—a new computing paradigm.

*Processing with symbols vs. computing with numbers.* The first computers crunched numbers. And regardless

of how powerful they've become, traditional systems still force you to deal with the world in quantitative terms.

Face sophisticated applications, and the limitations can become all too obvious.

An increasing number of computer scientists, researchers and program developers are discovering ways to break through this complexity barrier. Their vehicle—the Symbolics™ 3600.

The 3600 allows talented programmers and engineers to represent objects and knowledge far more flexibly than numeric formats allow.

Through the dynamic manipulation of arbitrary data structures consisting of symbols and their associated properties, a user can resolve problems previously considered impossible or infeasible.

*A few typical applications.* Custom VLSI engineering. The 3600 has a unique ability to deal with large, complex modeling structures. Semiconductor companies use it to assist in the development of the next generation of chips.

A development environment for complex software. Rapid prototyping and an incremental edit/compile/dynamic link/debug loop help

make the 3600 one of the most effective programming environments ever developed.

Expert systems development. Using the 3600's powerful inferencing throughput and ability to handle very large knowledge bases, government agencies and Fortune 1000 companies are developing expert systems in such fields as process control, financial advisory services and image understanding.

*Symbolics—the first name in symbolic processing.* Symbolics was founded in 1980 to commercialize this new technology. Among the founders were the developers, at MIT, of the first hardware architecture designed specifically for symbolic processing.

Today, the 3600 represents the highest expression of symbolic processing technology. Its custom processor design incorporates a tagged memory architecture that manipulates symbols as efficiently as

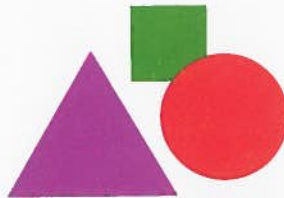
a traditional computer manipulates numbers.

Using Symbolics-enhanced Lisp, the 3600 provides a powerful integrated software environment which features object-oriented window system, incremental Lisp/Fortran-77/Pascal compilers and exceptional networking and graphics capabilities—for a new dimension in man-machine interaction.

To learn more about symbolic processing, write us at the address below.

**SYMBOLIC PROCESSING  
WAS DEVELOPED  
TO SOLVE TWO KINDS  
OF PROBLEMS:**

**THE COMPLEX.  
AND THE IMPOSSIBLE.**



**symbolics** (Canada) inc.  
A Member of the NEXA Group

5915 Airport Road, Suite 200,  
Mississauga, Ontario L4V 1T1  
(416) 671-0510

## Contents

CSCSI/SCEIO news: New executive elected  
by acclamation, 5  
Letters to the editor, 6  
Announcements, 6  
Research in Canada on intelligent computer-  
aided instruction (*J. Zachary Johnson*), 9  
Fifth Generation Society signs agreement  
with Japanese Lab, 11  
Machine Vision International Ltd starts in  
Ottawa, 11  
AAAI solicits university and lab exhibits at  
conference, 12  
Fund for the Julian Davies Gold Medal, 12  
New Bindings, 12  
Cartoon (*P. S. Mueller*), 12  
The Sixth Canadian Artificial Intelligence  
Conference: information and registration  
form, 13  
Updates to the directory of Canadian AI

## Résumé en français, 7

Editor: Graeme Hirst  
Assistance: Joanne Mager, Jim des Rivières  
French/English translations: Jean-Pierre  
Corriveau  
Cover design: Cathy Ledden, University of  
Toronto Press  
Cover logo: Kathryn Finter  
Printing and Production Assistance: University  
of Toronto Press. Printed in Canada

Copyright © 1986, Canadian Society for Computational Studies of Intelligence / Société canadienne pour l'étude de l'intelligence par ordinateur. All rights reserved; *Canadian Artificial Intelligence* may not be reproduced in any form without the written permission of the editor.

The opinions expressed herein are those of their respective authors, and are not necessarily those of their employers, CSCSI/SCEIO, *Canadian Artificial Intelligence*, the editor, CIPS, or the University of Toronto.

businesses, 23  
Updates to the directory of AI graduate pro-  
grammes in Canadian universities, 23  
New books, 24  
Recent technical reports, 29  
Cartoon (*P. S. Mueller*), 31  
Workshop reports (*Brian Nixon and Janice  
Glasgow*), 34  
Obituary: Paul A. Kolers (*Fergus Craik and  
John Tsotsos*), 35  
Forthcoming conferences, and calls for  
papers, 36  
All-purpose form, 39

## Advertisers

Symbolics, 2	University of Brit- ish Columbia, 28
Applied AI Systems, 8	Lisp Canada, 32
Interact R&D, 19	Applied AI Systems, 40
Xerox Canada, 20	Ovum, Ltd., <i>insert</i>
Logicware, 22	
The Report Store, 27	

**Canadian A. I. Newsletter representatives:**  
University of British Columbia  
Bill Havens, Department of Computer Science  
Simon Fraser University  
Nick Cercone, Department of Computing Science  
University of Alberta  
Len Schubert, Department of Computing Science  
University of Saskatchewan  
Gord McCalla, Department of Computational Science  
University of Western Ontario  
Michael Bauer, Department of Computer Science  
University of Waterloo  
Randy Goebel, Department of Computer Science  
Queen's University  
Janice Glasgow, Department of Computing and Inform-  
ation Science  
University of Ottawa  
Doug Skuce, Department of Computer Science  
Bell-Northern Research  
Dick Peacocke, Knowledge Technology  
McGill University  
Steve Zucker, Department of Electrical Engineering  
Concordia University  
Renato de Mori, Department of Computer Science  
Dalhousie University  
Richard Rosenberg, Department of Mathematics

# Canadian Society for Computational Studies of Intelligence

## Société canadienne pour l'étude de l'intelligence par ordinateur

CSCSI/SCEIO is the Canadian society for the promotion of interest and activity in Artificial Intelligence. It conducts workshops and fully refereed national conferences, publishes this newsletter, sponsors the journal *Computational Intelligence*, and coordinates activities with related societies, government, and industry.

To join CSCSI/SCEIO, use the membership form in this issue. Non-Canadian members are welcomed.

CSCSI/SCEIO is affiliated with the Canadian Information Processing Society and the International Joint Council on Artificial Intelligence.

CSCSI/SCEIO officers for 1984-86 are:

**President:**

Gordon McCalla  
Department of Computational Science  
University of Saskatchewan  
Saskatoon, Sask S7N 0W0  
Phone: 306-966-4902  
UUCP: . . . !sask! kimnovax! mcalla

**Vice-President:**

John Tsotsos  
Department of Computer Science  
University of Toronto  
Toronto, Ont M5S 1A4  
Phone: 416-978-3619  
UUCP: . . . !utcsri! utai! tsotsos

**Secretary:**

Michael Bauer  
Department of Computer Science  
University of Western Ontario  
London, Ont N6A 3K7  
Phone: 519-679-6048

**Treasurer:**

Wayne A. Davis  
Department of Computing Science  
University of Alberta  
Edmonton, Alta T6G 2H1  
Phone: 403-432-3976  
UUCP: . . . !alberta! uqv-mts! sams

# Canadian Artificial Intelligence Newsletter

## Number 7 (New series) March 1986

ISSN 0823-9339

The *Canadian Artificial Intelligence Newsletter* is published quarterly by CSCSI/SCEIO, and is a benefit of membership in the society.

**Editor:**

Graeme Hirst  
Department of Computer Science  
University of Toronto  
Toronto, CANADA M5S 1A4  
Phone: 416-978-8747  
CSNET: cscsi@toronto  
ARPANET: cscsi.toronto@csnet-relay  
UUCP: . . . !utcsri! cscsi

(UUCP connections to allegra, cornell, decvax, decwrl, depthot, drea, floyd, garfield, hcr, ihnp4, linus, mbcsl, mcgill-vision, musocs, qucis, sask, ubc-vision, utzoo, uw-beaver, watmath, and many others.)

The *Newsletter* solicits contributions in English or French on any matter related to artificial intelligence, including:

- Articles of general interest.
- Descriptions of current research and courses.
- Reports of recent conferences and workshops.
- Announcements of forthcoming activities.
- Calls for papers.
- Book reviews (and books for review).
- Announcements of new AI companies and products.
- Opinions, counterpoints, polemic, controversy.
- Abstracts of recent publications, theses, and technical reports.
- Humour, cartoons, artwork.
- Advertisements (rates upon request).
- Anything else concerned with AI.

Please send submissions, either on paper or by network, to the editor or to your local *Newsletter* representative (see list on page 3). On-line submissions are preferred, but they should not contain justification spaces or hyphenated line breaks.

The *Newsletter* is published in March, June, September, and December. Material for publication is due on the 15th of the preceding month.

Please send changes of address to:

CSCSI/SCEIO, c/o CIPS  
243 College Street, 5th floor  
Toronto, CANADA M5T 2Y1

## New Executive Elected by Acclamation

---

Gord McCalla,  
President, CSCSI/SCEIO

---

I am pleased to announce the new CSCSI/SCEIO executive for 1986-88. As no other nominations were received, the slate proposed by the present executive is returned unopposed, and will take office on 1 June 1986. The members of the new executive are the following:

*President*, Dick Peacocke, Bell-Northern Research  
*Vice-President*, Renato De Mori, McGill University  
*Secretary*, Bill Havens, University of British Columbia  
*Treasurer*, Randy Goebel, University of Waterloo

The outgoing executive congratulates the new members, and wishes them the best of luck in their new offices.

□ □ □ □ □

**Dick Peacocke** received his BA in mathematics from the University of Cambridge (England) in 1967, an MSc in computing science from the University of Alberta in 1969, and a PhD in computer science from the University of Toronto in 1978. His thesis topic was a formalism and programming methods for scene analysis. He held an IBM Scholarship while at Cambridge and worked for IBM in the U.K. for several years. Since joining Bell-Northern Research in 1977, Dick has worked on office communication applications, software engineering, and software quality assurance. He is



*Dick Peacocke*



*Bill Havens*



*Randy Goebel*



*Renato De Mori*

currently manager of knowledge technology, applying AI techniques to corporate products and processes.

**Renato De Mori** received the doctorate degree in electronic engineering from Politecnico di Torino, Torino, Italy, in 1967. In 1976 he became Professor and Chairman of the Institute for Computer Science, University of Torino. In 1982 he joined Concordia University, Montreal, as a Professor in the Department of Computer Science, and was appointed Chairman in 1984. As of January 1986, he is a Professor and the Director of the School of Computer Science at McGill University, Montreal. He is author of three books and over 100 papers.

**Bill Havens** is a member of the Laboratory for Computational Vision and the Department of Computer Science at the University of British Columbia. He received a BSc degree in 1969 and an MSc degree in 1973 both in Electrical Engineering from the Virginia Polytechnic Institute and a PhD in Computer Science from the University of British Columbia in 1978. He was then a faculty member at Simon Fraser University and the University of Wisconsin at Madison before returning to UBC in 1981. His research interests are knowledge representation for knowledge-based systems, object-centered programming, and computer vision.

**Randy Goebel** is director of the Waterloo Logic Programming and AI Group. He received his BSc in computer science from the University of Regina in 1974, and an MSc in computing science from the University of Alberta in 1977. In 1977, he moved to the University of British Columbia to pursue a PhD. In January 1982, he became a faculty member at the University of Waterloo. His PhD, on the topic of logic-based knowledge representation, was completed in 1985.

## Letters to the Editor

### AI is not emulating the brain

I wish to express some concerns over what I perceive as the current direction of research in artificial intelligence. While I have been intending to write for some months now, my intentions have been transformed into action by a statement in a recent *Scientific American*, which seems to sum up an aspect of AI that I feel is taking up a lot of valuable research time and effort, and leading essentially nowhere. The statement is as follows:

Expert systems are detailed descriptions, expressed as computer rules, of the thought processes human experts use to reason, plan, or make decisions in their specialities.

Expressed in this naked form, I doubt if anyone in the field of AI who is the least bit familiar with what is actually known about how the brain works would admit to believing that this claim is anywhere close to the truth of the matter. Nevertheless, reams upon reams of published work demonstrate the behavioural reality of this belief.

The one thing that we know for certain about human intelligence is that no one has ever succeeded in capturing its essence by describing it in terms of a single, straightforward process or function. The one thing we know for certain about the organization of the brain that apparently corresponds to the attribute that we label 'intelligence' is that it works by at least two, and probably many more, processes that while simultaneous and interconnected are sufficiently different from one another that we label them qualitatively distinct or even incompatible. To attempt to duplicate such an arrangement by ever-increasing multiplication and elaboration of single, 'linear' models seems unusually shortsighted even for a human brain that has invested millions of years of evolution in developing the ability to turn a blind eye to its own shortsightedness.

Whatever intelligence is, it certainly involves the simultaneous action of at least two qualitatively distinct processes. Surely its successful emulation will require at least some recognition

of this fact?

Tim Mead  
Box 820  
Hagersville, Ont N0A 1H0

### This is great! Give me more!

This is a letter to inquire as to how I could buy the previous issues of *Canadian Artificial Intelligence*. I just became a member of CIPS and of CSCSI/SCEIO, and was so impressed by the magazine that I decided to try to obtain the back issues and thus I am writing to you.

Gladys Wong  
Vancouver

Enough people have asked for back issues that we have now set up an official mechanism to sell them through CIPS. See the all-purpose order form on the inside back cover for details. Some issues are in short supply, or are completely gone; we will therefore substitute photocopies when necessary. — Editor

---

### New Editor Sought

CSCSI/SCEIO seeks applicants for the volunteer position of editor of *Canadian Artificial Intelligence*. People interested should contact the present editor for details.

---

### Membership renewals

Because CSCSI/SCEIO is a subgroup of CIPS, our membership renewals go out on CIPS invoices. You will be billed for membership in the appropriate society or societies. Only one notice will be sent.

A recent mailing by CIPS suggests that only CIPS members may subscribe to *Computational Intelligence* at the discount rate of \$16, and that others must pay \$75. This is not the case. All CSCSI/SCEIO members, whether also CIPS members or not, get the discount, and the rate for human non-members is \$37; only institutional subscribers (whether CSCSI/SCEIO members or not) pay the \$75 rate.

---

### Deadline for the June issue is 15 May.

---

Canadian  
Artificial Intelligence  
Numéro 7, mars 1986

Résumé

CSCSI/SCEIO Nouvelles, 5

Le nouvel exécutif de la société est élu par acclamation:  
*Président*, Dick Peacocke, Bell-Northern Research  
*Vice-Président*, Renato De Mori, Université McGill  
*Secrétaire*, Bill Havens, Université de la Colombie-Britannique  
*Trésorier*, Randy Goebel, Université de Waterloo

Lettres à l'éditeur, 6

L'IA ne correspond pas aux structures de l'intelligence humaine (*Tim Mead*).

Annonces, 6

Les numéros précédents de la *Canadian A.I.* sont maintenant en vente; utiliser le formulaire se trouvant en page 39. Nous encourageons les candidatures pour le poste bénévole d'éditeur de la *Canadian A.I.* Les avis de renouvellement pour les membres du CSCSI/SCEIO sont expédiés sur papier portant l'en-tête de la CIPS/ACI; ne vous y trompez pas!

Recherche au Canada en instruction informatisée intelligente (*J. Zachary Jacobson*), 9

Plusieurs groupes canadiens s'intéressent à l'instruction informatisée intelligente, mais il n'y a pas assez d'expertise en psychologie dans ce domaine.

Nouvelles, 11

La société canadienne pour la recherche en cinquième génération signe un accord préliminaire de coopération avec l'Institut Japonais pour la nouvelle génération de technologie informatique, l'ICOT.

Machine Vision International Ltd. choisit Ottawa pour son siège social. Fort du soutien financier de son importante maison mère américaine, MVIL produit des systèmes d'inspection visuelle informatisée, ainsi que des systèmes de guidage de robots, pour milieu industriel en tout genre.

Nouvelles, 12

L'Association Américaine pour l'Intelligence Artificielle, l'AAAI, encourage la participation d'institutions académiques et de laboratoires de recherche à but non-lucratif, au programme d'expositions de la conférence américaine en intelligence artificielle de cette année, ayant lieu à Philadelphie, du 11 au 15 août 1986.

Le département d'informatique de l'université de Western Ontario vous invite à contribuer à l'objectif de 1,600\$ pour la médaille d'or Julian Davies.

Avis de déplacement, 12

Bande dessinée (*P. S. Mueller*), 12

La conférence canadienne en intelligence artificielle 1986, 13

Programme, renseignements et formulaires d'inscription (bilingue).

Mises à jour du répertoire des compagnies canadiennes en IA, 23

Mises à jour du répertoire des programmes diplômés en IA offerts par les universités canadiennes, 23

Nouveaux titres en IA, 24

Critiques: *Artificial intelligence: A personal, commonsense journey* par William R. Arnold et John S. Bowie, compte rendu par Graeme Hirst; *Progress in artificial intelligence* par Luc Steels et John A. Campbell, compte rendu par Zavis Zeman; *Programming in Common Lisp* par Rodney A. Brooks, compte rendu par Malcolm Bersohn; *Traitement de langue naturelle: Les applications commerciales* par Tim Johnson, brève critique. Livres reçus.

Résumés de rapports techniques récents, 29

Bande dessinée (*P. S. Mueller*), 31

Rapports d'ateliers (*Brian Nixon*), 34

Deux récents ateliers se sont ajoutés à la série d'ateliers en IA entre les universités de Toronto et de Waterloo.

Rapport d'atelier (*Janice Glasgow*), 35

L'université Queen's organise un atelier au sujet des systèmes d'expertise.

Nécrologie, 35

Paul A. Kolars, 1926-1986.

Conférences à venir et demandes d'articles, 36

Formulaire tout-usage, 39

Annonces

Symbolics, 2

La série des machines Lisp Symbolics 3600.

Applied AI Systems, 8

LPA PROLOG; *apes* (un PROLOG adapté aux systèmes d'expertise).

Interact Research and Development, 19

Emplois disponibles en recherche et développement de systèmes experts de base et appliqués.

Xerox Canada, Inc., 20

La série Xerox 1100 d'appareils pour le travail en intelligence artificielle.

Logicware, 22

MPROLOG, un langage pour l'IA.

The Report Store, 27

*L'IA: une bibliographie choisie.*

Université de Colombie-Britannique, 28

Positions disponibles en informatique et en psychologie.

Lisp Canada, Inc., 32

Représentants canadiens pour la série LMI Lambda de machines Lisp.

Applied AI Systems, 40

*Le répertoire pour le développement de systèmes en IA*, et *Golden Common Lisp* pour les IBM PCs.

Ovum Ltd., à part

*Les systèmes d'expertise en 1986: Le rapport Ovum. Volume I: les Etats-Unis et le Canada.*

---

L'échéance pour le numéro  
de juin est le 15 mai.

# Rapid Prototyping of Expert Systems

becomes more feasible on your PCs and UNIX systems

## LPA PROLOG

Developed since 1975 at Imperial College, London, U.K., one the most stable and elegant implementations of PROLOG used world-wide, approaching 3000 installations.

### LPA **micro**-PROLOG professional

LPA **micro**-PROLOG professional is a new powerful version of **micro**-PROLOG with its own window handling primitives and "Wordstar-like" screen editor. With "Macintosh-style" menus and windows, LPA **micro**-PROLOG professional is fully integrated with the MS-DOS 2 environment using all the memory available.  
\$632.58 + tax + shipping(\$20.00)

### LPA **Mac** PROLOG

LPA **Mac** PROLOG is the version of PROLOG implemented for Apple Macintosh computers. This implementation is an incremental compiler fully compatible with the Macintosh window and mouse philosophy.  
\$709.59 + tax + shipping(\$20.00)

### LPA **sigma**-PROLOG

LPA **sigma**-PROLOG is the version of PROLOG tailored to UNIX. Like UNIX, LPA **sigma**-PROLOG has a coherent design philosophy.  
\$2359.81 + tax + shipping(\$20.00)

## Expert system shell

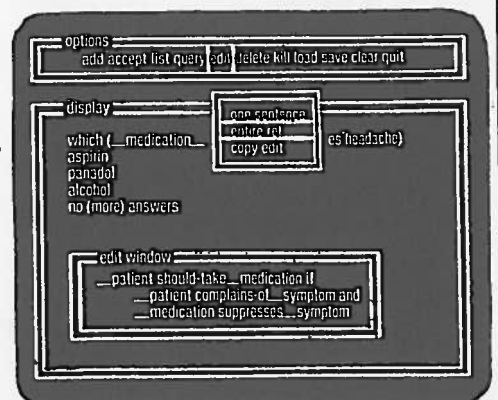
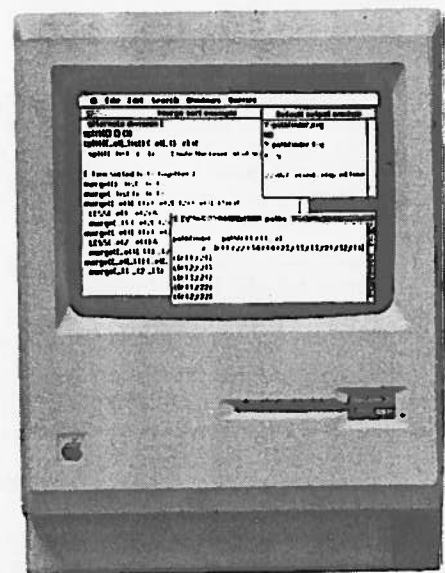
### **apes**: An augmented prolog for expert systems

**apes** is an effective logic programming and Expert System construction tool which runs on LPA PROLOG. Features of PROLOG may be accessed from within **apes** for sophisticated programming. A simple Natural Language facility enhances the robustness of application. **apes** has been successfully applied in various AI projects in the world including Expert Systems in the domains of Geology, Law, Biochemistry, Medicine, and Engineering.

### An Expert System development kit including:

LPA **micro**-PROLOG professional, **apes**, LPA **micro**-**sigma**-PROLOG Reference manual, **apes** manual, introductory logic programming text book "micro-PROLOG: Programming in Logic", by Clark & McCabe; available for  
\$1072.64 + tax + shipping(\$20.00) for **micro**-PROLOG,  
\$3,718.48 + tax + shipping(\$20.00) for **sigma**-PROLOG versions.

Applied AI Systems Inc is the authorized Canadian dealer of LPA **micro**-PROLOG professional, LPA **sigma**-PROLOG, LPA **Mac**-PROLOG, and **apes**. LPA **micro**-PROLOG professional, LPA **sigma**-PROLOG and LPA **Mac** PROLOG are trademarks of Logic Programming Associates Ltd. **apes** is a trademark of Logic Based Systems Ltd. UNIX is a trademark of AT&T Bell Laboratories.



Applied AI Systems, Inc.  
P.O. Box 13550  
KANATA, Ontario  
Canada K2K 1X6

Telephone: (613) 592-0084



# Research in Canada on Intelligent Computer-Aided Instruction

---

J. Zachary Jacobson  
Bureau of Management Consulting  
365 Laurier Avenue West  
Ottawa, Ont. K1A 0S5

---

## Introduction

Instruction by a living, breathing teacher is thought to be the best way to teach most subjects to most students. Unfortunately, it is time-intensive for both teacher and student. Moreover, the quality of instructors' teaching varies. If the best instructors were able to create high quality computer-aided instructional materials, it would greatly improve the effectiveness and efficiency of teaching, and perhaps of learning.

Present computer-aided instruction (CAI) is not always very effective. The typical computer tutor is a "page turner" or, at best, a page selector, which shows the student textbook-like material, one page at a time. Near the other extreme, CAI can use an expert system that contains a logical representation of the subject matter and uses that representation to train students through simulated experience or some other presentation. The expert-system-based configuration for CAI has been found to be very effective in practice.

The most advanced intelligent CAI can be argued to have left even expert systems behind. The Lisp and geometry tutors developed by Anderson, Boyle, and Reiser<sup>1</sup> at Carnegie-Mellon University do not have expert systems at their bases. Broadly defined, intelligent CAI (ICAI) includes a spectrum of possibilities. At one end, there is text- and picture-oriented courseware with branching programs to give the student different parts of the material in a flexible order, tailored for his or her progress. Expert-

system-based training tools and other highly sophisticated ICAI tools reside at the other end of the spectrum. This paper concentrates on the more advanced end of that spectrum.

In 1984, the Defence and Civil Institute of Environmental Medicine asked the Bureau of Management Consulting to examine ongoing Canadian research into, and development of, intelligent computer-aided instruction. That work is summarized here.

## Equipment and Personnel Resources

Very few Canadian researchers presently have access to the best computers for artificial intelligence. The situation is changing somewhat with regard to hardware. Several laboratories are ordering AI Computers, or are considering ordering them. However, few intend to use them to develop ICAI, nor are the best environments being acquired for that purpose.

Prominent Canadian AI scientists tend to come from computing science programs. American specialists are frequently trained as psychologists, particularly those that work in ICAI. There are psychologists working on aspects of ICAI in Canada, but their involvement usually is secondary to their other tasks and assignments. A few computer scientists in Canada have developed working contacts with psychologists; fewer still have training in both disciplines. The Science Council of Canada sponsored a conference in 1984 with the seeming purpose of introducing people in the two disciplines to each other.

The relative scarcity of AI researchers in Canada with psychological training may explain why the delivery of ICAI is not given its due attention here. Computing scientists are aware of the problems of communicating knowledge to a system, but psychologists are more likely to be concerned with communicating knowledge back to the students. Indeed, some psychologists are at work on the delivery problems of standard CAI. However, many psychologists are not interested in CAI or ICAI; they still smart from the lessons of early programmed instruction, which was clumsy, expensive, oversold, and no more informative than reading a textbook.

---

This study was supported by the Defence and Civil Institute of Environmental Medicine, Downsview, Ontario.

<sup>1</sup>Anderson, John R., Boyle, C. Franklin, & Reiser, Brian J. "Intelligent tutoring systems." *Science*, 1985, 228, 456-462.

MVIL are at 280 Albert Street (6th floor),  
Ottawa, Ontario, K1P 5G8; phone 613-238-7659.

□

---

## University and Research Lab Exhibits Solicited for AAAI Conference

The American Association for Artificial Intelligence, AAAI, is inviting academic institutions and non-profit research laboratories to participate in this year's Exhibit Program at the U.S. National Conference on Artificial Intelligence, 11-15 August 1986 in the Philadelphia Civic Center. The Association believes it important to communicate what universities and laboratories are doing in AI by demonstrating their different research projects to the conference attendees.

AAAI will provide participants with one 3m x 3m booth free of charge, describe their demonstration in the Exhibit Guide, and assist with logistical arrangements. Although they cannot provide support equipment such as phone lines or computers, they can direct participants to different vendors who may be able to assist with equipment needs.

If you and your department are interesting in participating, please call Lorraine Cooper at AAAI, 415-328-3123. □

---

## The Julian Davies Gold Medal

The University of Western Ontario Department of Computer Science is soliciting contributions towards a \$1,600 fund for The Julian Davies Gold Medal. The medal will be awarded annually to a student graduating from a Computer Science program who has made a significant contribution to computer-assisted interpersonal communications, particularly for the communications-impaired.

Dr Julian Davies died of cancer in June 1985. The award is in recognition of his contributions to the Department of Computer Science, the University, to artificial intelligence, and to the community at large. The wording of the award reflects Dr Davies' own commitment to interpersonal communications, and his particular concern for the exploitation of computer and communications technology to help the communications-impaired.

Contributions may be sent to:  
Dr E.W. Elcock, Chairman

Department of Computer Science  
Middlesex College  
The University of Western Ontario  
London, Ontario N6A 5B7

Contributions should be in the form of a cheque payable to The University of Western Ontario. The contribution should be accompanied by a note identifying that the cheque is a contribution to the award, and including the address of the contributor to allow an appropriate receipt to be given. □

---

## New Bindings

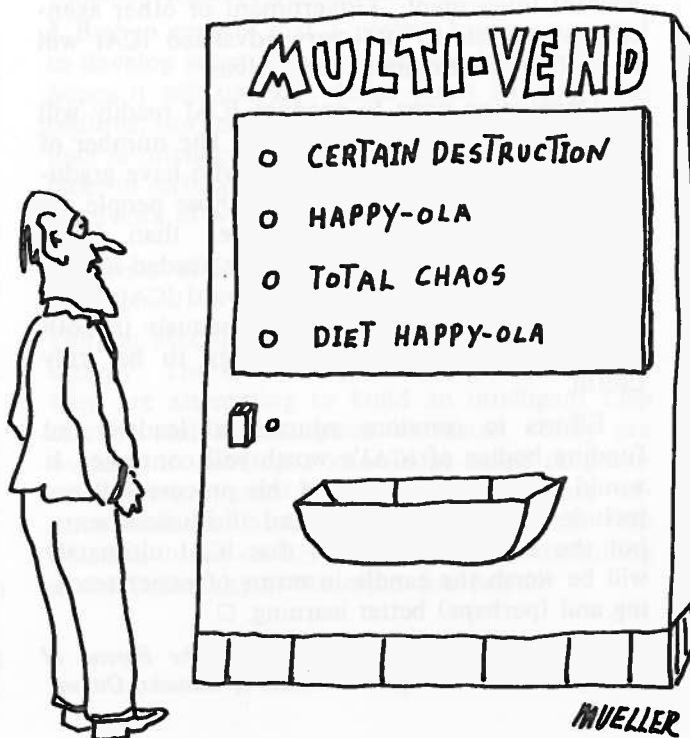
*Colin Archibald*, from National Research Council to Machine Vision International, Ltd., Ottawa.  
*Peter Rowat* from Coast Mountain Intelligence to Simon Fraser University.

---

## After all these years, they finally notice us

"Interest in artificial intelligence and expert systems is relatively new in Canada."

*From a Canadian government report on expert systems by the Office of Industrial Innovation, Department of Regional Industrial Expansion, October 1985*



---

**Sixth Canadian  
Artificial Intelligence  
Conference**

**Sixième conférence  
canadienne  
d'intelligence artificielle**



**Ecole Polytechnique de Montréal  
on the campus of / sur le campus de l'  
Université de Montréal  
Montréal, Canada  
21 – 23 May / mai 1986**

**Sponsored by / Commanditée par la  
Canadian Society for Computational Studies of Intelligence  
Société canadienne pour l'étude de l'intelligence par ordinateur**

**Comité organisateur / Organizing committee:**

Renato De Mori, chair / président, McGill University; Lorne Bouchard, Université de Québec à Montréal; Daniel Delmas, Ecole Polytechnique de Montréal; Evelyne Hausen-Tropper, Université de Québec à Montréal; Rajjan Shinghal, Concordia University; Steve Zucker, McGill University.

**Comité de programme / Programme committee:**

Bill Havens, chair / président, University of British Columbia; Roger Browse, Queen's University; B. Chandrasekaran, The Ohio State University; Ernie Chang, Alberta Research Council; Robin Cohen, University of Waterloo; Brian Funt, Simon Fraser University; Geoff Hinton, Carnegie-Mellon University; Graeme Hirst, University of Toronto; Hector Levesque, University of Toronto; Robert Mercer, University of Western Ontario; Richard Rosenberg, Dalhousie University; Len Schubert, University of Alberta; Robert Woodham, University of British Columbia.



## Programme technique Technical programme

- CONFERENCIERS INVITES
- ARTICLES RECUS

Le comité responsable du programme s'affaire à la sélection d'environ 35 à 40 communications parmi les 101 reçues. Les articles choisis seront présentés au cours des sessions plénière et parallèles de la conférence.

Six chercheurs bien connus en IA ont été invités en tant que conférenciers. Leurs noms apparaissent ci-dessous.

De plus, le premier soir de la conférence, Brian Smith, Ph.D., (Xerox Palo Alto Research Center) s'adressera au grand public. Son exposé portera sur l'idée de responsabilité, l'intelligence artificielle et l'Initiative de Défense Stratégique.

### Conférenciers invités

Elliot Soloway (Yale University), Education et IA  
Candy Sidner (Bolt, Beranek and Newman),

Compréhension de langue naturelle

Pat Hayes (Schlumberger), Logique

Takeo Kanade (Carnegie-Mellon University), Vision par ordinateur

Mark Fox (Carnegie-Mellon University), Systèmes d'experts

Brian Smith (Xerox), Représentation du savoir

- INVITED TALKS
- SUBMITTED PAPERS

The program committee is selecting approximately 35 to 40 technical papers from the 101 submissions. These will be presented in plenary and parallel sessions over the three days of the conference.

Six well-known AI researchers have been invited to give special addresses. The list of speakers appears below.

In addition, on the first evening of the conference, Dr Brian Smith (Xerox Palo Alto Research Center) will give a talk open to the public on "Responsibility, Artificial Intelligence, and the Strategic Defense Initiative".

### Invited talks

Elliot Soloway (Yale University), Education and AI  
Candy Sidner (Bolt, Beranek and Newman), Natural language understanding

Pat Hayes (Schlumberger), Logic

Takeo Kanade (Carnegie-Mellon University), Computer vision

Mark Fox (Carnegie-Mellon University), Expert systems

Brian Smith (Xerox), Knowledge representation



## Activités sociales Social programme

- RECEPTIONS
- BANQUET
- ACTIVITES SPORTIVES

Détails à venir.

- RECEPTIONS
- BANQUET
- ATHLETIC ACTIVITIES

Details to be announced.

# Cours intensifs Tutorial programme



## SYSTEMES EXPERTS: PRINCIPES ET CONSTRUCTION Le 20 mai 1986 (1 journée) (en français)

### Objectifs:

On se propose d'abord ici de montrer, d'une manière relativement concrète, ce qui constitue la base de la méthodologie des systèmes experts. La plupart des systèmes experts (pas tous cependant!) créés pour des applications effectives sont nettement plus sophistiqués que ne le laissent penser ces schémas de base. La sophistication des moteurs réels est liée, entre autres, à la richesse du langage qui est admis pour représenter les connaissances. Néanmoins, la compréhension de tels schémas de base paraît une étape souhaitable pour étudier les systèmes experts existants ou développer de nouvelles réalisations.

### Clientèle:

Cette introduction aux systèmes experts peut aider à l'initiation d'un public assez large: informaticiens amateurs ou professionnels, étudiants en informatique, certaines catégories d'utilisateurs de l'informatique, ... et, bien entendu, «experts» en tous genres, soucieux de prendre contact avec une technique qui les concerne. Ce cours n'exige pas beaucoup de connaissances informatiques préalables.

### Animateur:

Henri FARRENY est professeur titulaire d'informatique à l'Institut National Polytechnique de Toulouse (INP-ENSEEIH). Il enseigne, depuis près d'une dizaine d'années, l'Intelligence Artificielle à l'ENSEEIH et dans d'autres établissements. Sa thèse de doctorat d'état (Université de Toulouse, 1980) a porté sur l'expression et la résolution de problèmes orientés vers le contrôle de robots. Il est l'un des animateurs de l'équipe de recherche «Intelligence Artificielle et Robotique» du laboratoire Langages et Systèmes Informatiques, associé au Centre National de Recherches Scientifiques (C.N.R.S.), où il a développé le système expert général ARGOS-II. Il est l'auteur de nombreuses communications scientifiques et de deux ouvrages, «Les systèmes experts Principes et exemples» (CEPADUES) et «Programmer en LISP» (MASSON).

## ROBOT VISION May 20, 1986 (1 day) (in English)

### Audience:

The audience should include engineers and computer scientists who are interested in exposure to computer vision as well as those who are in the early stages of designing and installing vision systems.

### Topics:

Sensory information is beginning to provide robotic systems with real feedback from their environment. In this tutorial we will concentrate on visual feedback, and will cover:

- the early processing of images, including edge and curve detection, and texture analysis;
- the representation and analysis of 2 and 3 dimensional shapes;
- the state of art in commercial vision systems;
- engineering principles for vision applications.

The tutorial will be mainly introductory, but will highlight selected research efforts in several laboratories around the world to provide attendees with a feeling for how the technology is developing.

### Speaker:

Steven W. ZUCKER is the Co-Director of the Computer Vision and Robotics Laboratory at McGill University, and a Professor of Electrical Engineering there. He was elected a Senior Fellow of the Canadian Institute for Advanced Research in 1983. Dr ZUCKER obtained his education at Carnegie-Mellon University in Pittsburgh and at Drexel University in Philadelphia, and was a Post-Doctoral research fellow in Computer Science at the University of Maryland, College Park. He has written more than 125 papers on computational vision, image processing, and robotics, and is on the editorial boards of IEEE Trans. on Pattern Analysis and Machine Intelligence, Int. J. Robotics and Automation, Pattern Recognition Letters, and Spatial Vision.

## INDUSTRIAL APPLICATIONS OF EXPERT SYSTEMS May 21st, 1986 (1 day) (in English)

### Topics:

- A review of some of the earliest actual uses of AI in industry, the conditions surrounding them.
- What has been required to make them operational.
- Savings and added values that arise from enhancing traditional manufacturing technologies with AI technologies.
- Applications in manufacturing.
- Survey of systems currently in use, and their current stages of development.
- Vision of the major changes AI will produce in industry.
- Impacts of AI on the future of the industries.

### Speaker:

Mark S. FOX heads the Intelligent Systems Laboratory of The Robotics Institute, and is an Assistant Professor of Industrial Administration at Carnegie-Mellon University. His primary interests in artificial intelligence is knowledge-based management and manufacturing systems. At present, his laboratory is extending artificial intelligence techniques to the design and construction of engineering, production control and management systems for «flexible» factory organizations. Dr FOX received a B.Sc. in Computer Science from the University of Toronto, and Ph.D. in Artificial Intelligence from Carnegie-Mellon University. Dr FOX's publications include: «The Intelligent Management System: An Overview» In Processes and Tools for Decision Support, «A Knowledge-Based System for Factory Scheduling» In International Journal of Expert Systems, and «Artificial Intelligence in Manufacturing» In Artificial Intelligence Magazine.

## PLANNING AND REASONING IN DYNAMIC WORLDS May 21st, 1986 (1 day) (in English)

### Topics:

The largely and well-developed systems of if... then... rules are only a first step on the way of knowledge representation. We use many other structures and strategies to make daily or specific planification, reasoning or actions. For example, we have often a good view of what we know and what we do not know. This tutorial will cover the following topics, which are of great importance in the valuable development of artificial intelligence techniques:

- Representation of actions, procedures, and strategies
- The notion of process
- Planning and reasoning in dynamic worlds
- The representation and use of metalevel and control strategies
- The design of reactive intelligent systems
- Applications

Speaker:

Michael P. GEORGEFF is the Program Director of the Representation

and Reasoning Group of the Artificial Intelligence Center at SRI International. The SRI (Stanford Research Institute), founded in 1946 and located at Menlo Park (California), is one of the world leading community in the field of Artificial Intelligence for fundamental research as well as for technology transfer. Previously, Dr. GEORGEFF held a position at Monash University (Australia) as Head of the Department of Computer Science. He received a Ph. D. in aeronautical engineering from Imperial College, London.

Pour plus de renseignements au sujet des cours intensifs, contactez:

For more information about tutorials, contact:

Louise Bourdon  
Ecole Polytechnique de Montréal  
514-340-4252



## Renseignements Conference Information

### • LIEU DE LA CONFERENCE

Toutes les sessions auront lieu dans l'édifice principal de l'Ecole Polytechnique, sur le campus de l'Université de Montréal. Une carte vous sera expédiée avec votre confirmation d'inscription.

### • INSCRIPTION ANTICIPEE

Un rabais s'applique aux inscriptions reçues avant le 15 avril.

### • RABAIS POUR ETUDIANTS

Les étudiants s'inscrivant à la conférence et aux cours intensifs bénéficient d'un rabais substantiel. La confirmation du statut d'étudiant au recto du formulaire doit être signée par le directeur de thèse.

### • LOGEMENT EN RESIDENCE

On pourra se loger aux résidences de l'Université de Montréal, à 4 minutes à pied de l'Ecole Polytechnique. La plupart des chambres ont un lit simple; quelques lits doubles seront peut-être disponibles. Au total, 150 chambres ont été réservées. Les tarifs ci-dessous n'incluent pas le petit déjeuner. De plus, les étudiants devront présenter leur carte s'ils veulent bénéficier du tarif spécial. Tarifs:

Non-étudiants 25\$ la nuit; étudiants, 15\$ la nuit ou 55\$ la semaine.

Le coût d'une nuit doit être fourni à titre de dépôt. Pour réserver une chambre, il vous faut joindre un dépôt de 10\$ à votre demande d'inscription, ainsi que fournir vos dates d'arrivée et de départ. Pour plus de renseignements, contactez:

Lise Julien  
Résidences de l'université de Montréal  
Campus de l'université de Montréal  
Casier postal 6128, Station A  
Montréal H3C 3J7  
514-343-6531

(suite page 19)

### • CONFERENCE LOCATION

All sessions will be held in the main building of Ecole Polytechnique, on the campus of the Université de Montréal. A map will be sent with confirmation of registration.

### • EARLY REGISTRATION

A discount is given for registration received before 15 April.

### • STUDENT DISCOUNT

Students may register for both the conference and the tutorials at a substantial discount. Certification on the form must be completed by the student's supervisor.

### • DORMITORY ACCOMMODATION

Accommodation will be available in the Université de Montréal Résidences, 4 minutes by foot from Ecole Polytechnique. Most rooms are singles; a few doubles may be available. A block of 150 rooms has been reserved. Rates do not include breakfast. Student ID must be shown to get the student rate. Rates:

Non-students \$25 per night; students, \$15 per night or \$55 per week.

Deposit of one night's rate is required. To reserve a room, you must enclose the deposit with your registration form, and give your arrival and departure dates. For more information:

Lise Julien  
Résidences de l'université de Montréal  
Campus de l'université de Montréal  
Casier postal 6128, Station A  
Montréal H3C 3J7  
514-343-6531

(continued on page 19)



# Formulaire d'inscription Registration form

Nom / Family name ..... Prénoms / Given names .....

Adresse / Address .....

.....

.....

Tél. / Phone (.....) ..... CSNET / UUCP .....

## Frais d'inscription / Registration fees

		Avant le 15 avril Before 15 April	Après le 15 avril After 15 April
Membre non-étudiant de la SCEIO, de l'ACI, ou de l'AAAI	Non-student member of CSCSI, CIPS, or AAAI	\$125	\$150
Non-membre non-étudiant*	Non-student non-member*	\$150	\$175
Etudiant membre	Student member	\$25	\$35
Etudiant non-membre*	Student non-member*	\$35	\$45

\*Les frais pour ceux qui ne sont pas membres comprennent la cotisation annuelle à la SCEIO.  
Non-member fee includes one year membership in CSCSI/SCEIO.

Frais / Fee \$ .....

## Confirmation du statut d'étudiant / Student certification

J'affirme que l'applicant est bel et bien étudiant à: / I certify that the registrant is a bona fide student at:

Université / University .....

Signature du directeur de thèse / Supervisor's signature .....





## Cours intensifs / Tutorials

Cocher les cours intensifs choisis / Indicate desired tutorials

- |   |   |
|---|---|
| Mardi 20 mai / Tuesday 20 May                                 | Mercredi 21 mai / Wednesday 21 May                      |
| <input type="checkbox"/> Farreny, Systèmes experts<br>ou / or | <input type="checkbox"/> Fox, AI in industry<br>ou / or |
| <input type="checkbox"/> Zucker, Computer vision              | <input type="checkbox"/> Georgeff, Planning             |

Un cours intensif, non-étudiant	One tutorial, non-student	\$250
Deux cours intensifs, non-étudiant	Two tutorials, non-student	\$350
Un cours intensif, étudiant	One tutorial, student	\$50
Deux cours intensifs, étudiant	Two tutorials, student	\$80

Frais / Fee \$ .....

## Logement / Accommodation

Un dépôt pour la première nuit (soit 15\$ pour un étudiant et 25\$ pour les autres) ainsi que vos dates d'arrivée et de départ sont nécessaires si vous désirez loger à l'une des résidences de l'Université de Montréal (voir détails page 16).

If you want dormitory accommodation at the Université de Montréal Résidences (see details, page 16), enclose a deposit of one night's rate (\$15 for students, \$25 for others), and give your arrival and departure dates:

Dates .....

Dépôt / Deposit \$ .....

Montant total inclus / Total amount enclosed \$ .....

Le paiement doit être effectué en dollars canadiens par chèque, mandat de poste ou traite bancaire au nom de la Conférence du CSCSI/SCEIO-86, et doit accompagner ce formulaire.

Payment in Canadian dollars, in the form of cheque, money order, or bank draft, payable to CSCSI/SCEIO-86 Conference, must accompany this form.

Poster à: / Mail form to:

CSCSI/SCEIO-86, c/o CRIM  
1550 de Maisonneuve Blvd ouest, Room 901  
Montréal, Québec  
CANADA H3G 1N2





## ● HOTELS

Nous avons également réservé plusieurs chambres aux hôtels suivant. Prière de communiquer directement avec les dlts hotels.

Royal Terrace Apts Hotel  
5225 Côte des neiges  
Montréal H3T 1Y1  
Réservations: Marc Giard, 514-739-6391

Chambre avec petite cuisine, à dix minutes à pied de l'Ecole Polytechnique. Trente de ces chambres ont été réservées; agissez rapidement! Le tarif pour ceux qui s'incrivent à la conférence est de 45\$ la nuit pour une personne, 6\$ pour chaque personne supplémentaire.

Holiday Inn Centre Ville  
420 Sherbrooke ouest  
Montréal H3A 1B4

Réservation : Mme Hoda, 514-842-6111; mentionner "A186"

A 18 minutes en taxi, 25 minutes en métro ou par autobus de l'Ecole Polytechnique. Il n'y que des chambres avec un lit "queen". Au total 40 chambres ont été réservées jusqu'au 20 avril. Après le 20, ce sera premier arrivé, premier servi. Tarif de conférence: une personne, 75\$ la nuit (sans petit déjeuner), deux personnes 85\$ la nuit. Il vous faut envoyer un dépôt équivalent au coût d'une nuit. Votre carte de crédit est acceptée.

## ● HORAIRE

Toutes les sessions commencent à 9h00 chaque matin, et se termine aux environs de 17h00. Il y a des pauses pour le café et le dîner. La session du vendredi prendra fin plus tôt.

## ● PLUS DE RENSEIGNEMENTS

Pour plus de renseignements, contactez:  
Nadine Lasalle  
CRIM, Inc  
1550 de Maisonneuve Blvd ouest, Bureau 901  
Montréal, Québec  
CANADA H3G 1N2  
514-848-3990

## ● HOTELS

Blocks of rooms have been reserved at the following hotels. Registrants should make arrangements directly with the hotels.

Royal Terrace Apts Hotel  
5225 Côte des neiges  
Montréal H3T 1Y1  
Reservations: Marc Giard, 514-739-6391

Suites with kitchenette, 10 minutes by foot from Ecole Polytechnique. A block of 30 suites has been reserved; make reservations early. Special conference rates:

1 person, \$45 per night, each additional person \$6 per night.

Holiday Inn Downtown  
420 Sherbrooke west  
Montréal H3A 1B4

Reservation : Mme Hoda, 514-842-6111; refer to "A186".

18 minutes by taxi or 25 minutes by metro and bus from Ecole Polytechnique. Only rooms with one bed (queen size) are available. A block of 40 rooms has been reserved until 20 april; after this date, first come, first served. Special conference rates: 1 person \$75 per night (breakfast not included), 2 persons \$85 per night. Deposit (or credit card) of one night value required.

## ● SESSION TIMES

Technical and tutorial sessions start at 9:00 each morning, and run until about 5:00, with breaks for coffee and lunch. The Friday afternoon session will finish earlier.

## ● MORE INFORMATION

For more information, contact  
Nadine Lasalle  
CRIM, Inc  
1550 de Maisonneuve Blvd ouest, Room 901  
Montréal, Québec  
CANADA H3G 1N2  
514-848-3990

## ARTIFICIAL INTELLIGENCE RESEARCH AND DEVELOPMENT OPPORTUNITIES

Our Canadian research and development company has positions available for career-minded research staff in our Artificial Intelligence Division. Interact is an established (incorporated 1978) science and engineering, research and development company with experience in artificial intelligence, numerical modelling & computer design.

The A. I. Division is primarily interested in basic and applied expert systems research. We are currently developing expert system tools, knowledge acquisition methods, and applications in ocean science, geoscience, agriculture and medicine. Employees are encouraged to publish their work in learned journals and to maintain links with universities. The A. I. Division is supported by a 50 member multidisciplinary professional staff including physicists, mathematicians, psychologists, engineers and computer scientists. We would be interested in receiving applications from researchers holding either the Ph.D., or M.Sc. degrees,

Interact is located in the beautiful coastal city of Victoria in the province of British Columbia. Our company offers competitive salaries, a wide range of fringe benefits and an excellent research and computing environment. Researchers interested in employment are encouraged to forward their curriculum vitae, with references, expected salary and terms of employment, in confidence, to:



**Interact** RESEARCH & DEVELOPMENT CORPORATION

Artificial Intelligence Division  
4252 Commerce Circle  
Victoria, B.C.  
Canada V8Z 4M2



# The keys to Artificial Intelligence are at Xerox.

The Xerox 1108 Series of Artificial Intelligence Workstations provide an affordable, high-performance line of personal computers in an integrated, interactive environment that greatly enhances programmer productivity.

- High resolution graphics display
- Interactive user interface
- Ability to mix interpreted and compiled code
- Multiprocessing capacity
- Support of an extensible, interpreted language
- Display-oriented programming tools
- Local area networks and data communications through XEROX ETHERNET
- 8 Mbytes virtual memory

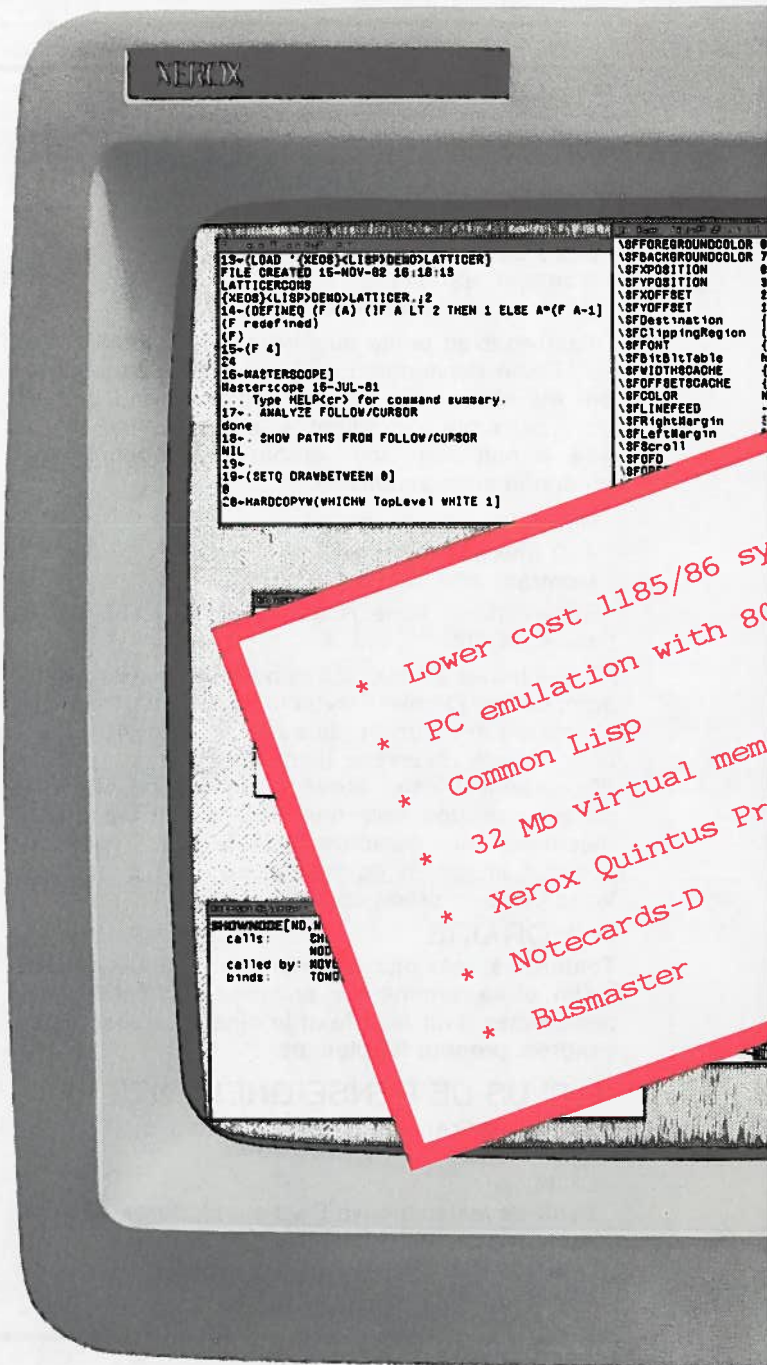
## Power Tools for Programmers

### 1. Display Editor and Inspector

The display-based structure editor allows the interactive editing of programs and other list data. Structure-based editing exploits the form of an object, emphasizes the meaning of its parts, and thus reduces errors. The data inspector extends the philosophy to both system and user data types, allowing easy inspection and modification of any object in the system.

### 2. Programmer's Assistant

The Programmer's Assistant provides an intelligent assistant and bookkeeper that frees the programmer from much mundane detail. The Programmer's Assistant includes an error analysis capability and also monitors and records all user inputs. For example, a history is kept of the commands typed, their side-effects, and the results. Thus, one can request that a previous command or sequence of commands be repeated, modified and then repeated, or even undone (which undoes all the changes it may have caused). Also



provided is a spelling corrector that automatically corrects spelling mistakes using information from the local context. To simplify file management for the programmer, Interlisp-D automatically keeps track of where in the file system each object is stored and which ones have been modified. In response to a simple request, the system can therefore save the user's state, updating all changed files automatically. The Programmer's Assistant provides a programming environment which cooperates in the development of programs allowing the user to concentrate on higher level design issues.

### 3. Debugging Tools

Debugging tools allow the user to break and trace

# XEROX

the program's structure and assist in the process of making modifications automatically. Because Master-scope is interfaced with the file package and editor, it re-analyzes a program whenever it is modified. Information about program calling structure, variable and data structure usage, and side effects can be graphically displayed and used to provide a map or browser for the system. The same information can be used to make systematic changes automatically. Further, Interlisp-D's measurement tools can be used to analyze the behavior of a system after it has been developed to pinpoint those areas that may need improvement.

## 5. A Professional Workstation

A high bandwidth user interface is provided by combining the mouse and the high resolution display. The mouse permits the user to specify and manipulate positions or regions on the screen. The interactive display facilities include complete raster graphic functions as well as a display management system supporting multiple overlapping windows, menu driven selection of operations, and a wide range of built-in graphical abstractions. Functions are also provided to display text in multiple fonts, manipulate raster images, and draw spline curves. The large format, high resolution display and the sophisticated multiple window system allow concurrent sessions, close-up views, and simultaneous displays of multiple representations of complex data. It is easy to create windows with text, graphics, or both and to make them scroll, update and interact in useful ways with the end user.

## 6. Knowledge Programming System (Optional)

LOOPS extends the programming environment to provide a powerful tool for research and expert system development. LOOPS combines four programming styles:

- Procedure-Oriented
- Data-Oriented
- Object-Oriented
- Rule-Oriented

## Xerox Canada Inc.

Advanced Systems Group  
703 Don Mills Road, North York, Ontario M3C 1S2 416-429-6750

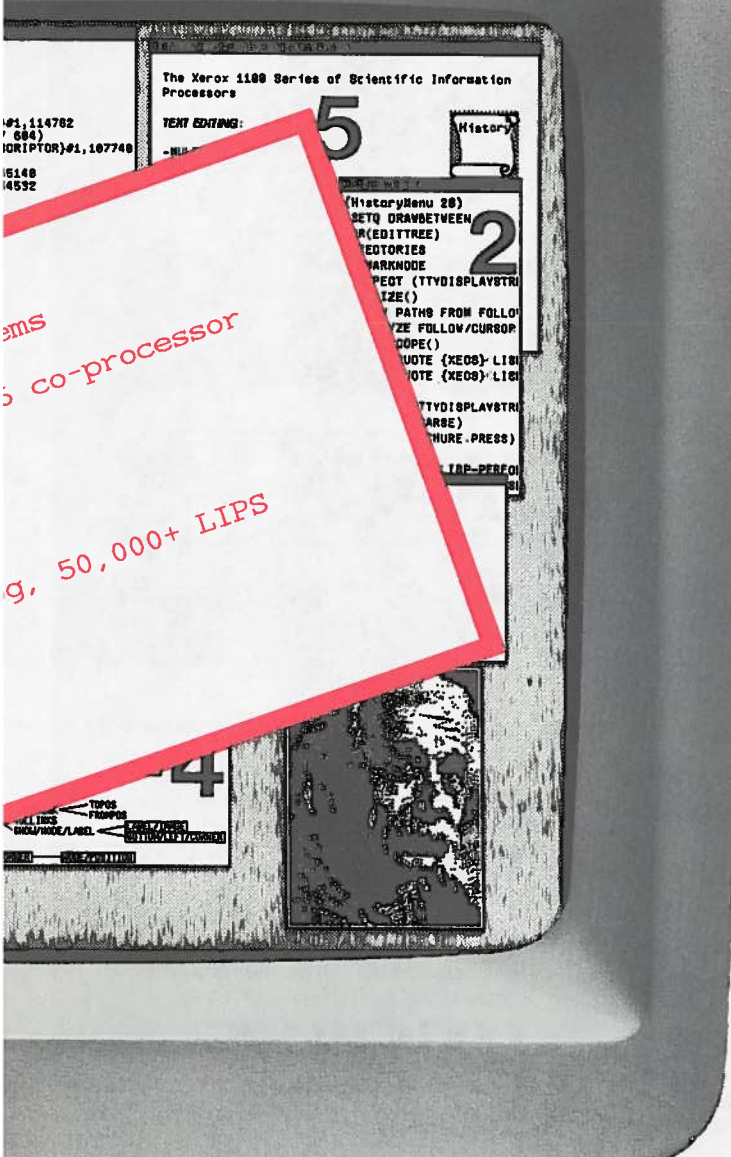
XEROX is a registered trademark of XEROX CORPORATION used by XEROX CANADA INC. as a registered user.

co-processor  
g. 50,000+ LIPS

arbitrary functions, and examine the state of the machine at any desired level of detail. Not only can the state of a suspended computation be displayed and perused graphically, but it can be manually unwound to a specified point, the offending program edited, and execution resumed, all without loss of state. Also included is the capability of specifying complex, user-defined intervention conditions, such as allowing breaks only when a given function is called from another given function. These debugging tools allow bugs to be tracked down quickly and easily.

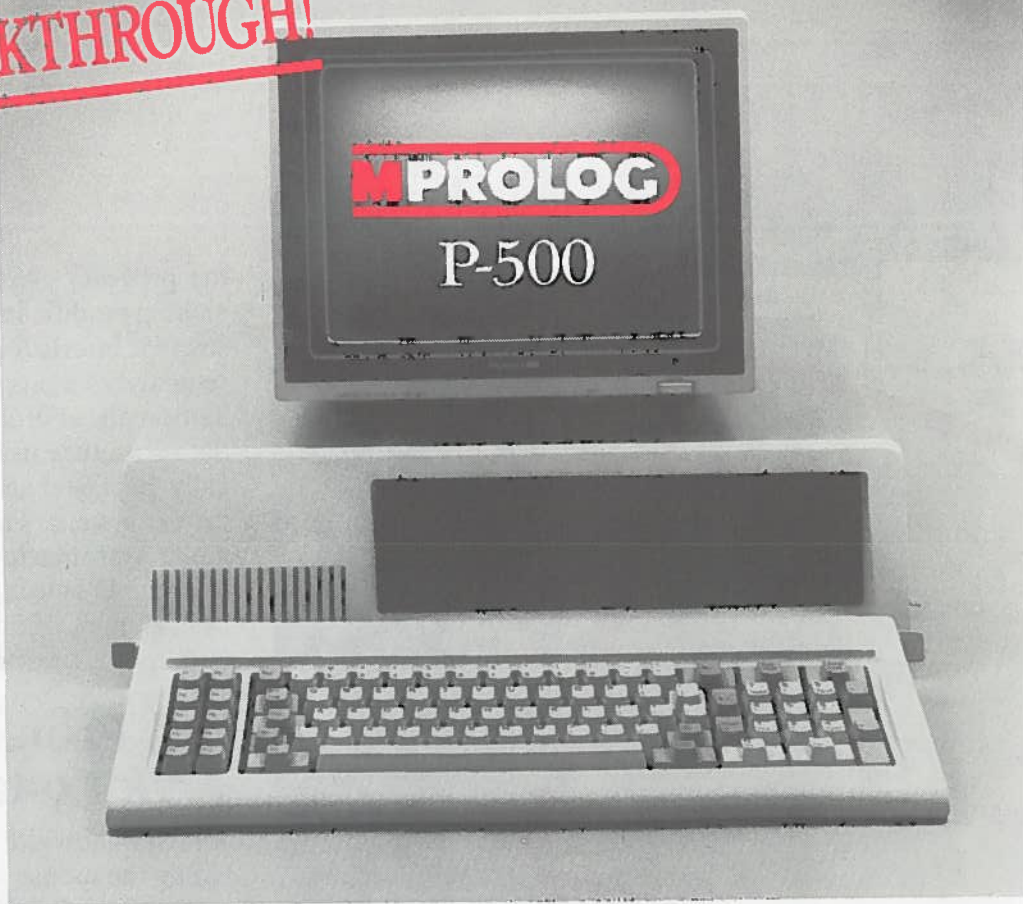
## 4. Program Analysis

The Masterscope facility can analyze a user's program and use that information to answer questions, display



**IMPORTANT P.C. BREAKTHROUGH!**

Now you can buy a full power mainframe Artificial Intelligence language for your IBM-compatible personal computer



**T**hrough a major breakthrough in the development of Artificial Intelligence applications, a unique version of Prolog is now available for your personal computer. It is called MPROLOG P-500. MPROLOG P-500 is an extended, programmer-friendly edition of Prolog — the computer language selected as the basis for the Japanese Fifth Generation Computer Systems Project. MPROLOG has been specially designed for:

- Software developers
- AI innovators
- Expert systems researchers and developers
- Corporations seeking a competitive edge

**How MPROLOG Programming Works**  
 An MPROLOG program consists of FACTS and RULES expressed in a natural way. The inference mechanism for answering questions or arriving at conclusions based on FACTS and RULES is built into the language. This language allows you to write powerful software faster and easier than with traditional algorithmic languages. MPROLOG extends your computer's ability from its current tasks of processing and manipulating data to reasoning tasks that are based on the knowledge you provide it.

"... if programmed with the statements 'Boston is the capital of Massachusetts' and 'All capitals are cities', the system could deduce that 'Boston is a city'. As witnessed by the actual notation for the first statement — (capital of/Boston Massachusetts) — the language is declarative and easy to learn."  
 — High Technology, December 1984

**MPROLOG P-500 Offers Seven Key Features**

- Easy to learn.
- Flexible enough to let you tailor your expert systems.
- Supported by Logic Lab, a powerful, interactive programming development environment to maximize convenience and productivity.
- Designed for the modular development of AI applications to reduce their complexity and to enable a programming team to concurrently develop applications.
- Machine independent. Any application written in MPROLOG on one machine can be transferred to or run on any other machine with a run-time implementation of MPROLOG.
- A full-featured implementation of PROLOG. It contains over 200 built-in predicates including DEC-10 compatibilities

- Built to offer performance, productivity and portability
- MPROLOG P-500 on your IBM® PC or compatible system lets you take the identical, unaltered MPROLOG application code running under PC DOS and run it under: IBM® VM/CMS; IBM® MVS/TSO; DEC VAX/VMS®; DEC VAX®/UNIX®; M68000 UNIX; and TEKTRONIX 4404 UNIFLEX and other AI work stations.

For further details call the numbers below, or complete and mail this coupon today.

**LOGICWARE**  
 Los Angeles • Toronto • Atlanta • Boston  
 Call our Micro Division at  
 1-617-547-2393 or  
 1-416-665-0022 (In Canada)

UNIX is a registered trademark of Bell Laboratories. VAX is a trademark of Digital Equipment Corp. IBM, PC-DOS, MVS, VM/CMS, TSO are registered trademarks of International Business Machines Corporation. Tektronix 4404 is a trademark of Tektronix Corporation.

**Find Out More about MPROLOG P-500**

For free information, complete and mail this coupon to: Logicware  
 Suite 600, 1000 Finch Ave. W.,  
 Toronto, Ontario Canada M3J 2V5

Yes, Please send me more information on MPROLOG P-500.

Name: \_\_\_\_\_

Title: \_\_\_\_\_ Company: \_\_\_\_\_

Address: \_\_\_\_\_

State/Prov.: \_\_\_\_\_ Zip/Postal Code: \_\_\_\_\_

Computer Operating System: \_\_\_\_\_ Version #: \_\_\_\_\_

Manufacturer's Make & Model: \_\_\_\_\_ Memory: \_\_\_\_\_



---

# Updates to Directory of Canadian AI Businesses

*Editor's note:* The full directory is published annually, in the September issue of *Canadian A.I.* Updates are published as they are received.

□ □ □ □ □

**MACHINE VISION INTERNATIONAL LTD**  
280 Albert Street (6th floor)  
Ottawa, Ont. K1P 5G8  
613-238-7659  
Contact: Colin Archibald

Sells turnkey visual inspection and robot guidance systems for a wide variety of industries, and the GENESIS series of general-purpose image processing computers.

**SYNERLOGIC**  
Suite 1300, 635 8th Avenue SW  
Calgary, Alta T2P 3M3  
403-237-6500

Contact: Terry Arneson, 800-387-5501

R&D in expert systems. Sells the Alvey Expert Systems Starter Pack for IBM PCs.

**NETRON INC**  
99 St Regis Crescent N  
Downsview, Ont M3J 1Y9  
416-636-8333  
Contact: Rudy Koehler

Develops and sells AI-based application generation business software.

**K. TAHIR SHAH**  
1628 Springwell Avenue  
Mississauga, Ont L5J 3H9  
416-822-7365

Consulting, software development, and feasibility studies on expert systems for business and for fault diagnosis in factory automation.

---

# Updates to Directory of AI Graduate Programmes in Canadian Universities

*Editor's note:* The following are new entries for the directory which was published in the December 1985 issue of *Canadian A.I.*

MARCH 1986

---

## Carleton University

• School of Computer Science  
Colonel By Drive  
Ottawa, Ontario K1S 5B6

### Programmes

Master of Computer Science programme (current enrolment: 4 students in AI). No PhD programme.

### AI faculty and staff

*Franz Oppacher:* Natural language processing, automated theorem proving.

*John Oommen:* Robotics and learning automata.

*Wilf LaLonde, Dave Thomas, John Pugh:* Object-oriented systems, future generation systems.

### Research equipment

Symbolics Lisp machine, Sun workstation, 25 IBM PCs, 25 2Mb Macintosh XLs.

### Graduate AI courses

95.407 Applied artificial intelligence (LaLonde).

95.406 Robotics and computer vision (Oommen).

95.507 Expert systems (Oppacher).

94.583 Logic programming (Pagurek).

95.505 Automaton models of learning systems (Oommen).

95.506 Natural language processing (Oppacher).

CSI5181 (at University of Ottawa) Artificial intelligence applications in software development.

CSI5580 (at University of Ottawa) Sujet en intelligence artificielle.

### Enquiries

Mike Atkinson (613-564-3860) or School of Computer Science (613-564-7545).

### Other notes

The Masters program is a joint program with the University of Ottawa, administered by the Ottawa—Carleton Institute for Computer Science. Students may include courses from both universities in their programs.

---

## University of Ottawa

• School of Translators and Interpreters  
Ottawa, Ontario K1N 6N5

### Programmes

Program includes AI aspects of translation.

### AI faculty and staff

*Brian Harris:* Machine translation.

*Benoit Thouin:* Machine translation.

### Research equipment

Cromenco C-10, Amdahl 470-V7A.

### Graduate AI courses

TRA 5903 Computer aids to translation (Thouin).

TRA 6903 Current research in machine-aided translation (Thouin).

### Enquiries

Brian Harris (613-232-1704).

## New Books in AI

**Artificial intelligence:**

**A personal, commonsense journey**

*William R. Arnold and John S. Bowie*

Prentice-Hall, Inc., 1986, xiii + 219 pp.  
ISBN 0-13-148877-1, \$US24.95

*Reviewed by  
Graeme Hirst  
University of Toronto*

I had made it to page 22, nearly the end of chapter 1. I had endured, though with some considerable annoyance, the authors' loosely organized intellectual history of artificial intelligence, written in a patronizing style, full of minor inaccuracies. And then I read this: "You [the reader of this book] are a valuable person whom we respect very much. Although we cannot interface personally, we respect your intelligence and ability". It was at this point that the book found itself leaving my hand, flying across the room, and bouncing off the wall. I'm sorry, but I myself cannot respect the intelligence and ability of anyone who could write such a thing with a straight face.

But let's say some nice things first. The authors' admirable and ambitious goal is a book that can introduce the lay reader to AI, its history, techniques, applications, and implications, at a reasonably deep level. There is clearly a need for such a book; many readers of this magazine would probably like to give such a book to their friends or their company's vice-presidents to help them understand AI. Equally admirable, in my opinion, is the authors' intended approach — presenting the field in a wider historical and social perspective.

Alas, the authors, both professional technical writers at Hewlett-Packard, are defeated by their task. In fact, for persons of their profession they are defeated surprisingly often by the English language — by the difference between *principal* and *principle*, for example, or the need to get verb tenses right. Sloppiness is apparent throughout the book. About one-third of the names mentioned are misspelled. We learn such amazing facts as these:

- From 1978 to 1984 is seven years (p. 160).
- John McCarthy and Marvin Minsky were (collectively) an assistant professor of communication sciences (p. 20).
- The Xerox Palo Alto Research Center is in Menlo Park, California (p. 93). (It is, of course, in Palo Alto.)

Having noticed such obvious things, the lay reader may well assume that the book contains lots of other misinformation and that trying to learn from it would be a risky business; indeed, this is the case. It becomes clear that the authors' grasp of AI is simply not adequate to their task. For example, chapter 5 purports to show how expert systems evolved out of Lisp. (On page 83, the terms "Lisp expert" and "knowledge engineer" are said to be equivalent! It was at this point that the book collided with the wall for a second time. Its aerodynamics are excellent, but the binding has suffered.) The authors seem not to understand the distinction between a system and the language that it's written in; they are in love with Lisp and their love is blind. (The history of Lisp is recounted on three separate occasions in the book.) They have heard of Prolog, but describe it as "software which functions partly as a computer language and partly as a software environment in which you can do AI in a less direct manner than is required when you use Lisp" (p. 22), and as a mistake made by the Japanese that they will soon correct (p. 179). Nevertheless, the blurb claims that the book "examines AI in relation to languages such as Lisp and Prolog". In fact (despite its occasional mention) Prolog is not even listed in the index. Actually, few things *are* listed in the index, which is rather shorter than it should be. Even the invention of Lisp is only indexed once.

I could go on, but maybe I'd better not. □

*Graeme Hirst is editor of this magazine. His second book on natural language understanding will be published later this year, and he is praying for kind-hearted reviewers.*

### Progress in artificial intelligence

*Luc Steels and John A. Campbell, editors*

Chichester: Ellis Horwood, 1985, 320 pp.  
(Ellis Horwood Series in Artificial Intelligence)  
Distributed in Canada by John Wiley  
ISBN 0-85312-830-8, hardcover \$<sup>CDN</sup>75.50

*Reviewed by  
Zavis P. Zeman  
ZZ International*

This volume contains a selection of papers and updates of papers from the 1982 European Conference on artificial intelligence, in Orsay, France. The meeting was the first of a biennial series of European AI conferences, organized by ECCAI with the cooperation of the various national AI societies.

The volume contains 21 papers from 32 contributors, a half from the U.S., the rest from Europe, with most of latter contributions from the U.K., Italy, and France. The collection is organized into five sections: Problem solving and learning; knowledge representation, reasoning, and control; extending the scope of knowledge representation and reasoning; AI and external relations; and areas of application. An index accompanies the papers.

The four contributions in the section on problem solving and learning start with Roger Schank (Yale University) looking at learning, where the author states and justifies some key questions on learning as a starting point for debates on the topic. All the remaining papers in this section discuss learning in the context of the solution of some class of problems about which enough is known a priori to allow an evaluation of the progress in the subject.

The papers by Sleeman (Stanford University) and Kant and Newell (CMU) focus on modelling or extraction of information about human problem-solving activities. Both contributions could be useful in computational studies in learning. Langley (CMU) deals with learning of procedures by refining problem-solving methods from general to more specific ones.

The second section, on knowledge representation, reasoning, and control, focuses on the problem of control, with the whole range of views within the declarativist-proceduralist spectrum. The declarativists, who believe that the information should be represented independently of its use, are led by Kowalski (Imperial College), who is convinced that information should be expressed as a variant of first-order predicate calculus, with the unification-backtracking algorithm for control. The paper gives a good overview of Prolog, based on this position. Bundy, Byrd

(University of Edinburgh) and Mellish (University of Sussex) attempt to build a domain-independent inference mechanism, showing how additional information about predicates and rules could be used to obtain some measure of control over combinatorial explosion.

Berliner (CMU) argues that both declarative and procedural approaches (based on the belief that information cannot be represented without implications for its use), have a role to play. His arguments are illustrated by examples from the domain of games. His data support the view that human processing is done not by a single serial processor, but rather by a set of cooperating processors, where process and pattern lookup must interact. He conjectures that intelligence arises out of a series of mappings, selected to correlate with something known. Kahn (then at University of Uppsala) argues for an inference mechanism that relies less on assertions or statements but more on structuring information around the objects in the domain. The paper concentrates on explaining the unification mechanism of Uniform, a knowledge representation and programming language based on equivalence of descriptions, giving examples. A similar, object-oriented bias is found in the constraint system described by Steels (Vrije Universiteit Brussel). Steels proposes to decouple the control structure from the constraints, which are relegated merely to the role of consultants.

The third section of the volume, "Extending the scope of knowledge representation and reasoning", focuses on issues open for research into the representation of knowledge not based upon simple structures of facts and rules. One form of reasoning studied here is reasoning by analogy. Chouraqui (CNRS, Marseille) provides a model for such reasoning. A matching operation which detects similarities between structures could be regarded as a basis for analogical inference, according to the author.

On the periphery of knowledge representation, Pfeifer and Nicholas (CMU) provide a serious report of an attempt to construct a computational model of emotion generation, demonstrating a relative straightforwardness of such a model.

The final concept considered in this section is metaphor, investigated by Russell (University of New Hampshire), with emphasis on intention behind the introduction of the metaphor.

The fourth section, "Artificial Intelligence and External Relations", includes a paper by Wertz (LITP/CRNS, Paris) on how AI could help software engineers, and a contribution by Huet (INRIA, Rocquencourt) showing that AI has been a fertile ground for design of programming

languages, without being fully aware of its influence.

The final contribution of this section focuses on commercialization of AI. Gallaire (European Computing Research Centre, Munich) in his paper provides a 1982 snapshot of the situation of the AI industry, useful for comparisons with where we stand today.

The final section of the book is "Areas of Application", dedicated to descriptions of successful applications of AI. Michalski *et al* (University of Illinois at Urbana) present an experimental expert system called PLANT/ds for advising farmers on the diagnosis of soybean diseases common in Illinois, planned to be used by the cooperative extension service of the state. The paper by De Mori *et al* (Universita de Torino and Concordia University, Montreal) presents an ambitious Italian project on the use of expert systems technology for the difficult and multifaceted problem of decoding speech, with some success. The paper by Bratko (Kardelj University, Ljubljana) demonstrates a powerful problem solving tool, ready for further applications. Maier and Salveter (SUNY Stony Brook) argue for updating databases by natural language using structures called verbagraphs. The last two papers of Roesner (Universität Stuttgart) and Tait (Acorn Computers, Cambridge) touch upon understanding of the contents of newspaper texts.

The volume provides a useful source of otherwise difficult to access material, so needed for precise references. Unfortunately, it comes with a three-year delay. □

*Zavis P. Zeman is the president of ZZ International, a Toronto-based consulting company specializing in technology policy issues, and is Vice-President of Canadian Artificial Intelligence Products Corporation of Ottawa.*

### **Programming in Common Lisp**

*Rodney A. Brooks*

John Wiley & Sons Canada Ltd., 1985  
ISBN 0-471-81888-7, paperbound, xv+303 pp

*Reviewed by  
Malcolm Bersohn  
University of Toronto*

This text is methodical, thorough, and well organized. The demands on the reader are minimal. The examples and the exercises are easy throughout. It would be quite possible to use this book as a self-study text. There are very few typos; those that I found were in the exercises.

One must compare this text with the only other existing students' introduction to Common

Lisp, Lisp (2nd edition) by Patrick Winston and Berthold Horn. The latter book requires more exertion by the reader; some exercises even need a tour de force to program a problem with minimum tools. The Winston book goes rather further into the language and provides various miscellaneous information about how to do AI programming in Lisp. In my judgement, the Brooks book is considerably the better one for the beginner. After finishing the problems in *Programming in Common Lisp*, the student would be well prepared to digest the Winston book. □

*Malcolm Bersohn is a member of faculty in the Department of Chemistry, University of Toronto, and sometime Guggenheim Fellow, Department of Computer Science, Stanford University.*

### **Natural language computing: The commercial applications**

*Tim Johnson*

London: Ovum Ltd, 1985  
ISBN 0-903969-22-X; 459 pp  
\$US395, or £275 in the U.K.

*Reviewed by  
Graeme Hirst  
University of Toronto*

Everything you need to know about the commercial aspects of natural language processing is in this well-written book. Johnson believes that NLP will be a billion-dollar industry within ten years, and explains why, and how an interested company can get in on the ground floor. He covers the history of the field, current players and products, and the basics of present NLP technologies, all in detail. The thoroughness and care in Johnson's research shows through time after time.

The book is well worth its high price to anyone thinking of getting involved in commercial NLP. I just wish it could be made available at a more conventional price to the AI and NLP research and teaching community. □

*Graeme Hirst is editor of this magazine. He worries that complimentary reviews of advertisers' books might be thought to be biased.*

## **Other books received**

### **An introduction to Lisp**

*Ajit Narayanan and Noel E. Sharkey*

Chichester: Ellis Horwood; 227 pages; 1985  
Distributed in Canada by John Wiley  
ISBN 0-470-20244-0, paperback; \$CDN29.50



Lisp primer for the computing novice. The cutesy writing style seems suitable for a young audience.

**International robotics industry directory™**  
(4th edition)

*Philip C. Flora*

Conroe, Texas: Technical DataBase™ Corporation  
1984, 385 pp.

Distributed in Canada by John Wiley  
ISBN 0-444-86890-9, paperback; \$<sup>CDN</sup>66.95

A directory of industrial robots, systems, and accessories currently available.

**Artificial intelligence: Promise and performance**

*Alain Bonnet*

[Translation of the 1984 French edition]  
London: Prentice-Hall International, 1985  
221 pp.; ISBN 0-13-048869-0

Guy Lapalme reviewed the French edition of this book in *Canadian A. I.*, June 1985. He described it as an excellent informal introduction to AI. The reader, who is assumed to be quite familiar with computer science, will find clear and concise discussions of several topics of interest. This is not a text book, but rather a well-written outline which sparks further reading.

**Artificial intelligence in business, science, and industry**

Volume I: Fundamentals

Volume II: Applications

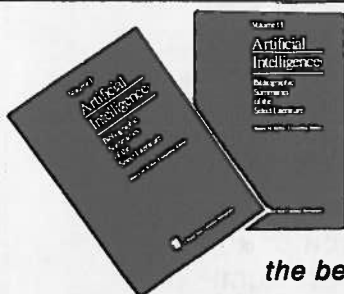
*Wendy B. Rauch-Hindin*

Englewood Cliffs, NJ: Prentice-Hall, 1985 and 1986  
331 and 348 pp; ISBN 0-134-048893-3  
and -048901-8; \$<sup>US</sup>34.95 each

A comprehensive and detailed applications-oriented introduction to AI, with an emphasis on technical details, case histories, and commercial products.

How come all these book reviewers are from Toronto? I bet the Editor just likes giving those free review copies to himself and all his friends!

We usually have several AI books awaiting reviewers, who of course may keep the book after writing the review. If you would like to be a book reviewer for *Canadian A. I.*, contact the editor, giving your subfields of interest. (We cannot, of course, promise to have books in stock in your exact areas.) Reviewers who do not live in Toronto are particularly encouraged.



**How do you decide  
what's worth reading in AI?**

**With Artificial Intelligence—  
the best, perhaps only, sourcebooks you'll ever need.**

**Artificial Intelligence: Bibliographic Summaries of the Select Literature—The Set** is a unique new reference designed to save you time and money. It will help you catch up, keep up, survey developments, and find out who's who in AI.

Discover the latest developments in all areas of AI and how they're affecting your own business or field of expertise. Become more knowledgeable, productive and efficient by using this library of works in AI in two handy volumes.

**The two-volume set contains:**

- Capsule Reviews of 447 titles with full Tables of Contents.
- Quick Reference Author/Title list.
- Complete Author/Subject Indexes.
- Survey of AI periodicals.
- Access to the most recent works in AI (20% of the titles published since 1984; 40% published since 1983).
- 20% are the most recent technical and research reports.

With the purchase of the set you will receive a companion reference work containing a comprehensive index of authors and contributors (over 4600 names) and a cumulative subject index (over 1150 terms). Most of the documents listed are available through The Report Store's Document Delivery Service.

**Artificial Intelligence: Bibliographic Summaries of the Select Literature,  
Volumes I & II (The Set) \$295**

To order by credit card call (913) 842-7348. Or send your check or company purchase order to:

**the  
Report Store**

910 Massachusetts, Suite 503CA  
Lawrence, Kansas 66044 USA  
(913) 842-7348

## University of British Columbia

### **Positions in Computer Science and Psychology**

The University of British Columbia invites applications for two tenure track positions (assistant professor rank), beginning July 1, 1986, associated with the Canadian Institute of Advanced Research's programme in artificial intelligence and robotics. The appointments, one in the Department of Computer Science and one in the Department of Psychology, will be funded initially, for a five year period, by CIAR, during which time the appointee will also be a research fellow of CIAR. Teaching responsibilities during this initial period will be limited.

Candidates should have a Ph.D. and be trained and actively involved in any combination of the following areas: computational aspects of visual perception, physiology of vision, knowledge representation, or motor control. Applicants must be able to show strong research commitment and achievement demonstrated by published work. Salary will be commensurate with qualifications and experience.

The University of British Columbia offers equal opportunity for employment to qualified female and male applicants. In accordance with Canadian Immigration requirements this advertisement is directed to Canadian citizens and permanent residents (landed immigrants) in Canada.

Send complete curriculum vitae, reprints, and the names of at least three professional referees to Dr James M. Varah, Head, Department of Computer Science, University of British Columbia, Vancouver, B.C. CANADA V6T 1W5, or to Dr. Richard C. Tees, Department of Psychology, University of British Columbia, Vancouver, B.C. CANADA V6T 1W5, Closing date for applications is March 1, 1986.

## Recent AI Technical Reports

*Editor's note:* Recent Canadian AI technical reports are listed in this department. Abstracts will be included as space permits, with preference being given to theses.

□ □ □ □ □

### University of Alberta

The following report may be requested from the authors at:

Department of Computing Science  
University of Alberta  
Edmonton, Alta T6G 2H1

#### Is best-first search really best?

*Alexander Reinefeld, T.A. Marsland,  
and Jonathan Schaeffer*

Technical Report 85-16  
October 1985

Of the many minimax algorithms, SSS\* consistently searches the smallest game trees. Its success can be attributed to the accumulation and use of information acquired while traversing the tree, allowing a best-first search strategy. The main disadvantage of SSS\* is its excessive storage requirements. This paper describes a class of algorithms, based on the popular alpha-beta algorithm, that acquire and use information to guide tree search. They retain their directional nature, yet are as good as SSS\*, even while searching random trees. Further, while some of these new algorithms also require substantial storage, they are more flexible and can be programmed to use only the space available, at the cost of some degradation in performance.

□ □ □ □ □

### University of Saskatchewan

Requests for any of the following publications should be addressed to the authors at:

Department of Computational Science  
University of Saskatchewan  
Saskatoon, Saskatchewan S7N 0W0

#### G.E.N.I.U.S. — An experiment in ignorance-based automated program advising

*Gordon McCalla and K. M. Murtagh*

Technical Report 85-20

The process of dispensing useful advice on program

bugs to students is one requiring great intelligence and much knowledge. To automate this process would seem to require a large, sophisticated, knowledge-based system. It is the contention of this paper, however, that it is possible to build at least a marginally useful automated program advisor without needing to build such a large and complex system. G.E.N.I.U.S. is one such system, founded on what could be called "ignorance-based" principles in contrast to a knowledge-based approach. G.E.N.I.U.S. is a small program which uses a keyword-style natural language interface to understand students' queries on programming difficulties, and a simple discrimination net knowledge representation to dispense useful advice on these difficulties. G.E.N.I.U.S. was tested in several computer science courses, and while it didn't exactly set the world on fire, it did prove to be of use to many students. With some enhancements many of its current shortcomings could be ameliorated, making it even more useful. There is, of course, a limit on how far an ignorance-based approach such as G.E.N.I.U.S.'s can be taken. Nevertheless, this experiment shows that certain problems can benefit in the short term by taking such an approach, at least until knowledge-based approaches begin to map out more sophisticated solutions.

#### The design of the SCENT automated advisor

*Gordon McCalla, R. B. Bunt, J. J. Harms*  
Technical Report 85-22

The SCENT (Student Computing ENvironment) project is concerned with building an intelligent tutoring system to help student programmers debug their programs. The major thrust of current SCENT investigations is into the design of the SCENT advisor, which is meant to provide debugging assistance to novice students. Six conceptual levels constitute the advisor. At the lowest level is the "raw data", consisting of the student's (possibly buggy) Lisp program. This can be interpreted by a "program behaviour" level which can produce traces, cross-reference charts, etc., from the student's program. These traces, etc., can be analyzed by "observers" for interesting patterns. At the next level are "strategy judges" and "diagnosticians" which determine which strategy the student has used in his/her program and bugs in this strategy. "Task experts" provide task-specific input into the process of analyzing the student's solution, and a "student knowledge component" provides student-specific input into this process. Information from the six levels interacts in a variety of ways and control is similarly heterarchical. This necessitates a blackboard-style scheme to coordinate information dissemination and control flow.

This paper discusses the objectives of SCENT and focuses on organizing the process of debugging student programs. A complete example is given to illustrate how entities at the six levels interact and to indicate the kinds of information sharing which occur in the SCENT advisor. The paper concludes with an evaluation of the strengths and weaknesses of this approach

to automated debugging, and suggestions about directions for further exploration.

□ □ □ □ □

## University of British Columbia

Requests for any of the following publications should be addressed to:

Department of Computer Science  
University of British Columbia  
Vancouver, BC, CANADA V6T 1W5

### **A theory of schema labelling**

*William Havens*

Technical Report 84-16  
Revised June, 1985

Schema labelling is a representation theory which focuses on composition and specialization as two major aspects of machine perception. Previous research in computer vision and knowledge representation has identified computational mechanisms for these tasks. We show that the representational adequacy of schema knowledge structures can be combined advantageously with the constraint propagation capabilities of network consistency techniques. In particular, composition and specialization can be realized as mutually interdependent cooperative processes which operate on the same underlying knowledge representation. In this theory, a schema is a generative representation for a class of semantically related objects. Composition builds a structural description of the scene from rules defined in each schema. The scene description is represented as a network consistency graph which makes explicit the objects found in the scene and their semantic relationships. The graph is hierarchical and describes the input scene at varying levels of detail. Specialization applies network consistency techniques to refine the graph towards a global scene description.

### **A portable image processing system for computer vision**

*William Havens*

Technical Report 85-9

Computer vision research is flourishing, although its growth has been hindered by the lack of good image processing systems. Existing systems are neither general nor portable despite various attempts at establishing standard image representations and software. Issues of hardware architecture and processing efficiency have frequently dominated system design. Often standard representations are primarily data formats for exchanging data among researchers working at affiliated laboratories using similar equipment.

We argue that generality, portability and extensibility are the important criteria for developing image processing systems. The system described here, called PIPS, is based on these principles. An abstract image datatype is defined which is capable of representing a wide variety of imagery. The representation makes few assumptions about the spatial resolution, intensity resolution, or type of information contained in the

image. A simple set of primitive operations are defined for direct and sequential access of images. These primitives are based on a bit stream access method that considers files and devices to be a long contiguous stream of bits that can be randomly read and written. Bit streams allow the word boundaries and file system architecture of the host computer system to be completely ignored and require only standard byte-wide direct-access I/O support.

The standard image representation has encouraged the development of a library of portable generic image operators. These operators support interactive experimentation and make it easy to combine existing functions into new more complex operations. Finally, graphics device interfaces are defined in order to isolate graphics hardware from image processing algorithms.

□ □ □ □ □

## University of Toronto

Requests for any of the following publications should be addressed to:

Joanne Mager  
Department of Computer Science  
University of Toronto  
Toronto, Ont., CANADA M5S 1A4

### **On the hierarchical construction of orientation and velocity selective filters**

*David J. Fleet and Allan D. Jepson*

Research in Biological and Computational Vision  
Technical Report, RBCV-TR-85-8  
November 1985

This paper concerns the development of tools for the early measurement of visual primitives. It is our view that a rich representation should be computed in the first functional level of processing, using image-independent processes that require no previous or concurrent interpretation. We review suitable design criteria for the extraction of orientation and velocity information, and present a variety of tools useful in the construction of simple linear mechanisms. We use a hierarchical parallel processing scheme in which nodes need only compute a weighted sum of inputs from a few nodes within a small spatiotemporal neighbourhood. The resulting scheme is easily and completely analyzed, and is shown to provide mechanisms sensitive to narrow ranges of both image velocity and orientation.

### **The effects of ambient illumination on the structure of shadows in chromatic images**

*Ron Gershon, Allan D. Jepson, and John K. Tsotsos*

Technical Report RBCV-TR-86-9  
January 1986

The structure of the relationships between shadow and lit regions in chromatic images is discussed. Although

there have been previous attempts at providing solutions to this problem, the assumptions they adopted were too restrictive. In particular, we show that the ambient illumination cannot be assumed to have the same spectral characteristics as the incident illumination, and therefore the treatment of the relationships between shadow and lit regions becomes more complex. In such cases, we show that it is necessary to take into account the effects of the spectrally biased ambient illumination and develop a scheme which is more robust and stable than previous schemes. We apply this scheme as an initial step towards the early visual classification of discontinuities in images as either material changes or shadows, and discuss further steps required to achieve this goal.

□ □ □ □ □

### McGill University

The table below lists recent AI technical reports from McGill University. They may be requested from:

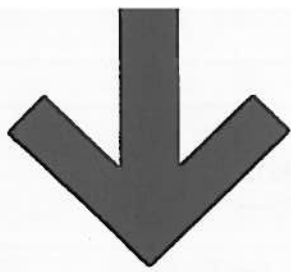
The Librarian  
 Computer Vision and Robotics Laboratory  
 Department of Electrical Engineering  
 McGill University  
 3480 University Street  
 Montreal, PQ, CANADA H3A 2A7

THE NOBEL BOOBY PRIZE.



### Recent McGill University AI Technical Reports

Title	Authors	Number
The diversity of perceptual grouping	S.W. Zucker	85-1R
Reconstructing and interpreting the 3D shape of moving objects	F.P. Ferrie, M.D. Levine	85-2R
Subjective figures and texture perception	S.W. Zucker, P. Cavanagh	85-2R
Points and endpoints: A size/spacing constraint for dot grouping	S.W. Zucker, S. Davis	85-3R
Sensitivity to corners in flow patterns	N.K. Link, S.W. Zucker	85-4R
Computer Vision and Robotics Laboratory progress report, October 1984 to September 1985	—	85-10R
Early orientation selection: Tangent fields and the dimensionality of their support	S.W. Zucker	85-13R
Radial projection: An efficient update rule for relaxation labelling	P. Parent, S.W. Zucker	85-15R
Receptive fields and the representation of visual information	S.W. Zucker, R.A. Hummel	85-16R
Line detection in digital pictures: A hypothesis prediction/verification paradigm	A.R. Mansouri, A.S. Malowany, M.D. Levine	85-17R
Multiple resolution skeletons	A.R. Dill, M.D. Levine, P.B. Noble	85-18R

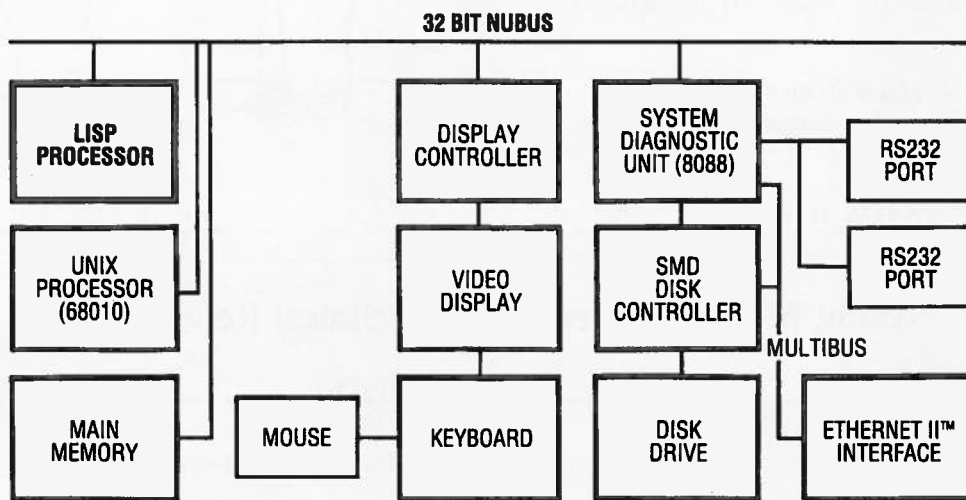


# LISP Canada Inc.

## Distributes and Services the LMI Lambda Machine

---

### LMI Lambda Machine



---

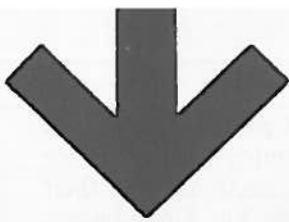
### USERS BENEFIT FROM:

- MULTIBUS™ Compatibility
- Multi-processor Capability
  - LISP Processor
  - 68010 UNIX Processor
  - 8088 System Diagnostic Unit
- Virtual Control Store and Microcompiler
- Powerful Software Resources



**LISP Canada Inc.**  
5252 de Maisonneuve W. Blvd.  
Montreal, Quebec, Canada  
H4A 3S5

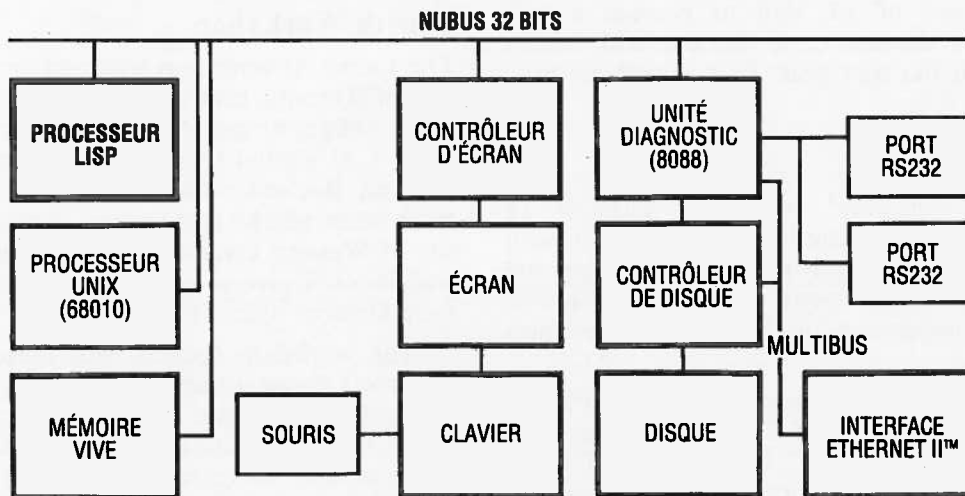
Tel: 514 487 7063  
Telex: 055-66382



# LISP Canada inc.

## Distribue et entretient la machine Lambda de LMI

### Machine Lambda de LMI



### LES AVANTAGES DU LAMBDA

- Compatibilité MULTIBUS™
- Accès à de multiples processeurs
  - Processeur LISP
  - Processeur UNIX (68010)
  - Unité de diagnostic (8088)
- Microcompilateur
- Logiciels puissants



**LISP Canada Inc.**  
5252 de Maisonneuve W. Blvd.  
Montreal, Quebec, Canada  
H4A 3S5

Tel: 514 487 7063  
Telex: 055-66382

---

## Toronto—Waterloo AI Workshops Continue

Brian Nixon

*Department of Computer Science  
University of Toronto*

The University of Waterloo—University of Toronto artificial intelligence workshops have alternated in location between the Departments of Computer Science of the two universities. The purpose is to allow Waterloo's Logic Programming and AI Group and Toronto's AI Group to meet, to learn about each other's research in different areas of AI, and to provide a new medium for discussion of student and faculty research. In the past year, four workshops have been held.

### Third Workshop

The third workshop\* was held Tuesday 19 November 1985 at Waterloo, in conjunction with a workshop "Challenges in Image Processing and Vision Modelling", sponsored by the Toronto-Waterloo Cooperative on Information Technology.

The day opened with keynote talks by Professors John Tsotsos of U of T and Edward Jernigan of U of W. Professor C. C. Gotlieb of U of T was given an award for his work in fostering cooperation between the two universities by founding the Cooperative and chairing it for its first four years.

Participants then split up into two "tracks": vision and knowledge representation. The vision track stayed with the Cooperative, where several different image and vision groups from the two universities were introduced. Meanwhile, the KR track had presentations by Waterloo's KR group, chaired by David Poole. Speaking were David Poole, Randy Goebel, and Romas Aleliunas, and their students Paul van Arragon, Eric Neufeld, Scott Goodwin, Andre Trudel and Ken Jackson.

Next was a joint lunch at St. Jerome's College.

In the afternoon, the vision track had parallel small-group sessions on image processing and vision modelling, image and scene analysis, and applications, followed by a plenary session. During the parallel sessions, John Tsotsos co-chaired a session with Andrew Wong, and speakers included Peter Hallett and Toronto vision students Ron Gershon and Michael Mohnhaupt.

---

\*See *Canadian A.I.*, June 1985, for reports on the first two workshops, held in early 1985.

Meanwhile the KR track had presentations from Toronto by John Mylopoulos and Hector Levesque (who chaired the session) and their students Lawrence Chung, Eric Yu, Tim Lownie, Greg McArthur, Gerhard Lakemeyer, Bart Selman, Jim des Rivières, Calvin Ostrum, and Andrew Gullen.

Andre Trudel and administrative assistant Anne Harris did a fine job of arranging snacks for the crowd of 50, assisted by Peter van Beek, Sue Kindersley, and Scott Goodwin. With the active work of Kelly Gotlieb and A. Venetsanopoulos and secretaries Ruth Lee and Bonnie Kent of the Cooperative, the two workshops dove-tailed nicely. Ron Gershon coordinated the Toronto vision students.

### Fourth Workshop

The fourth AI workshop was held on the University of Toronto campus on Tuesday 28 January 1986. About 65 people attended, including some U of T AI alumni from Ottawa, Toronto, Waterloo and Rochester and AI students and faculty from other nearby universities, including University of Western Ontario, University of Rochester, and Brock University. There were also visitors from Ontario Hydro.

The workshop opened with presentations by Toronto's vision group (students David Fleet and Michael Jenkin) and Toronto's expert systems group (Taro Shibahara and Russell Greiner). A group of over 50 then enjoyed lunch at a nearby Chinese restaurant. The afternoon featured presentations by Waterloo's expert systems group (Marlene Jones and students Jim Tubman and Sue Kindersley) and Waterloo's natural language understanding group (Robin Cohen and student Peter van Beek).

After a break for discussion, the day concluded by visiting Toronto's AI Laboratory for demonstrations by student Gregory Dudek and programmer Jose Nunes of hardware and software used by Toronto's vision and expert systems groups.

The U of T organizers were Brian Nixon, Andrew Gullen, Diane Horton, Yves Lesperance, Joanne Mager, Teresa Miao, and Jean Gray of the Department of Computer Science. They were supported by the Faculty/Student Relations Fund of the School of Graduate Studies Alumni Association, University of Toronto.

For information on future workshops, contact Robin Cohen (Department of Computer Science, University of Waterloo), or Brian Nixon (Department of Computer Science, University of Toronto). □



---

## Queen's University Expert Systems Workshop

*Janice Glasgow  
Department of Computer Science  
Queen's University*

On 9 and 10 February, the Computer-Aided Process Design (CAPD) Lab at Queen's University hosted a workshop on Expert Systems in Process Engineering. The purpose of this meeting was to foster interaction between industry, government, and university in the area of next generation computer design tools. Participants of the workshop, which was held at the Donald Gordon Centre in Kingston, were primarily from the chemical, oil, and communications industries of Canada.

The program was divided into two sessions. The first session, which consisted of talks given by Roger Browne, Janice Glasgow, Michael Jenkins, and Peter Douglas of Queen's University, gave an overview of artificial intelligence and knowledge-based systems. Emphasis was placed on applications and tools for building expert systems. The second session of the workshop consisted of invited talks describing the state of expert-systems development in several Canadian companies. Speakers in this session included Dick Peacocke of Bell-Northern Research, Mark Buchner of IBM Canada Limited, Hugh Sawyer of Imperial Oil Limited, and Calvin Weaver of Dow Chemical Canada. This session also included a presentation on "Using Apprenticeship Training for Building AI Systems" by Michel Pilote. Each speaker in this session included in their talk an overview of what they considered the role of university research in the development of expert systems for industry.

A highlight of the meeting was a keynote address by Nick Cercone of Simon Fraser University. In his talk, Dr. Cercone illustrated the difficulty in developing expert systems or (more generally) fifth generation systems. He said that "one can view the creation of an expert system as a lengthy feedback cycle where sets of rules are formed and reformed to successively capture more and more of the reasoning of the expert".

The CAPD Lab is an NSERC Industrial Affiliates Program that has two primary goals: to accelerate the use of CAPD techniques in Canadian process industries and university, and to develop advanced CAPD technology. CAPD Lab research projects are focused on the areas of process synthesis, process simulation, process control, and expert systems. □

---

## Paul A. Kolars 1926—1986

Paul Kolars was born in New York in 1926 and obtained his PhD from New York University. After occupying several teaching and research positions, including posts at Bell Labs, Harvard, and MIT, he joined the Department of Psychology at the University of Toronto in 1970.

His work in various aspects of cognitive psychology had gained him an outstanding international reputation. He held visiting scientist positions in Holland, Germany, Italy, and Australia, and as a NATO Visiting Scientist he had paid brief visits to laboratories in France, Italy, Greece, and Turkey. In addition he presented talks and colloquia to many universities in Canada, the U.S., Europe, Israel, and Australia.

His early work was on classical issues of visual perception, especially the psychology of real and apparent visual movement. A central concern that developed in his later work was for mental representation and symbolization. These interests led him to the study of bilingualism and to problems of reading.

Paul was an active member of the Research in Biological and Computational Vision Group in the Department of Computer Science at U of T. He collaborated on experimental and theoretical topics concerning correspondence and dynamic stereopsis.

His many scientific articles revealed his great powers of imagination, creativity, and insight when dealing with the difficult problems of mental processes. His empirical work, also was ingenious, insightful and influential. Paul Kolars was warm, sensitive and cultured. The University and the discipline of experimental psychology has lost an important theorist. Computer vision research in Canada has lost a major contributor and a good friend.

*Fergus Craik and John Tsotsos  
University of Toronto*

---

## Forthcoming Conferences, and Calls for Papers

### Canadian conferences

#### **CSCSI-86: Canadian Artificial Intelligence Conference**

21–23 May 1986

Montréal

For details, see the announcement  
on pages 13–18.

□ □ □ □ □

#### **Vision Interface '86**

26–30 May 1986

University of British Columbia  
Vancouver, BC

The Vision Interface '86 conference is sponsored by the Canadian Image Processing and Pattern Recognition Society (CIPPRS). It is being held in conjunction with Graphics Interface '86, sponsored by the Canadian Man-Computer Communications Society (CMCCS). The joint conference consists of two days of tutorials followed by three days of technical sessions. Registered participants can attend technical sessions in either conference.

The joint Graphics/Vision Interface '86 tutorial program includes the following:

- Introduction to graphics, Alain Fournier *et al.*, Toronto.
- The user interface, William Buxton & Ron Baecker, Toronto.
- Graphics standards and GKS, G. Schrack, UBC.
- Robotic vision, Steve Zucker, McGill.
- Advanced graphics, Alain Fournier *et al.*, Toronto.
- Graphics for architects, J. Pittman, HOK/CSC.
- Low-cost workstations for architects, C.K. Lie, GE-Calma.
- Animation: 3D motion and control, D. Sturman, NYIT.
- Remote sensing, J. MacDonald, MDA.
- Geographic information systems, T. Poiker, SFU.

Vision Interface '86 will present 30 submitted papers and five invited talks organized into six technical sessions. The six technical sessions are:

- Vision/Graphics interface.
- Remote sensing and geographic information

systems.

- Robotics.
- Perception/computational vision.
- Image processing and pattern recognition.
- Applications: Other.

The invited talks are:

- "Natural Representations for Vision and Graphics", A. Pentland, SRI.
- "Integration of Remotely Sensed Data and GIS", D. Goodenough, CCRS.
- "Machine Vision for Robotic Fueling", J. Wilson, RSI.
- "Cross-Correlational Mechanisms for Visual Texture Segmentation", T. Caelli, Alberta.
- "Parallel Architectures for Machine Vision", S. Tanimoto, Washington.

For a copy of the Graphics/Vision Interface '86 conference brochure, registration, and accommodation information, write to:

Prof. G. F. Schrack  
Department of Electrical Engineering  
University of British Columbia  
Vancouver, BC, V6T 1W5.

Electronic mail requests can be forwarded via:

R. J. Woodham, Program Co-Chairman  
UUCP: ...!ubc-vision!woodham  
CSNET: woodham@ubc

□ □ □ □ □

### **Workshop on Knowledge Acquisition for Knowledge-Based Systems**

3–7 November 1986

Banff, Alberta

The bottleneck in the process of building knowledge-based systems is usually acquiring the appropriate problem-solving knowledge. The objective of this workshop is to assemble theoreticians and practitioners of AI who recognize the need for developing systems that assist the knowledge acquisition process.

To encourage vigorous interaction and exchange of ideas the workshop will be kept small — about 30 participants. There will be individual presentations and ample time for technical discussions. An attempt will be made to define the state of the art and future research needs.

Papers are invited for consideration in all aspects of knowledge acquisition for knowledge-based systems, including (but not restricted to):

- Transfer of expertise: systems which interview experts to obtain and structure knowledge.
- Transfer of expertise: manual knowledge engineering interviewing methods and techniques.
- Induction of knowledge from examples.
- Knowledge acquisition methodology.

Four copies of an extended abstract (up to 8 pages, double-spaced) or a full-length paper should be sent to the workshop chairman before 1 May 1986. Acceptance notices will be mailed by 1 July. Revised abstracts should be returned to the chairman by 1

October 1986, so that they may be bound together for distribution at the workshop. Potential attendees should also indicate their interest in chairing or participating in special topic discussion sessions.

**Co-Chairmen:**

John Boose (send papers here)  
Boeing Artificial Intelligence Center  
Boeing Computer Services, M/S 7A-03  
PO Box 24346  
Seattle, WA 98124, U.S.A.  
Phone: 206-763-5811

Brian Gaines  
Department of Computer Science  
University of Calgary  
2500 University Dr. NW  
Calgary, Alberta, CANADA T2N 1N4  
Phone: 403-220-6015

□ □ □ □ □

**Computers and the Humanities:  
Today's research, Tomorrow's Teaching**

*15-18 April 1986*

University of Toronto

Computers in the humanities, computational linguistics, and computer-assisted language-learning (CALL) belong to the larger field of artificial and natural languages and their relations. Critics engaged in literary text analysis, philosophers at work in symbolic logic and theorem proving, writing and language teachers discovering new computational tools, and computer scientists concerned with natural language understanding systems have much ground in common.

What can CALL and computer-assisted literary and linguistic research learn from one another? What has Computer Science to offer the Humanities? Does the Humanities have a role to play in AI?

This international conference features 35 speakers from Britain, France, Canada, and the United States in eight plenary sessions on:

- Humanities computing facilities.
- Second-language learning.
- Logic instruction and simulation.
- Tools for teaching writing.
- Computer Science and the Humanities.
- Literary analysis.
- Text databases.
- Publishing and networking.

Other activities include an academic software fair and a meeting of representatives from all Ontario universities to discuss a provincial consortium for Humanities computing.

The conference is sponsored by the Centre for Computing in the Humanities in the Faculty of Arts and Science at the University of Toronto, which promotes the development of research and teaching applications of this challenging new technology, and by the Toronto-Waterloo Cooperative on Information Technology, an affiliation of units within the two universities that promotes research and teaching in information science and in information technology, including

Humanities-related activities.

Conference sessions will be held at the Faculty of Library and Information Science, 140 St. George Street, Toronto.

Registration (\$CDN100) covers all conference activities, two lunches, a reception, an advance copy of the speakers' papers, and a guide to the software fair. For additional information contact:

Ian Lancashire  
Centre for Computing in the Humanities  
New College, University of Toronto  
Toronto M5S 1A1  
Phone: 416-978-6487  
BITNET/NetNorth: IANL @ UTORONTO  
UUCP: utcsri! ianne@utcs

or

Ruth Lee  
Toronto-Waterloo Cooperative on Information  
Technology  
Faculty of Library and Information Science  
University of Toronto  
Toronto M5S 1A1  
Phone: 416-978-5460  
NetNorth: UTCIT @ WATDCS

□ □ □ □ □

**Conference on the  
Danger of Accidental Nuclear War**

*26-30 May 1986*

University of British Columbia  
Vancouver, BC

**Goals:**

The exchange of data, results, and ideas among researchers and experts in all relevant areas, including computers and AI.

Formulation of a more precise consensus as to the seriousness of the danger.

Identification of those specific technologies, strategies, operating procedures, policies, and weapons deployments that contribute most significantly to the risk.

Communication of accurate information on the issue to the media and the public at large.

**Participants:**

Will include both natural and social scientists and computer professionals engaged in research, along with defence analysts and experienced military personnel. Participants may expect to attend morning plenary sessions and afternoon small group studies.

**Confirmed invited speakers include:**

Martin Hellman, Roger Schank, Lloyd Dumas, Severo Ornstein, Henry Thompson

**Registration:**

\$CDN150, \$US115, payable to University of British Columbia. Conference registration desk open Monday, May 26th, 8:00 am.

The registration fee does *not* include accommodation and meals; however, a block of sufficient rooms for delegates has been reserved on campus, \$24-\$55 plus tax, and a daily meal ticket at the Conference site is

\$14.

Information and Registration: University of British Columbia, Centre for Continuing Education, 5997 Iona Drive, Vancouver, BC V6T 2A4. Phone 604-222-5237.

*Sponsors:*

Science for Peace, with partial funding from the Canadian Institute for International Peace and Security, Ottawa.

Conference Organizing Committee Chairman: Prof. Michael D. Wallace, University of British Columbia.

□ □ □ □ □

### ACM SIGDOC '86

#### Fifth International Conference on System Documentation

9–11 June 1986

Toronto

We face a computerized world that revolves upon itself. It is time to open out the focus to all related fields of knowledge, especially of human communication and learning. We can begin to explore the ways to make computers fit human needs, not to force human values to conform to algorithms. The conference aims to explore such topics as:

- Computers and the study of human languages.
- How computers affect or reflect human thought.
- Effective storage, organization, and retrieval of on-line texts.
- Documenting user-adaptive and expert systems.
- The art of visual presentation for human recognition.

For more information:

Chris Hallgren  
7 George Street South  
Toronto, CANADA M5A 4B1

### U. S. Conferences

#### Eighth Annual Conference of the Cognitive Science Society

15–17 August 1986

University of Massachusetts  
Amherst, Massachusetts

The Society's 1986 conference will focus on three topics: Formal analyses of language, intelligent systems, and neuroscience and cognitive science. There will be major addresses by Bruce Buchanan (Stanford), Barbara Grosz (SRI), Vernon Mountcastle (Johns Hopkins), and Zenon Pylyshyn (Western Ontario). Invited symposia will cover the topics of cognitive models and neurological phenomena, linguistic perspectives on cognitive science, motor control, and vision. Workshops will deal with various topics, including teaching cognitive science, intentionality and representation, reasoning about uncertainty, and the acquisition of syntax. There will be presentation and poster sessions for submitted papers.

For more information contact the chairman:  
Charles Clifton  
Department of Psychology  
University of Massachusetts  
Amherst, MA 01003, U.S.A.

### Outside North America

#### Knowledge and Data (DS-2) TC2 Working Conference organized by IFIP Working Group 2.6

3–7 November 1986

Albufeira (Algarve), Portugal

Scope: Questions of meaning are more important for the design of a knowledge base than methods of encoding data in bits and bytes. As database designers add more semantic information to their systems, their conceptual schemata begin to look like AI systems of knowledge representation. In recognizing this convergence on issues of semantics, IFIP Working Group 2.6 is organizing a working conference on Knowledge and Data. It will address the issues and problems of knowledge representation from an interdisciplinary point of view.

Topics:

Design of a conceptual schema  
Knowledge and data modeling  
Database semantics  
Natural language semantics  
Expert database systems  
Logic, databases, and AI  
Methods of knowledge engineering  
Tools and aids for knowledge acquisition

Invited speakers:

Herve Gallaire, Germany  
Robert Meersman, Belgium  
J. Alan Robinson, USA  
Roger Schank, USA  
Dana Scott, USA

An IFIP working conference is oriented towards detailed discussion of the topics presented. Participation is by invitation, with optional contribution of a paper that is refereed by the program committee. Anyone who is interested in participating should send an abstract of current research or a prospective paper to the program co-chairman. Abstracts are due 14 March 1986. Complete papers are due 16 May 1986. Papers presented at the conference will be published in book form by North-Holland Publishing Co.

General Chairman: Amilcar Sernadas, Portugal.

U.S. cochairmen:

John F. Sowa  
IBM Systems Research Institute  
500 Columbus Avenue  
Thornwood, NY 10594, U.S.A.  
CSNET: sowa.yktvmt@ibm

Use this form to join CSCSI/SCEIO, to subscribe to *Canadian A. I. or Computational Intelligence*, and to order publications

Canadian Society for  
Computational Studies  
of Intelligence

Société canadienne pour  
l'étude de l'intelligence  
par ordinateur

## Application for Membership and / or Journal and Conference Proceedings Order

To join CSCSI/SCEIO and receive *Canadian Artificial Intelligence*, fill out this form (or a photocopy of it) and send it to CIPS (which administers membership for the society) at the address below, with the appropriate fee. You need not be Canadian to be a member. This form can also be used to subscribe to the journal *Computational Intelligence*, and to purchase back issues of *Canadian Artificial Intelligence* and CSCSI/SCEIO conference proceedings. Mail it to:

CIPS, 243 College Street (5th floor), Toronto, CANADA M5T 2Y1

- I wish to join CSCSI/SCEIO and receive *Canadian A. I.* (\$20).  
 I am a student (subtract \$10).  I am a member of CIPS (subtract \$5).
- Please send me the following back issues of *Canadian Artificial Intelligence* (\$10 each including postage, except \$15 for #3):\* .....
- Please enter my subscription to *Computational Intelligence* at the CSCSI/SCEIO non-institutional member discount rate (\$16).†
- Please send me the following CSCSI/SCEIO conference proceedings (\$25 each, plus \$5 postage within Canada, \$7 outside):  
 Victoria, 1980.  Saskatoon, 1982.  London, 1984.

Total enclosed: \$..... Cdn./U.S. (Payment may be made in U.S. dollars at the current rate of exchange.)

Name .....

Mailing Address .....

.....

.....

\*If an issue you request is out of print, a photocopy will be provided. Issue #3 (March 1985) includes the supplement *Towards a Canadian Fifth Generation Research Plan*.

†*Computational Intelligence* subscriptions are filled by its publisher, the National Research Council of Canada. CIPS only certifies your eligibility for the discount and forwards your order.

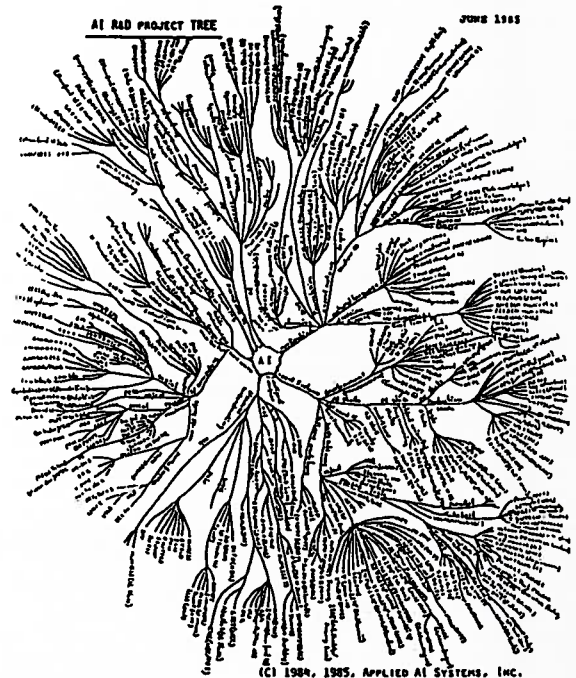
## • THE DIRECTORY OF AI SYSTEM DEVELOPMENT

- First comprehensive directory of world's AI tools
- Covers tools for building Expert Systems and other AI application systems
- Over 130 items covered
- Includes American, European, Canadian, and Japanese products
- 1985/1986 edition with the latest information as of late 1985
- Binder format allows later additions and updates as new materials become available
- Address and phone numbers of manufacturer
- Canadian dealer's address and phone number, if there is a dealer
- Pricing information
- An introduction to AI system development cycles
- Tools classified into practical categories

### Contents of directory:

- Introduction
- AI development cycle and AI tools
- AI hardware
  - Microcomputer based AI development systems
  - Available supermini development systems
  - AI development using general purpose workstations
  - AI workstations
  - Multi user AI workstations
  - AI delivery vehicles
- Basic AI languages
  - LISP systems
  - Prolog systems
  - Hybrid and other AI languages
  - AI programming using conventional computer languages
- Expert system shells
- Expert systems
- Natural Language shells
- Development Environments
- Issues with today's AI tools
- List of applied AI publications

The directory has approx. 220 pages.  
Price: \$145



## • Golden Common Lisp

Gold Hill Computers recently demonstrated several new GCLISP products at the International Joint Conference on Artificial Intelligence. These new products and an extremely flexible and cost effective corporate licensing arrangement offer your AI team the competitive edge in utilizing artificial intelligence now. Our exciting new products include:

**GCLISP LM (Large Memory version)** -- the first MS-DOS language that can address up to 15 megabytes of physical memory on an IBM PC AT. \$1,049.45 + tax + shipping(\$40)

**GCLISP Compiler** -- increases the performance of an interpreted GCLISP program substantially, making GCLISP programs run up to five times faster, and reducing code size by as much as 40%. \$1,049.45 + tax + shipping(\$40)

**GCLISP HALO Graphics** -- offers over 150 graphics subroutines and primitives, and supports a variety of graphics devices, such as the IBM Enhanced Graphics Adapter, the Mouse Systems mouse, and the Hewlett-Packard LaserJet and ThinkJet printers. \$415 + tax + shipping(\$40)

**GCLISP Network** -- provides an Ethernet connection between IBM PCs, PC ATs, and Symbolics LISP machines; facilities include file transfer, remote terminal login, and print service utilizing the Symbolics LISP machine.

Applied AI Systems Inc. is an authorized dealer of products by Gold Hill Computers Inc of Cambridge, Mass. GCLISP, GCLISP LM, GCLISP Compiler, GCLISP HALO Graphics, and GCLISP Network are registered trademarks of Gold Hill Computers Inc. IBM PC, AT are registered trademarks of International Business Machines Corp. MS-DOS is a registered trademark of Microsoft Inc.

For additional information, call or write Applied AI Systems Inc.



Applied AI Systems, Inc.  
P.O. Box 13550  
KANATA, Ontario  
Canada K2K 1X6

Telephone: (613) 592-0084