

Published by the Center for Applied Linguistics for the Association for Computational Linguistics. EDITOR: David G. Hays. EDITORIAL ASSISTANT: Brian Phillips. SECRETARY: Jacquin Brendle. MANAGING EDITOR: A. Hood Roberts. ASSISTANT: Nancy Jokovich. EDITORIAL ADDRESS: Twin Willows, Wanakah, New York 14075. BUSINESS ADDRESS: 1611 North Kent St., Arlington VA 22209

NEWSLETTER OF THE ASSOCIATION FOR COMPUTATIONAL LINGUISTICS

VOLUME 11 - NUMBER 2

DECEMBER 1974

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P E R S O N A L   N O T E S

- CARROLL, JOHN B. To Psychometric Laboratory, University of North Carolina, Chapel Hill 27514. Formerly Educational Testing Service
- COLLINS, ALLAN M. Guggenheim Fellowship for work on a semantic theory and its implications for education.
- DAVIS, RUTH. Editorial in Science (11 Oct 74): Impermanent balance between man and computer. How the man-machine division of labor, not to say power, will end is not yet settled, but we may transcend ourselves and achieve a new mastery of our "personal environment".
- FURUGORI, TEIJI. Department of Information and Computer Science, Cleveland State University, Ohio 44115. Ph. D. 1974, State University of New York, Buffalo.
- KAY, MARTIN. To Xerox Palo Alto Research Center; home address 935 Peninsula Way, Menlo Park, California 94025. Formerly University of California, Irvine.
- KEENAN, EDWARD. To Department of Linguistics, University of California, Los Angeles 90024. Formerly Kings College, Cambridge.
- MOSKOVICH, WOLF. To Hebrew University, Jerusalem; home address 202 maon Beit Giora, Kiriat Yuval, Jerusalem, Israel. Formerly chief, information retrieval laboratory, Moscow Institute of Patent Information.
- SEDELOW, SALLY YEATES and WALTER A., JR. Both to the Division of Computer Research, NSF; home address 1415 31st St., Washington, 20007. On leave from University of Kansas, Lawrence.

**TUTORIAL ON  
COMPUTATIONAL  
SEMANTICS**

**DATE : MARCH 17 THROUGH 22, 1975**

**PLACE : LUGANO, SWITZERLAND**

**LANGUAGE : ENGLISH**

COMPUTATIONAL SEMANTICS DEALS WITH THE DEVELOPMENT OF THEORIES OF NATURAL LANGUAGE COMPREHENSION SUFFICIENTLY DETAILED TO BE IMPLEMENTED AS COMPUTER PROGRAMS. AS SUCH, IT IS A FIELD WHERE COMPUTER SCIENCE, LINGUISTICS, PSYCHOLOGY AND PHILOSOPHY MEET ON COMMON GROUND.

**FURTHER INFORMATION FROM:**

**INSTITUTE FOR SEMANTIC**

**AND COGNITIVE STUDIES**

**VILLA HELENEUM**

**CH - 6976 CASTAGNOLA**

**SWITZERLAND**

DIRECTORY OF WORKERS IN  
ARTIFICIAL INTELLIGENCE

Donald E. Walker, Stanford Research Institute, Menlo Park, California 94025, is compiling for the National Institute of Education a directory of AI researchers interested in modeling or otherwise explaining language processes.

*Anyone who should be listed and has not received a form from Dr. Walker can submit the following information:*

Name, Institution, Mailing Address, Telephone

Statement of major research interests in the area of artificial intelligence and language processing (200 words or less).

List of most important publications and reports in this area

Keywords to characterize personal interests:

<i>System building</i>	<i>Conversational analysis</i>
<i>Question answering</i>	<i>Problem solving</i>
<i>Speech understanding</i>	<i>Inference</i>
<i>Comprehension</i>	<i>Logic</i>
<i>World modeling</i>	<i>Deduction</i>
<i>Belief modeling</i>	<i>Induction</i>
<i>Planning</i>	<i>Syntax</i>
<i>Decision making</i>	<i>Semantics</i>
<i>Protocol analysis</i>	<i>Pragmatics</i>
<i>Discourse analysis</i>	<i>Language acquisition</i>
<i>Narrative analysis</i>	

*(Respondents are invited to add to this list.)*

## LETTERS

The Finite String publishes letters of reasonable length on topics relevant to computational linguistics. On occasion letters are reviewed by referees prior to publication.

Logos Development Corp.  
P.O. Box 62  
New Hampton, N.Y. 10958

Dr. Yorick Wilks' comments regarding the Logos Machine Translation System, published in Nov.-Dec. 1973 The Finite String (Vol. 10, Nos. 9-10) contain blatant untruths that should be corrected. In sum, he states that the Logos System has enjoyed such success because Logos has taken the option of translating... "such trivial material that the problems of natural language processing simply do not arise, or at least arise only in a trivial form."

It is difficult to imagine the source of such misinformation because nothing has been published or publicly revealed about the system's linguistic approach since the Company's infancy in early 1970, before the development of three generations of Logos machine systems, at an expenditure of two and a half million dollars. For the record, the Logos System does not predicate its success on the processing of constrained English. Even in its earliest days the system handled standard linguistic operations as active-passive and verb-process noun transformations and limited pronomial antecedence recognition.

As early as mid 1971, when the Logos II English-Vietnamese system was still in mid-development, no less a critic of MT than Wallace Sinaiko acknowledged in an Institute for Defense Analysis study (Paper P-761, August 1971) that (p.33) "translation by computer, or machine translation (MT) is surprisingly good from a research and development point of view. It is encouraging, we believe, that the present state of technology permits fairly sophisticated technical English to be processed by MT; resulting translations into Vietnamese can be read and understood by native readers of that language." Or again, speaking of tests showing the relative merit of human translation, post-edited MT, and unedited MT by the Logos System, (p. 22) "Performance under all language conditions was surprisingly similar and not significantly different for the tests on Chapters 1 and 3. This suggests that some material might be left unedited, particularly if it is not too technical."

Mr. Sinaiko's views were based on the Logos System's performance in translating the Air Force's Instrument Flying Manual, which was

hardly written in constrained English. The English-Russian System, reported on in the March-April TFS (Vol. 10, Nos. 3-4) translated texts (to the satisfaction of Soviet officials) that were taken from foundry specifications destined for the Soviet Union's Kama River Project.

The Logos III English-French System has been under contract to translate IBM computer manuals experimentally, with success. On the strength of its performance, Logos subsequently received a contract from the UN to install its English-French System for pilot translation experimentation. The System is now about to undergo optimization for use in bi-lingual Canada.

If Dr. Wilks feels MT systems should address language other than as it is encountered in the real world of Kama engineering specs, UN treatises, and AF training manuals, then, of course, there can be no argument with his views.

Concerning linguistics and the Logos System, the Company attributes the strength of its technology to the system's grammar and ultimately to the linguistic principles on which it is based. This grammar has been developed inductively through the processing of 5 million words (and over 100 concordances) of scientific, engineering, legal and economic/political texts, and through contrastive studies of English with Vietnamese, Chinese, Russian, French, Spanish and German.

The grammar makes use of transformational techniques for normalizing (a la Selig [sic] Harris) various constructions for semantic transformation purposes. Other than this, the grammar is a phrase-structure grammar with a high degree of development in word class sub-classifications. These sub-classifications (somewhat along the lines suggested by Chomsky in Aspects) are semanto-syntactic groupings, that is, semantic groupings in terms of syntactic behavior and effect. For example, over 100 semanto-syntactic subclassifications have been recognized and applied to verbs, representing, in effect, a systematic mapping of the intersection of syntax and semantics in English verbs.

Logos has refrained from publishing any accounts of its grammar in the interest of protecting a proprietary aspect of the Company's business. But in all fairness to ourselves, Prof. Wilks' unaccountable misrepresentations could not remain unanswered.

Bernard E. Scott  
President

P.S. Friends of Logos Development Corporation will be pleased to know that the Company is about to solve its recent financial difficulties through foreign commercial and governmental development contracts of healthy proportions. Logos regrets that it has had to go outside of the U.S. for recognition and support of a technology that in general has been too much maligned in the U.S., often unjustly, as the present case bears witness.

S O L A R    P R O J E C T

D I S T R I B U T E S   F I R S T   M A T E R I A L S

Tim Diller, John Olney, and Nathan Ucuzoglu have collected words in use by Speech Understanding Research projects, and begun constructing semantic analyses which will be available via ARPANET.

The files in October 1974 contained analyses of 150 words, combining material extracted from published sources with critical annotations by SOLAR analysts.

Another file contains definitions and comments for descriptive constants used in the semantic analyses.

A third file contains summary analyses, based on a search of philosophical literature, of such notions as abstract object, cause, event, intentional action, object, physical object, process.

A bibliography is in preparation.

*For further information, contact Diller at System Development Corp.  
Santa Monica, California*

## American Journal of Computational Linguistics

### NAS/NRC COMMITTEE: INTERNATIONAL SCIENTIFIC AND TECHNICAL INFORMATION PROGRAMS

Can the United States obtain a better return on the money it puts into international organizations? The National Science Foundation has asked the National Academy of Sciences - National Research Council to form a committee to examine programs for making information accessible.

The Committee met June 24-25 in Washington and adopted a program:

- Examine international nongovernmental information organizations from the US viewpoint
- Analyze UNISIST programs
- Consider ICSU's information programs
- Disseminate information about such programs to US participants in them
- Consider the needs of developing countries

The committee is also to oversee NAS membership in ICSU/AB and FID.

Organizing members are Scott Adams, chairman, Isaac L. Auerbach, Dale B. Baker, Milton Harris, Rutherford D. Rogers, Vladimir Slamecka, Kenneth W. Thomson; staff officer is Judith A. Werdel.

Additional members are Joshua Smith, A. Hood Roberts, and Donald E. Walker.

NATIONAL FEDERATION OF ABSTRACTING AND INDEXING SERVICES  
3401 Market Street, Philadelphia, Pennsylvania 19104

1975 M E E T I N G :

INFORMATION INTERFACES

Hospitality House  
Arlington, Virginia  
March 4 - 5

THE FOUR SESSIONS AND THEIR CHAIRMEN:

Bibliographic Control	<i>Jerrold Orne, University of North Carolina</i>
User Aspects	<i>Lee G. Burchinal, Office of Science Information Service, NSF</i>
Repackaging of Abstracts	<i>Burton Adkinson</i>
Document Access	<i>Gerald Sophar, National Agricultural Library</i>

PROGRAM CHAIRMAN:

*Ben H. Weil, Exxon Research and Engineering Company*

OVERLAP STUDY

The federation will examine lists of journals covered by 13 major science abstracting and indexing services in the U.S., and a statistical sample of articles from the journals. Support is provided by NSF.

INDEXING KIT FOR UNESCO

A pilot kit for training courses in indexing will be edited by Everett H. Brenner, American Petroleum Institute, with the help of Stella Keenan, University of Loughborough, England.

The kit will contain a glossary of terms, introduction to indexing, outline paper on vocabulary development, procedure for development and evaluation of an index, descriptive review of indexing systems, historical review of evaluation and testing, description of current developments, and annotated bibliography.

ON - LINE TERMINAL SEARCHING  
FOR REFERENCE LIBRARIANS

*Conference:* Graduate School of Library and Information Science  
Pratt Institute  
Brooklyn, New York 11205

*Contact:* Dr. Patricia Breivik, (212) 636-3702

*Date:* January 20-22, 1975

*Program:* A day of lectures followed by two days of training  
in the use of terminals.

*Lecturers:* Everett Brenner, manager, Central Abstracting and  
Indexing Service, American Petroleum Institute.  
He has lectured at Pratt for nine years and at the  
City University of New York, Graduate Division.

Martha E. Williams, director, Information Retrieval  
Laboratory, University of Illinois, Urbana. For  
15 years she was manager of information science,  
I.I.T. Research Institute, Chicago.

*Training:* Small groups with expert guidance. Searches in  
Chemical Abstracts using a natural language format;  
ERIC using a controlled vocabulary with a thesaurus;  
New York Times Information Bank.

1975 ANNUAL CONVENTION  
ASSOCIATION FOR EDUCATIONAL DATA SYSTEMS

*Theme* DISCOVERY: NEW WORLDS OF EDUCATIONAL DATA SYSTEMS  
*Date* April 28 - May 2, 1975  
*Place* Virginia Beach, Virginia  
  
*Scope* New educational applications of computers;  
research and development in eds,  
computer use in instruction, educational  
administration and research  
  
*Information* Duff Green III, Program Chairman  
University Sciences Forum  
1700 K Street, Northwest  
Washington 20006

PUBLICATION PROBLEMS

Science, the AAAS weekly, is suffering financial pains, according to Philip H. Abelson, Editor (22 Nov 74). The cost of paper, printing, and postage are up; advertising is down; and libraries--with their own problems--are beginning to drop expensive subscriptions. Abelson's editorial was triggered by a Conference on the Economics of Biomedical Publications held in October at the National Library of Medicine; there the American Chemical Society announced a 35% increase to institutional subscribers for 1975.

The AJCL format would help.

R E P O R T

3RD INTERNATIONAL SUMMER SCHOOL  
COMPUTATIONAL AND MATHEMATICAL LINGUISTICS

C.N.U.C.E. & IBM  
Pisa

August 12 - September 6  
1974

DIRECTOR: Antonio Zampoli

*Attendance was limited to about 200 persons*

COURSES

- M Gross: *Les fondements de la grammaire generative transformationnelle; Problemes de la localisation du sens une grammaire et dans un lexique formalises.*
- S. R. Petrick: *Introduction to LISP Programming language.*
- A. Zampolli: *Introduction to Logic, I.*
- E. Bach: *Semantics in generative grammar.*
- C. Fillmore: *Semantics.*
- B. Hall Partee: *Introduction to Logic, II; Logic and semantics.*
- M. Kay: *Automatic morphological, syntactic, and semantic analysis*
- J. Lyons: *Special spatio-temporal expressions, causality, mood and modality*
- T. Winograd: *Current topics in computational semantics.*
- W. Woods: *Advanced problems in syntax and semantics for intelligent machines*
- F. Kiefer: *Text theory.*
- C. Mueller: *Elements de statistique linguistique.*

REPORT ON THE 3RD INTERNATIONAL SUMMER SCHOOL  
 COMPUTATIONAL AND MATHEMATICAL LINGUISTICS . . . . .Continued

LECTURES

- |                 |   |
|-----------------|---|
| J. Allen        | <i>Automatic morphological analysis of English;<br/>Transformational Grammar Tester</i> |
| R. Martin       | <i>La notion de presupposition;<br/>Négation logique et negation linguistique</i>       |
| R. Simmons      | <i>Generation of language and pictures from a semantic data base</i>                    |
| E. Coseriu      | <i>La sémantique fonctionnelle</i>  |
| D. Hays         | <i>Cognitive Structures</i>   |
| A. Melby        | <i>Junction Grammar and Machine Assisted Translation</i>                                |
| B. Vauquois     | <i>Informatic System of Computational Linguistics</i>                                   |
| P. Sgall        | <i>Topic, Focus in generative description</i>   |
| P. Imbs         | <i>L'organisation sémantique interne des mots polysémiques</i>                          |
| F. Marcos Marin | <i>Bilinguisme et enseignement</i>  |
| E. Hajicova     | <i>Negation and Presupposition</i>  |
| Y. Wilks        | <i>A preferential, pattern seeking, semantics for natural language inference</i>        |

R E P O R T

INTERNATIONAL SUMMER SEMINAR

CONCEPTS OF AUTOMATIC PROCESSING OF  
NATURAL LANGUAGES

Institut für Informatik

Stuttgart.

August 13-17, 1974

Director: HANS-JOCHEN SCHNEIDER

*Attendance was limited to about 50 persons.*

V. S. CHERNIAVSKY (Technion Haifa, Israel) reviewed work in Russia and discusses the PUSTO-NEPUSTO (empty-notempty) information retrieval system. Documents and requests are represented by vectors of descriptors chosen currently from a list of around 3500, arranged in about 1,000 trees. The system is operational with a file of hundreds of thousands of documents; statistical analyses of its effectiveness have been made. The use of the system is less automatic than many western systems due to the lack of software and hardware in the USSR.

BIBLIOGRAPHY

Dobranov, I. S., D. G. Lakhuti, and G. A. Lesskis. One approach to the development of an automated IRS with a grammar (Statement of the problem and general principles for its solution). *Nauchno-Tekhnicheskaya Informatsiya*, Series 2, No. 6, 17-19, 1973.

Federov, E. B. An algorithm for constructing paradigmatic relations in descriptor IRSs (An experiment). *Nauchno-Tekhnicheskaya Informatsiya*, Series 2, No. 10, 24-27, 1973.

Lakhuti, D. G. and V. S. Cherniavsky. Problem of retrieval systems evaluation. Part 3. Effect of ambiguity of the relevant output on the significance of formal evaluations. *Nauchno-Tekhnicheskaya Informatsiya*, Series 2, No. 11, 10-15, 1971.

B. PHILLIPS (State University of New York, Buffalo) presented a model of cognitive knowledge developed by David G. Hays and a group of students. The model specifies a few types of nodes and a set of 20 or so arc labels; processes on networks are defined by reference to these node types and arc labels. Processes are classified as path tracing operations, which can be realized by a finite-state automaton, and pattern-matching operations, which require more powerful computation. T. FURUGORI has used the model to build a robot planner for car driving. M. WHITE is analyzing the abstract terminology of a New England commune. B. PHILLIPS is developing a theory of discourse coherence. R. REESE has considered the model for representation of plots in fiction. W. BENZON is applying the model to poetry at several levels of analysis.

#### BIBLIOGRAPHY

- Hays, D. G. *Mechanisms of language*. Manuscript, 1974.
- Hays, D. G. Types of processes on cognitive networks. *Proceedings of the 1973 International Conference on Computational Linguistics*. Casa Editrice Leo S. Olschki, Florence, 1974.
- Furugori, T. *A memory model and simulation of memory processes for driving a car*. Doctoral dissertation, SUNY Buffalo, 1974.
- White, M. Cognitive networks and the Age of Aquarius: Mapping the teleological beliefs of a millenarian community. In press.
- Phillips, B. Discourse coherence. *Proceedings of the 1973 International Conference on Computational Linguistics*. Casa Editrice Leo S. Olschki, Florence, 1974.
- Phillips, B. Topic analysis. In preparation.

G. SALTON (Cornell University) discussed the SMART information retrieval system, in particular the problem of choosing terms to form a set of descriptors. A document is represented by a point in an n-dimensional descriptor space. A good term to use as a descriptor maximizes document separation. Middle frequency terms can be used directly as descriptors. The problems are with high and low frequency terms. The solution is to combine high frequency terms into phrases, and to construct thesauri for low frequency terms.

#### BIBLIOGRAPHY

Salton, G. *A theory of indexing*. Technical Report TR 74-203. Department of Computer Science, Cornell University, Ithaca.

L. SIKLOSSY (University of Texas, Austin) discussed the LAWALY robot planning system. This generates a specialized set of procedures for each axiomatized world. This approach bridges the generality-power gap between planners for very general and for very specific worlds. Extensions of the LAWALY system were also presented: DISPROVER shows that impossible tasks in a world correspond to disprovable tasks in the model. Models for worlds in which a robot is not omnipotent, i.e. a world containing other robots or containing processes over which the robot has no control also extend the system.

#### BIBLIOGRAPHY

Siklossy, L., and J. Dreussi. An efficient robot planner which generates its own procedures. In *Proceedings of the Third International Joint Conference on Artificial Intelligence*, 1973.

Siklossy, L, and J. Roach. Model verification and improvement using DISPROVER. Technical Report TR-26, Department of Computer Science, University of Texas, Austin, July 1973.

Hendrix, G. Modelling simultaneous actions in a robot environment. Department of Computer Science, University of Texas, Austin, no date.

R. SIMMONS (University of Texas, Austin) reviewed major work in the USA. He presented his system for drawing pictures on a videoscreen of a clown and a pole, following input sentences given in natural language. The aim of the project is to construct a 'toy' which children can use to learn to correlate sentence structure and meaning by seeing visual representations of the content of their sentences. A transition-network parser produces statements in a LOGO-type procedural language that draw the pictures.

#### BIBLIOGRAPHY

- Walker, D. E. Automated language processing. In *Annual Review of Information Science and Technology*, 8, edited by C. A. Cuadra. American Society for Information Science, 1973.
- Hendrix, G. G., C. W. Thompson, and J. Slocum. Language processing via canonical verbs and semantic models. Technical Report NL 16, Department of Computer Sciences and CAI Laboratory, University of Texas, Austin, June 1973.

I N F O R M A T I C S   A N D   P H I L O L O G Y

CONFERENCE AT ROCQUENCOURT, 4-5 NOVEMBER 1974

The conference, organized by the Institut de Recherche d'Informatique et d'Automatique, dealt with analysis of vocabulary and grammatical structure, problems of criticism and interpretation, deciphering unknown languages, preparation of dictionaries, and linguistic description.

Chairman of the conference was Professor Marichal, head of History and Philology at the Ecole Pratique des Hautes Etudes. The program committee consisted of F. Charpin, M. Gross, A. Lentin, and M. Nivat.

Information about the proceedings can be obtained from IRIA, Domaine de Voluceau, 78150 Rocquencourt.

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A R I O S T O   C O N C O R D A N C E

1974 is the 500th anniversary of the birth of Ludovico Ariosto. A concordance comparing three drafts of Orlando Furioso (1516, 1521, 1532) is being prepared by two specialists from the University of Pavia under the direction of Cesare Segre.

Computations will be performed at C.N.U.C.E., Pisa, by Antonio Zampolli. The concordance is to be completed in 1975; plans were reported by Zampolli and Segre at a commemorative symposium in Reggio Emilia and Ferrara, October 12-16.

ROUND TABLE ON

ANALYTIC PROCEDURES  
AND VALIDATION METHODS  
IN THE STUDY OF TEXT DATA

Aix-en-Provence, December 11-13, 1974

Application of new methods of textual analysis has not yielded results of demonstrably higher quality. Many projects set out to treat the entire problem of discourse, literature, etc. Often no distinction is made between the formulation of hypotheses and the demonstration of their validity. The round table was planned to consider two general areas.

1. The study of certain classes of texts with a view to determining the linguistic characteristics of these classes by understanding their syntactic, stylistic, lexicosemantic, and logical aspects.
2. The study of text data vis-a-vis the utilization of information techniques (man-machine communication in natural language, simulation of reasoning, etc.) and the points of view of fields such as linguistics, logic, information theory, etc.
3. The study of text data as data particularly appropriate to diverse human disciplines, including psychology, sociology, philosophy, history, anthropology, etc.

Information about the round table can be obtained from  
Groupe de Recherche Informatique et Linguistique,  
7, Boulevard Paul d'Olonne  
13103 -Aix-en-Provence, France

The second sponsor of the meeting was the Centre National  
de la Recherche Scientifique through its Unite de Recherche Analyse  
Documentaire et Calcul en Archeologie,  
31 chemin Joseph Aiguier  
13274 Marseille Cedex 2

S I G L A S H : SPECIAL INTEREST GROUP ON  
LANGUAGE ANALYSIS AND  
STUDIES IN THE HUMANITIES OF THE  
ASSOCIATION FOR COMPUTING MACHINERY

SIGLASH publishes a Newsletter five times a year.  
Membership is \$4.00 for ACM members, \$2.00 for ACM student  
members, \$6.00 for persons not members of ACM, and \$11.00 for  
institutions.

Officers 1973 - 1975 are

Chairman	Michael Lesk, Bell Laboratories
Vice Chairman	Stephen Waite, Dartmouth College
Secretary	Robert Wachal, University of Iowa
Treasurer	Dolores Burton, Boston University
Editor	Karen Mullen, University of Iowa

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CONCEPT COLLECTION IN POLITICAL SCIENCE

George J. Graham, Vanderbilt University, is designing a  
file for computer processing at the Information Utilization  
Laboratory, Pittsburgh.

Each entry is expected to include quotations and sources,  
formal statements where applicable, some indication of the type  
of theory and level of abstraction to which the concept is relevant  
and information about indicators and operational measures.

His project is part of a program of conceptual and termin-  
ological analysis within the International Political Science  
Association and the International Studies Association.

1975 INTERNATIONAL CONFERENCE ON  
RELIABLE SOFTWARE

*Sponsors* IEEE Computer Society  
and its Reliability Group  
ACM SIGPLAN, SIGMETRICS  
National Bureau of Standards

*Date:* April 22-24, 1975

*Place:* International Hotel, Los Angeles

*General  
Chairmen:* M. L. Shooman  
Polytechnic Institute of New York  
333 Jay Street  
Brooklyn 11021

R. T. Yeh  
University of Texas  
Austin 78712

*Program  
Chairman:* Barry W. Boehm  
TRW Systems Group  
One Space Park, El/5017  
Redondo Beach, California 90278

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CONFERENCE:

DEVELOPMENTAL PSYCHOLINGUISTICS  
AND COMMUNICATION DISORDERS

*Sponsor* New York Academy of Science

*Date & Place* January 24-25, 1975  
Delmonico Hotel, New York

*Scope* Philosophy, psychology, linguistics,  
anthropology

*Information* Conference Department, NYAS  
2 East 63rd Street  
New York 10021 Tel: (212) 838-0230

NATIONAL SCIENCE FOUNDATION

EXCERPTS FROM THE ORGANIZATIONAL DIRECTORY

Director: H. Guyford Stever  
Assistant Director for National and International  
Programs: Thomas B. Owen  
...Office of Science Information Service...  
Assistant Director for Research: Edward C. Creutz  
...Division of Computer Research,  
Division of Social Sciences...

OFFICE OF SCIENCE INFORMATION SERVICE

*1900 Pennsylvania Avenue, N.W. Washington, D.C. 20550*

Head	<i>Lee G. Burchinal</i>	<i>632-5824</i>
Senior Staff Associate	<i>Andrew A. Aines</i>	<i>632-5836</i>
Staff Associate	<i>Robert S. Cutler</i>	<i>632-5836</i>
Staff Associate	<i>Eugene Pronko</i>	<i>632-5706</i>

National Information Program

Director	<i>Harold E. Bamford, Jr.</i>	<i>632-5800</i>
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User Support Program

Acting Director	<i>Joel D. Goldhar</i>	<i>632-5850</i>
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Research Program

Director	<i>Edward C. Weiss</i>	<i>632-5818</i>
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DIVISION OF COMPUTER RESEARCH

*1800 G Street, N.W., Washington, D.C. 20550*

Head	<i>John R. Pasta</i>	<i>632-5960</i>
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Computer Science and Engineering Section

Head	<i>Kent K. Curtis</i>	<i>632-7346</i>
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Theoretical Computer Science Program

Director	<i>Val G. Tareski</i>	<i>632-7346</i>
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Software and Programming Systems Program

Director	<i>Thomas A. Keenan</i>	<i>632-7346</i>
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Computer Systems Design Program

Director	<i>John R. Lehmann</i>	<i>632-7346</i>
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A A A S MEETING:

SCIENCE AND THE QUALITY OF LIFE

NEW YORK, JANUARY 26-31, 1975

*Exerpts from the program announcement*

INFORMATION TECHNOLOGY AND INDIVIDUAL PRIVACY

Monday morning, January 27, 1975

W. M. Carlson, IBM Corporation, arranger

Problems of science, technology, economics, and law.  
The danger of antiscientific reactions.

*Alan F. Westin, and others to be announced.*

URBAN INFORMATION SYSTEMS

Tuesday afternoon, January 28, 1975

Vivian S. Sessions, CUNY Graduate Center, arranger

Interaction between representatives of computer-based information systems and those who face real urban problems.

*Kenneth A. Gibson, D. Geoffrey Hayward, Joyce A. Healy, Elmer L. Struening, John C. Beresford, Joseph G. Coyne, Joshua I. Smith*

STRUCTURE OF HUMAN MEMORY

Wednesday morning and afternoon, January 29, 1975

Charles N. Cofer, Pennsylvania State University, arranger

Meaning and word recognition, modeling of short-term memory, perception and cognition, associative mechanisms, language processing, and retrieval from long-term memory.

*David E. Meyer, Roger W. Schvaneveldt, Kevin Gilmartin, Allen Newell, Herbert A. Simon, Donald A. Norman, Walter Kintsch, Terry Winograd, William K. Estes, Roger C. Schank, John R. Anderson, Richard C. Atkinson.*

C U R R E N T   B I B L I O G R A P H Y

Both the selection of material for this issue and the choice of subject categories are tentative. The opinions of readers will influence both in the future.

Completeness of coverage, especially for reports circulated privately, depends on the cooperation of authors. Summaries or articles to be summarized should be sent to the editorial office, Twin Willows, Wanakah, New York 14075.

Many summaries are authors' abstracts, sometimes edited for clarity, brevity, or completeness. Where possible, an informative summary is provided.

The Linguistic Documentation Centre of the University of Ottawa provides a substantial number of entries; AJCL gratefully acknowledges the assistance of Brian Harris and R. Laskowski.

*See the following frame for a list of subject headings with frame numbers.*

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General

COMPUTATIONAL AND MATHEMATICAL  
LINGUISTICS

*Proceedings of the International Conference on Computational  
Linguistics, Pisa, August 27 - September 1, 1973*

Antonio Zampolli, Editor  
C.N.U.C.E.

*Casa Editrice Leo S. Olschki  
Florence  
1974*

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	Lexicology	10 papers
	Text corpus editing	6 papers
	Semantical calculus	21 papers
	Quantitative description of language systems	13 papers
VOLUME 2:	Grammatical analysis	20 papers
	Meaning extraction	12 papers
	Translation	6 papers
	Text comparison	4 papers

*Each volume about 700 pages  
20,000 lire per volume*

General

P R I N C I P L E S  
O F C O N S T R U C T I N G  
L I N G U I S T I C M O D E L S

P. N. Denisov

JANUA LINGUARUM  
SERIES MINOR  
91

Mouton  
The Hague . Paris  
1973

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General

FUNCTIONAL GENERATIVE GRAMMAR  
IN PRAGUE

Prague Authors' Group

Edited by Wolfgang Klein and Arnim v. Stechow

Linguistik und Kommunikationswissenschaft 2

*Scriptor Verlag GmbH  
Dronberg/Taunus  
1973*

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General

## ABSTRACTS OF RESEARCH, JULY 1973 - JUNE 1974

Computer and Information Science Research Center  
Ohio State University  
Columbus 43210

Organization, objectives, scope, facilities, academic programs, interaction with the university and community, degrees awarded. Lists of courses offered, faculty, public seminars, related activities of the staff, publications, and technical reports.

Partial list of abstracts:

INFORMATION STORAGE AND RETRIEVAL (10 projects).

HUMAN INFORMATION PROCESSING (2 projects)

INFORMATION ANALYSIS

A general theory of information flow and analysis. M. C. Yovits and J. G. Abilock.

LINGUISTIC ANALYSIS

Parallel recognition of formal languages. J. Rothstein and M. Moshell.

On the syntactic structures of unrestricted grammars. H. W. Butteltmann.

Generalized finite automata on unrestricted syntactic structures. H. W. Butteltmann.

A formal theory of the syntax, semantics and translation of phrase-structure languages. H. W. Butteltmann.

Syntax-directed and semantic-directed translation of phrase structure languages. H. W. Butteltmann.

Semantic-directed translation--another approach. H. W. Butteltmann and A. Pyster.

Studies in decidability, existence, and effectiveness of translations on phrase-structure languages. H. W. Butteltmann and R. Krishnaswamy.

Some properties of syntax-directed translations. H. W. Butteltmann and F. J. Dickey.

The role of the nonterminal in language generation. H. W. Butteltmann and A. Pyster.

ARTIFICIAL INTELLIGENCE, MATHEMATICAL TECHNIQUES, SYSTEMS PROGRAMMING, COMPUTER NETWORKS (50 abstracts)

ANNUAL BULLETIN  
RESEARCH INSTITUTE OF LOGOPEDICS AND PHONIASTRICS

University of Tokyo

No. 8 April 1973 - June 1974

*A high voltage thin X-ray beam scanner for computer controlled radiography.* S. Kiritani, K. Itoh, and H. Imagawa. 1-5.

A flying spot scanner under computer control follows pellets placed on the tongue of the speaker.

*A preliminary study on the simultaneous recording of laryngeal muscle activities and the glottal shape during speech utterance.* S. Niimi and M. Sawashima. 19-22.

A study of voiceless consonants using fiberscope, electromyography, and sound spectrograph. A 16k PDP computes the averaged electromyogram envelope curve of each muscle.

*Formulation of the coarticulatory process in the formant frequency domain and its application to automatic recognition of connected vowels.* H. Fujisaki, M. Yoshida, and Y. Sato. 79-90.

Formant frequencies are extracted by successive approximations, synthesizing the spectral envelope from factors of vocal tract transfer function, glottal source and radiation, and miscellaneous. A tree of decisions using linear discriminant functions sorts isolated, stationary vowels. The coarticulatory process is modeled by the step response of a critically damped second-order linear system. The initial vowel is recognized as stationary; target formant frequencies are estimated for the other vowels from the same speaker; when the signal differs from the initial vowel sufficiently, the next vowel is determined by synthesis of trajectories to the four candidates. All vowels in 35 2-vowel samples by two speakers and in 71 3-vowel samples by one speaker were recognized correctly.

*Final report on the pronunciation test system.* Julie B. Lovins 99-108.

Diverse observations; the system was described in earlier reports.

*An approach to the abbreviation of code-strings for Chinese character identification.* Ryohei Kagaya and Yo Kobayashi. 109-114.

A stroke belongs to one of 6 classes, with one of 7 variations within the class; but only 17 strokes are defined. The strokes of a character are linked by operators that indicate contact points. Rules of naturalness permit suppression of many operators.

General

## ARTIFICIAL INTELLIGENCE

Nils J. Nilsson  
Artificial Intelligence Center  
Stanford Research Institute  
Menlo Park, California

*Invited paper, IFIP Congress 74. SRI Publication No. Z105*

This survey divides AI into four core topics (embodying the base for a science of intelligence) and eight applications topics (in which research has been contributing to core ideas). The paper discusses the history, the major landmarks, and some of the controversies in each of these twelve topics. Each topic is represented by a chart citing the major references. These references are contained in an extensive bibliography. The paper concludes with a discussion of some of the criticisms of AI and with some predictions about the course of future research.

General

## IF COMPUTERS CAN LEARN TO TALK SIMPLE ENGLISH--

*U. S. News & World Report, June 24, 1974, 86-87.*

Simpler programming is needed because of the lack of skilled programmers, the breadth of the market for computing services for untrained users, and the inadequacy of current software. IBM is described as preparing systems for announcement in 1974 - 1976.

General

## THE HUMANIST IN THE COMPUTER LAB

Joseph Raben  
Department of English, Queens College  
City University of New York, Flushing

*Visible Language, VIII, 2, 1974, 167-177*

The attempts so far made to utilize computers in studying the humanities have resulted more in a fundamental analysis of the subject areas themselves than in any significant results. The most substantial accomplishments to date have been the rationalized lists of words.

SOME LUCUBRATIONS AND SPECIFICATIONS  
FOR A NATURAL LANGUAGE ANALYZER

John B. Smith  
Department of English and the Computation Center  
Pennsylvania State University

*Computer Studies in the Humanities & Verbal Behavior 4,2, 91-96*  
*August 1973*

The kinds of problems to which the computer has been applied in natural language analysis; difficulties with existing programming languages and systems; some suggestions for a system that would make analyses of this sort more practical. Associative processing.

Experimental phonetics

## COMPUTATIONAL PROCESSING OF PALATOGRAPHIC PATTERNS

O. Fujimura, I. F. Tatsumi and R. Kagaya  
Research Institute of Logopedics and Phoniatics  
Faculty of Medicine  
University of Tokyo

*Journal of Phonetics*, 1, 1, 47-54, January 1973

The time courses of articulatory movements and their random variation have been studied by recording palato-lingual contact patterns by use of a thin artificial palate with a number of implanted electrodes. The data were obtained from one subject for 25 repeated utterances of a carrier sentence in which a nonsense Japanese word of the form /aCa/ was embedded, where C represented one of nine consonants characterized by tongue tip articulations. Quantitative results were obtained by recording, in real time, both the digitized palatal signals and analog speech waveforms and then processing the data in a small digital computer, deriving in particular four characteristic patterns for each consonant. The tense-lax characteristics of the Japanese /t/ and /d/ are briefly discussed as well as the articulatory characteristics of the flap /r/.

ON THE AUTOMATIC RECOGNITION OF CONTINUOUS SPEECH:  
IMPLICATIONS FROM A SPECTROGRAM-READING EXPERIMENT.

Dennis H. Klatt and Kenneth N. Stevens  
Research Laboratory of Electronics,  
Department of Electrical Engineering  
Massachusetts Institute of Technology  
Cambridge

*IEEE Transactions on Audio and Electroacoustics*, AU-21, 3,  
June 1973

An experiment in which the authors attempted to recognize a set of unknown sentences by visual examination of spectrograms and machine-aided lexical searching. Nineteen sentences representing data from five talkers were analyzed. An initial partial transcription in terms of phonetic features was performed. The transcription contained many errors and omissions: 10% of the segments were omitted, 17% incorrectly transcribed, and an additional 40% transcribed only partially in terms of phonetic features. The transcription was used to initiate computerized scans of a 200-word lexicon. A majority of the search responses did not contain the correct word. However, following extended interactions with the computer, a word-recognition rate of 96% was achieved by each investigator for the sentence material. Implications for automatic speech recognition are discussed. In particular, differences between phonetic characteristics of isolated words and of the same words when they appear in sentences.

AN ALGORITHM FOR LOCATING THE BEGINNING AND END OF AN UTTERANCE  
USING ADPCM CODED SPEECH

L. H. Rosenthal, R. W. Schafer, and L. R. Rabiner  
Bell Laboratories  
Murray Hill, N.J.

*The Bell System Technical Journal* 53,6, 1974 1127-1135

A simple algorithm based on the fact that the code words for an adaptive differential (ADPCM) representation of speech exhibit considerable variation among all quantization levels during both voiced and unvoiced speech intervals while, because of a constraint on the minimum step size, during silent intervals the code words vary only slightly within the smallest quantization steps. The use of the algorithm is illustrated for automatically locating the beginning and end of vocabulary entries for a computer voice response system.

Speech RecognitionAUTOMATIC SPEAKER IDENTIFICATION USING NASAL SPECTRA  
AND NASAL COARTICULATION AS ACOUSTIC CLUES

Lo-Soun Su, and K. S. Fu  
School of Electrical Engineering  
Purdue University  
Lafayette, Indiana

Report No. TR-EE73-33 AFOSR-TR-74-0114, September 1973

Nasal consonants prove best for speaker identification and words, least favorable. A new approach which uses the statistical properties of the nasal spectra was used to study the coarticulation of nasal consonants with vowels in isolated /h CVd/ utterances. The differences between the mean spectra of nasals followed by back vowels were used as the acoustic measure of the coarticulation of (m,n) and the following vowel context (V). The coarticulation between (n) and (V) was found to be about 30 percent of that between (m) and (V). Strong speaker idiosyncratic characteristics of the coarticulation process were found. Speaker identification was performed using the (m) coarticulation measure as an acoustic clue along with a correlation decision criterion. [AD-773 772/9GA; PC \$9.25, MF \$1.45]

## SYLLABLE DETECTION IN CONTINUOUS SPEECH

D. C. Sargent, K. P. Li, and K. S. Fu  
School of Electrical Engineering  
Purdue University  
Lafayette, Indiana

Report No. AFOSR-TR-74-0111, October 1973

Machine extraction of the acoustic correlates of stress presupposes the ability of the machine to detect each syllable in a speech passage. Knowledge about the extent of the vocalic portion of each syllable is required for such correlates as syllable duration, or changes in intensity and voice fundamental frequency within the syllable. The syllable detection program described in this paper was developed to provide such syllable information. [AD-773 776/0GA; PC \$4.00, MF \$1.45]

## Speech Recognition

### A PROCEDURE FOR ADAPTIVE CONTROL OF THE INTERACTION BETWEEN ACOUSTIC CLASSIFICATION AND LINGUISTIC DECODING IN AUTOMATIC RECOGNITION OF CONTINUOUS SPEECH

C. C. Tappert and N. R. Dixon  
IBM Thomas J. Watson Research Center,  
Yorktown Heights, N.Y.

*Artificial Intelligence* 5, 1974, 95-113

An adaptive-control procedure is intended to improve both acoustic analysis and linguistic decoding in automatic recognition of continuous speech by bringing into agreement data available at each of these stages. Specifically, hypotheses are formed by the decoder concerning the phonetic transcription derived during acoustic analysis. The procedure then accesses and utilizes relevant acoustic data in an attempt to verify or reject these hypotheses. Depending on the success of such attempts, actions are taken to constrain the decoding in subsequent processing iterations. Preliminary results are presented and discussed.

### A SUMMARY OF SPEECH RESEARCH ACTIVITIES IN FRANCE

Speech Communication Group  
French Language Acousticians Association (GALF)  
Centre National D'Etude des Telecommunications  
Departement E.T.A., Lannion

*IEEE Transactions on Acoustics, Speech, and Signal Processing*,  
*ASSP-22*, 4, August 1974, 268-272

The Groupement des Acousticiens de Langue Française (GALF) is an acoustical society composed of about 650 members (engineers, audio-phonologists, linguists, phoneticians, physicists, manufacturers, etc). Within the GALF, there are specialized groups corresponding to different areas of the acoustic field (Audition-Phonation, Electroacoustics, Musical Acoustics, Aeronautical Acoustics, etc.). The Speech Communication group was created in 1970, and about 100 researchers participate in its activities. This paper provides information on the research activities of French groups in the field of speech communication. In particular, the groups of speech analysis, synthesis, perception, recognition. A general bibliography with the main and recent publications of the groups is given.

Speech Recognition

## AN ON-LINE SPEECH INTELLIGIBILITY MEASUREMENT SYSTEM

Arun Agrawal and Wen C. Lin  
 Department of Computing and Information Science  
 Case Western Reserve University  
 Cleveland, Ohio

*IEEE Transactions on Acoustics, Speech, and Signal Processing,*  
 ASSP-20, 3, June 1974, 203-206

A computer administers the test, records the listener response, and automatically evaluates it on-line. This makes the intelligibility testing conditions uniform at all times and the test more efficient compared to conventional methods. The test words are presented in random scramblings by using a shuffling algorithm. The listener's response is entered via a graphic tablet. The response evaluation is based on the similarity of sounds and not of spellings. The system is being used in the development and evaluation of analysis-synthesis type of speech compression systems and for identifying perceptually important parameters from the linear prediction model of speech. Adaption of this system to various speech perception experiments is also discussed.

AN ALGORITHM FOR AUTOMATIC FORMANT EXTRACTION  
 USING LINEAR PREDICTION SPECTRA

Stephanie S. McCandless  
 Lincoln Laboratory  
 Massachusetts Institute of Technology  
 Lexington, Mass

*IEEE Transactions on Acoustics, Speech, and Signal Processing,*  
 ASSP-22, 2, April 1974, 135-141

An algorithm finds the frequency and amplitude of the first three formants during all vowel-like segments of continuous speech. It uses as input the peaks of the linear prediction spectra and a segmentation parameter to indicate energy and voicing. Ideally, the first three peaks are the first three formants. Frequently, however, two peaks merge, or spurious peaks appear, and the difficult part is to recognize such situations and deal with them. The general method is to fill formant slots with the available peaks at each frame, based on frequency position relative to an educated guess. Then, if a peak is left over and/or a slot is unfilled, special routines are called to decide how to deal with them.

Speech RecognitionINTERACTION BETWEEN SEGMENTAL AND NONSEGMENTAL FACTORS  
IN SPEECH RECOGNITION

Björn E. F. Lindblom and Stig-Göran Svensson  
Department of Phonetics      Department of Speech Communication  
Stockholm University          Royal Institute of Technology  
Fack, Stockholm                  Stockholm

*IEEE Transactions on Audio and Electroacoustics*, AU-21, 6,  
December 1973

Spectrograms of Swedish utterances can be read with great accuracy under nontrivial conditions, attributable primarily to the development of a formalized strategy designed so that spectrogram readers can derive information on certain grammatical features of an utterance: word class, word boundaries, endings, and function elements. The input to this strategy consists of segmental phonetic features extracted from the spectrographic display, and information on prosodic features such as stress and tonal accent, which is specified on the spectrogram for each syllable. An experimental situation is thus created that differs from the informal recognition of unknown utterances from spectrograms. A subject can base his final identification of lexical items not only on segmental phonetic features but also on an error-free specification of prosodic features, and, in so far as he has been able to use the strategy successfully, on grammatical information. Experimental results indicate that subjects improve their performance markedly with the aid of the strategy. Attention is drawn to the important role that grammar and prosody appear to play in these experiments and to their implications for future work.

## MULTIDIMENSIONAL REPRESENTATION OF PERSONAL QUALITY OF VOWELS AND ITS ACOUSTICAL CORRELATES

Hiroshi Matsumoto, Shizuo Hiki, Toshio Sone, and Tadamoto Nimura  
Research Institute of Electrical Communication  
Department of Electrical Engineering  
Tohoku University  
Sendai, Japan

*IEEE Transactions on Audio and Electroacoustics*, AU-21, 5  
October 1973

The personal quality of sustained vowels uttered by eight male talkers was represented multidimensionally in a psychological auditory space (PAS) by means of Kruskal's multidimensional scaling procedure based on the perceptual confusion in talker discrimination tests. Physical properties of vowels were analyzed in terms of elementary acoustical parameters: formant frequencies, slope of glottal source spectrum, mean fundamental pitch frequency, and rapid fluctuation of fundamental pitch period. Relationship between the configuration on the PAS and the acoustical parameters was examined through multiple correlation and regression analysis. The contribution of those acoustical parameters to the personal quality of the five Japanese vowels and the relative contributions of the vocal tract and the glottal source characteristics are demonstrated quantitatively. Results obtained partially by utilizing hybrid voices in which the source wave or the formant frequency pattern was interchanged among different talkers.

## THE USE OF SPEECH FOR MAN-COMPUTER COMMUNICATION

Rein Turn  
Rand Corporation  
Santa Monica, California

*Report No. R-1386-ARPA, January 1974*

The intrinsic characteristics and the associated attractive features and problem areas of speech as a man-computer communication channel. Among the attractive features of speech and auditory channels are independence of visual and manual channels, omnidirectional nature of speech propagation, ability to communicate simultaneously with men and machines, and potential for using a telephone instrument as a complete computer terminal. Problem areas include incomplete knowledge of linguistic and semantic aspects of speech processing, lack of effective techniques of acoustic signal processing and need for large amounts of digital processing. It is expected that results of current large speech understanding research projects and advances in digital technology should, in a few years, permit economically attractive implementation of speech-based man-computer interfaces.

## A LOCALLY-ORGANIZED PARSER FOR SPOKEN INPUT

Perry Lowell Miller  
Massachusetts Institute of Technology  
Cambridge

*Communications of the Association for Computing Machinery, 17, 11, 621-630, November 1974*

The parser is designed for use in a continuous speech recognizer. It processes a string of phonemes which contain ambiguity and error. Each section of input is matched against words in a dictionary, and a measure of 'phonetic distance' between them is made. Likely words have low phonetic distance. Good matches form 'islands of reliability'. Heuristic routines direct matching in areas between and around words found. Partial parse trees are formed for each proposed string of words using an augmented transition network grammar. This grammar is locally organized in the sense that it processes the reliable substrings rather than sentences. The grammar is further used to predict connections between partial parse trees. More word matches are then sought in syntactic categories indicated by the connections.

Speech Synthesis

## READING ALOUD BY COMPUTER

Dennis L. Meredith  
News Office  
Massachusetts Institute of Technology  
Cambridge

*Computers and People*, 23, 9, 22-23, &33, September 1974

The first stage of the project, by Jonathan Allen, takes input typewritten words, segments them into morphs and applies letter-to-sound, morphophonemic and lexical stress rules to produce phonetic symbols.

Dennis Klatt's computer model of the human vocal system transforms the phonetic symbols into control instructions for the model. At present only word pronunciation is performed. To become more natural, phrase and sentence structure must be considered. A parser is being developed that searches exhaustively first for phrases, and only later seeks to link phrases.

Text InputAN OVERVIEW OF DEVICES FOR PREPARING LARGE NATURAL LANGUAGE  
DATA BASES

Ann Porch  
Southwest Regional Laboratory for Educational Research  
and Development  
Los Alamitos, California

*Computer Studies in the Humanities and Verbal Behavior* 4,2,81-89  
August 1973

Techniques for preparing a large file of natural language:  
dollar cost, ease of editing, time consumption, facility for in-  
sertion of identifying information within the text, and updating  
of a text by merging. MTST and Telterm2 are two highly effective  
methods for text preparation.

OrthographyENCODING OF THE GENERALIZED ALPHABET OF WRITTEN ROMANIAN  
FOR THE IRIS 50 (FELIX C-256) COMPUTER. I. THE SUBSTANTIVE

[CODAGE DE L'ALPHABET GÉNÉRALISÉ DU ROUMAIN ECRIT POUR L'ORDINATEUR  
IRIS 50 (FELIX C-256). I. LE SUBSTANTIF]

Minerva Bocşa  
University of Timișoara  
Romania

*Cahiers de Linguistique Théorique et Appliquée*, 10, 2, 139-151, 1973

The inflection of Romanian nouns involves such alternations as a~a, t~t, a~e, o oa, and l~ø. Assign a unique internal code to each alternation, using one byte to encode type of alternation and one to enumerate alternations within the type. An astute assignment of code values permits comparison of a dictionary entry with an inflected form, using arithmetic addition to construct the possible textual matches for any alternation.

## PRINTED TEXT DISCRIMINATION

Emily G. Johnson

*Computer Graphics and Image Processing* 3, 1, 83-89, 1974

A computer program which can distinguish printed text from photographs, line drawings, and other non-text material is discussed. Recognition of text is based on the stripe-like texture of printed matter.

OrthographyA BIBLIOGRAPHY IN CHARACTER RECOGNITION:  
TECHNIQUES FOR DESCRIBING CHARACTERS

R. Shillman, C. Cox, T. Kuklinski, J. Ventura, M. Eden, B. Blesser  
Cognitive Information Processing Group  
Massachusetts Institute of Technology  
Cambridge

*Visible Language*, 8, 2, 151-166, 1974

A bibliography is presented in the field of character recognition. Many of the references are from the fields of engineering and psychology and deal with various techniques for describing machine and hand-printed characters.

Lexicography

## RAND CORPORATION DATA IN SYSTRAN, VOLUME 2

Peter P. Toma, and Ludek A. Kozlik  
Latsec Inc.  
La Jolla, California

Report No. RADC-TR-73-262-Vol-2, August 1973

Some empirical findings based on a million-word Russian corpus with syntactic annotations produced by the Rand Corporation. Text statistics: high frequency wordlists in descending frequency order as well as alphabetical order for both individual and combined subject matters. [AD-769 560/4GA; PC \$8.00, MF \$1.45]

## A NEW COMPUTER FORMAT FOR WEBSTER'S SEVENTH COLLEGIATE DICTIONARY

Donald Sherman  
Department of Linguistics  
University of California  
Berkeley

*Computers and the Humanities*, 8, 1, 21-26, January 1974

Author's goals are to simplify computer access to Webster's Seventh by designing a new record structure for the data, and also to use Machine Readable Catalog (MARC) project standards and conventions to guide and control the record definition process, with the ultimate aim of using MARC software systems for large-scale data analysis and retrieval. A new record format WEBMARC is defined and a program developed to convert existing Webster's Seventh tapes to the new WEBMARC structure.

A STRING GRAMMAR FOR FRENCH:  
DISTRIBUTIONAL ANALYSIS

Morris Salkoff  
National Scientific Research Council  
Paris

Monographs in Mathematical Linguistics, 6

DUNOD  
Paris-Bruxelles-Montreal  
1973

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A STRING GRAMMAR FOR FRENCH :  
DISTRIBUTIONAL ANALYSIS

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Une grammaire en chaîne  
du français

ISBN 2-04-007733-2

## SYNTACTIC COMPLEXITY

Barry K. Rosen  
 IBM Thomas J. Watson Research Center  
 Yorktown Heights, N.Y.

*Information & Control, 24, 4, 305-335, April 1974*

Several measures of syntactic complexity in mathematical linguistics allow infinitely many sentences to share a complexity value. Thus there is doubt about the existence of bounds on the memory requirements of parsing mechanisms in terms of the complexities of their inputs. This paper establishes the existence of such bounds for all measures which satisfy certain postulates. The general theorems are applied to familiar measures of depth, nesting and self embedding, as well as to a new measure. The methods of proof lead to unexpected linguistic interpretations of the results.

## EMBEDDED PRONOUN REFERENCE

Vern Poythress  
 Westminster Theological Seminary

*Information & Control, 24, 4, 336-357, April 1974*

This paper gives a formal rule for calculating the referents of English personal pronouns when such pronouns occur in certain fixed ways in direct annotations, direct annotations of direct annotations, direct annotations of direct annotations of direct annotations, etc. The rule of reference can be expressed in the form of an informal computations method, an automaton, or an algebraic formalism, all of which result in the same output. The automaton and the algebraic formalism can be so constructed that they reject ungrammatical annotations.

Grammar

## RAND CORPORATION DATA IN SYSTRAN, VOLUME 1

Peter P. Toma and Ludek A. Kozlik  
Latsec Inc.  
La Jolla, California

Report No. RADC-TR-73-262-Vol-1, August 1973

Some empirical findings based on a million-word Russian corpus with syntactic annotations. Produced by the Rand Corporation. Since all syntagmas are explicitly marked in the Rand data base, little or no contextual reference is necessary in order to establish semosyntactic relationships that may be utilized as the most essential components of an automatic parser for S+T text. Text inventories of lexical items are given by syntactic type, for example, subject-predicate. A list of words inferring no relationship but essential to the parsing procedure is included. Ellipsis and apposition are also described. [AD-769 551/3GA· PC \$6.25, MF \$1.45].

## GRAMMAR FOR THE PEOPLE: FLOWCHARTS OF SHRDLU'S GRAMMAR

Andee Rubin  
Artificial Intelligence Laboratory  
Massachusetts Institute of Technology  
Cambridge

Report No. AI-Memo-282, March 1973

The grammar which SHRDLU uses to parse sentences is outlined in a series of flowcharts which attempt to modularize and illuminate its structure. In addition, a short discussion of systemic grammar is included. [AD-773 567/3GA; PC \$3.25, MF \$1.45]

ParsersA METALANGUAGE FOR EXPRESSING GRAMMATICAL RESTRICTIONS  
IN NODAL SPANS PARSING OF NATURAL LANGUAGE

Jerry Robert Hobbs  
New York University

*Doctoral dissertation, 1974*

Earley's parsing algorithm produces all parses in parallel in time  $n^3$ , and yields a convenient representation of ambiguity. Candidates lists constrain possible interpretations to those consistent with the interpretations of earlier parts of the input. This dissertation uses Sager's English grammar. Candidates lists save up to 50% in space and time.

Nodal spans parsing requires that restrictions act strictly locally. A metalanguage for expressing restrictions associates with each node in the parse tree a word in the input string as its core and a set of flags which signal structural features in the subtrees below the node. [University Microfilms Order No. 74-18, 167, 272 pages]

Semantics

## REPRESENTATION AND CONSTRUCTIBILITY OF SEMANTIC RELATIONS

Frank George Pagan  
University of Toronto

*Doctoral dissertation, 1972*

A methodology for computer-aided construction of graph structures representing semantic relations defined on the denotative lexical items of a natural language: compatibility and hyponymy; comparisons with other semantic models; semi-automatic discovery algorithms.

Comprehension

THE MARYSIA SYSTEM	<i>Opis systemu MARYSIA</i>
I. SCRIPTS AND SCREENPLAYS <i>Report No. 41</i>	<i>I. Zasady pisania scenariusza i scenopisu</i>
II. DICTIONARY LOADING <i>Report No. 42</i>	<i>II. Wprowadzanie haseł do systemu</i>
III. GRAMMAR <i>Report No. 43</i>	<i>III. Tworzenie części gramatycznych słowników systemu</i>

Janusz St. Bien, Witold Łukaszewicz, and Stanisław Szpakowicz

*Computation Centre  
Warsaw University*

Marysia is a general-purpose, morphology-based, table-driven computer system for conversing in inflexional languages, e.g. Polish. It is an interpreter of exchangeable scripts, supplemented by auxiliary programs called screenplays. Part I describes the syntax and semantics of scripts and screenplays as implemented in an experimental version for the GIER computer; they are patterned after Weizenbaum's ELIZA. A script consists of decomposition and composition rules; a screenplay is a counterpart of the program part of an ELIZA script. However, rules can refer to linguistic units as well as to some sets of them described by means of morphological coordinates. It is possible to check syntactic properties, eg. agreement or government. Part II is for those who write a model of natural language. The dictionary consists of a lexicon, linker, and index. The description of an item supplied the loader consists of syntax written in BNF and a short outline of semantic features. The BNF is in most cases compatible with format of input data for the loading programs. Part III describes grammar in the lexicon. Preparation of tables of finite automata and list of morphological endings. The syntax of each segment of the grammar is given in BNF.

Comprehension

## A METALANGUAGE FOR SYSTEMATIC RESEARCH ON HUMAN COMMUNICATION VIA NATURAL LANGUAGE

Harold B. Pepinsky  
Departments of Psychology, and Computer and Information Science  
Ohio State University  
Columbus

*Journal of the American Society for Information Science, 25,1,  
59-69 January - February 1974*

Systematic research on human communication will be enhanced by access to a metalanguage, which analyzes natural language texts rapidly and accurately into their structural counterparts. A rationale for constructing the metalanguage is provided in the context of a long range program of research, and illustrated by reference to an existing Computer-Assisted Language Analysis System (CALAS) for use with English language texts. Such a metalanguage has immediate practical applications. Its underlying rationale may also be extended to encompass the study of policy-oriented communications among persons or groups within or across human cultures.

## MECHANICAL INFERENCE PROBLEMS IN CONTINUOUS SPEECH UNDERSTANDING

W. A. Woods and J. Makhoul  
Bolt Beranek and Newman inc.  
Cambridge, Mass.

*Artificial Intelligence, 5, 1, 73-91, 1974*

Experiments by Klatt and Stevens at MIT indicate that the process of deciphering the content of spoken sentences requires a close interaction between the acoustic-phonetic analysis of the speech signal and higher level linguistic knowledge of the listener. This paper describes a technique of "incremental simulation", used to discover the different roles of syntactic, semantic, pragmatic, and lexical information in this process and to evolve effective strategies for applying these different types of knowledge in a computer system for understanding continuous speech. Two examples illustrate situations in which the different sources of information make their contributions, and the types of probabilistic, plausible inference techniques which are required to take advantage of them. [BBN Report No. 2565]

## AN ALGORITHM FOR GENERATING STRUCTURAL SURROGATES OF ENGLISH TEXT

Suzanne Marvin Strong  
Computer and Information Science Research Center  
Ohio State University  
Columbus

Report No. OSU-CISRC-TR-73-3, April 1973

The surrogate makes explicit three important properties of language: context, syntactic function, and case role. The contextual properties of the surrogate differ markedly from those of linear strings (sentences) from which they are derived. Thus the relationships between the elements of text are made explicit and readily discernible in the surrogate. The construction and organization of the surrogates is syntactically based. Thus the shape of a graph is determined by the syntax of the sentence. The values associated with its nodes and edges are determined by the vocabulary. Whereas syntax defines relations among the elements of text, case roles characterize those relations. Such characterizations, in turn, make possible automatic 'judgments' concerning specific elements of the structural surrogates using the results of a syntactic analysis system described elsewhere. [PB-227 395/1GA; PC \$10.50, MF \$1.45]

## COMPUTER SOLUTION OF VERBAL ANALOGY PROBLEMS

Francis D. Tuggle, Daniel Moore, Stanley C. Vestal, & Richard Isaacs  
School of Business/Department of Computer Science  
University of Kansas

*Computer Studies in the Humanities and Verbal Behavior* 4,2,97-111  
August 1973

A computer program, called TP for Test Program successfully solves verbal analogy problems of the form "A is to B as C is to which of 1,2,3,4,5?" with a minimum of memory processes. TP is modelled after Evans' ANALOGY geometric analogy computer program.

ComprehensionNATURAL LANGUAGE, LINGUISTIC PROCESSING, AND SPEECH UNDERSTANDING:  
RECENT RESEARCH AND FUTURE GOALS

Allen Klinger  
Computer Science Department  
University of California  
Los Angeles

*The Rand Corporation, R-1377-ARPA, 1973  
Santa Monica, California*

Conversational systems: ELIZA, STUDENT, SIR, CONVERSE.  
Deductive systems: QA4, Woods, PLANNER, CONNIVER. Data structure  
and deep structure: Thompson, Shapiro, Winograd, Woods, Plath,  
Simon. Parsing. Miscellaneous. Speech processing: an idealized  
system; evaluation. Research goals.

Inference**MRPPS - AN INTERACTIVE REFUTATION PROOF PROCEDURE SYSTEM  
FOR QUESTION-ANSWERING**

Jack Minker, James R. McSkimin, and Daniel H. Fishman  
Department of Computer Science  
University of Maryland, College Park

*International Journal of Computer and Information Sciences*, 3,2,  
1974, 105-122

The Maryland refutation proof procedure system (MRPPS) is an interactive system which gives the user the ability to create and maintain a core-bound data base and to input queries either as well-formed formulas in the first-order predicate calculus or as clauses. Components: (1) inference rules, many of which are based on the resolution principle; (2) a search strategy for heuristically determining the sequence in which to select base clauses and to perform deductions on clauses already generated; and (3) a base clause selection strategy that uses heuristic and semantic information for determining which data axioms and general axioms are to be brought to bear on the problem.

**A MAN - MACHINE THEOREM-PROVING SYSTEM**

W. W. Bledsoe and Peter Bruell  
University of Texas  
Austin,

*Artificial Intelligence*, 5, 51-72

A man-machine theorem-proving system has been used to prove a few theorems in general topology. The theorem (or subgoal) being proved is presented on the scope in its natural form so that the user can easily comprehend it and, by a series of interactive commands, can help with the proof when he desires. A feature called DETAIL allows the human to interact only when needed and only to the extent necessary for the proof. The program is built around a modified form of IMPLY, a natural-deduction-like theorem proving technique which has been described earlier. A few examples of proofs are given.

## NATURAL LANGUAGE INFERENCE

Yorick Wilks  
Department of Computer Science  
Stanford University  
California

*Reprint No. STAN-CS-73-383, AIM-211, August 1973*

The way in which a preference semantics system for natural language analysis and generation tackles anaphoric inference problems (finding the correct referent for an English pronoun in context) requiring either analytic (conceptual) knowledge of a complex sort, or requiring weak inductive knowledge of the course of events in the real world. The method employed converts all available knowledge to a canonical template form and endeavors to create chains of non-deductive inferences from the unknowns to the possible referents. [AD-769 673/5GA; PC \$3.00, MF \$1.45]

## SYNTAX-DIRECTED CONCEPT ANALYSIS IN THE REASONING FOUNDATIONS OF MEDICAL DIAGNOSIS

Robert S. Ledley

*Computers in Biology and Medicine, 3, 89-99, 1973*

How do physicians handle medical diagnosis? They obviously do not remember all possible symptom complexes associated with a disease. A mathematical formalism simulates the implicit reasoning processes utilized by a physician in handling the problem of the multitude of symptom complexes. This formalism can itself be used to program a computer to more easily process symptom complexes as an aid to medical diagnosis.

A NUCLEUS OF A THEOREM-PROVER DESCRIBED IN ALGOL 68

Jaques Cohen, Laurent Trilling, and Peter Wegner

*International Journal of Computer and Information Sciences* .3, 1,  
1-31, 1974

The tree method is a variant of Beth's semantic tableaux. The presentation of the ALGOL 68 programs enables one to evaluate the facilities available in that language for expressing symbolic manipulation algorithms. The relationship between the tree method and resolution-based methods of theorem-proving is briefly discussed.

Instruction

## CASE - A NATURAL LANGUAGE COMPUTER MODEL

William G. Harless, Gary G. Drennon John J. Marxer, Judith A. Root,  
Linda L. Wilson and George E. Miller  
Center for Educational Development  
University of Illinois College of Medicine  
Chicago

*Computers in Biology and Medicine, 3, 227-246, 1973*

A computer-aided simulation of the clinical encounter (CASE) offers a student the opportunity to assume the role of a practicing physician, making clinical decisions and observing the consequences. A solution to the natural language problem allows the student to interact with any CASE without being restricted in the use of his own language for inquiry.

## GENESYS - A GENERATING SYSTEM FOR THE CASE NATURAL LANGUAGE MODEL

William G. Harless, Gary G. Drennon, John J. Marxer, Judith A. Root,  
Linda L. Wilson and George E. Miller  
Center for Educational Development  
University of Illinois College of Medicine  
Chicago

*Computers in Biology and Medicine, 3, 247-268, 1973*

A library of computer-aided simulations of the clinical encounter, CASE, is being developed using GENESYS, a semi-automatic generating system. Three essential phases are (1) interrogation, (2) generation, and (3) integration. A Coursewriter III program called MREC (medical record entry course) interrogates the author at a terminal, gathering information which is subsequently processed by a series of PL1 programs to form a CASE.

Instruction

## ATS IN EXPOSITION

W. D. Hagamen, D. Linden, M. Leppo, W. Bell, and J. C. Weber  
Department of Anatomy  
Cornell University Medical College  
New York City

*Computers in Biology and Medicine*, 3, 205-226, 1973

ATS (A Tutorial System) is written in APL/360. An author interrogation program interviews the author in English and formats his tutorial for him, and a tutorial supervisor program interfaces with the students. The supervisor program contains many features of machine intelligence (a knowledge of the rules of human discourse) which operate in every tutorial without intervention by the author, and provide the discourse with an aura of intelligent behavior. Certain aspects of both programs are illustrated by terminal examples.

## STRUCTURING AND RETRIEVING INFORMATION IN COMPUTER-BASED LEARNING

Klaus Brunnstein and Joachim W. Schmidt  
German Electron Accelerator  
DESY, Hamburg, Germany

*International Journal of Computer & Information Science*, 2, 2, 89-101  
June 1973

Special techniques to introduce information systems into learner-controlled instruction on a broader basis than encountered today. "Information networks" are defined to add to the information stored in the data base some kind of semantic understanding of the logical structures involved. This approach differs from others, in that the student (or user) works himself with the information network, while other approaches try to guide the learning process via conversational programs which are generated according to a given network.

SCIENTIFIC AND TECHNICAL  
INFORMATION PROCESSING

*A new serial translation of Nauchno-Tekhnicheskaya  
Informatsiya, Seriya 1*

Allerton Press, Inc.  
150 Fifth Avenue  
New York, New York 10011

This Soviet journal is edited by A. I. Mikhailov and published by VINITI, the All-Union Institute of Scientific and Technical Information. It contains reports on manual and machine methods for storing and retrieval.

SAMPLE CONTENTS

*Functional Analysis of R&D Information Needs*  
*Efficient Organization of Institutional Information Services*  
*Disciplinary Reviews: Informational Groundwork for Long-Term  
Planning and Forecasting*  
*Secondary Document Indexing in Petroleum Chemistry*  
*Selective Dissemination of Information in Electrotechnology*  
*On-line Information Processing of Information File Data*  
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Data bases:    creation, management, and utilization.

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DocumentationPROBLEMS OF FORMALIZATION OF LINGUISTIC DATA IN A SYSTEM FOR  
INTEGRATED PROCESSING OF TEXTUAL AND GRAPHIC INFORMATION

(PROBLEMES DE FORMALISATION DES DONNEES LINGUISTIQUES DANS UN  
SYSTEME INTEGRE DE TRAITEMENT DE L'INFORMATION TEXTUELLE ET  
GRAPHIQUE)

A. Borillo

Center for Documentary Analysis in Archeology  
Marseille

Report No. Art/68/1972

Shapes of (sections of) amphorae are input with a light pen and are stored as points in a two dimensional Euclidean space. The data base can be interrogated on-line in natural language (French). The two problems solved are (1), the linguistic problem of designing an internal representation language for the natural language queries, and (2) the analytic problem of substituting forms for aggregates of coordinates.

PROBLEMS OF SYNTACTIC AND SEMANTIC ANALYSIS OF FRENCH INTERROGATIVE  
CONSTRUCTIONS IN THE FRAMEWORK OF AUTOMATIC QUESTION ANSWERING

(PROBLEMES D'ANALYSE SYNTACTICO-SEMANTIQUE DE CONSTRUCTIONS  
INTERROGATIVES EN FRANCAIS DANS LE CADRE DU TRAITEMENT AUTOMATIQUE  
DE QUESTIONS)

A. Borillo

Archeological Documentation and Computation Research Unit  
Marseille

Report No. Com/61 bis/ 1973

Linguistically, questions pose alternatives (yes-no, etc.) or call for specification (who? what? etc.). Both types occur as direct or indirect questions or with the imperative of a verb such as dire. Informational analysis includes determining the type of information requested and the set of objects to be examined. Alternative questions are translated into propositions to be matched in a file. Some specification questions can be answered with an element in a semantically defined role in a stored proposition, but some call for calculation: What is the difference between A and B? Some questions call for exhaustive search; others are satisfied by the first proposition to fit a certain pattern.

## EXPERIMENTS WITH SYNTACTIC TRACES IN INFORMATION RETRIEVAL.

T. DeHeer  
Institute TNO for Mathematics  
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*Information Storage & Retrieval*, 10, 3-4, 133-144 March-April 1974

Syntactic traces consist of syntactic similarity patterns and data base pointers. The similarity patterns contain indications about polygram-substrings that searchable parts of the different documents which are connected by means of the pointers have in common. An experimental computer system called STORES (Syntactic Trace Organized Retrospective Enquiry System) makes use of an access-strategy based on the syntactic traces. The results show that just a minor part of the total data base has to be processed in order to find exactly all possible lists for a given information inquiry in the form of a Boolean expression.

## THE COMPARATIVE EFFICIENCY OF TWO DICTIONARY STRUCTURES FOR DOCUMENT RETRIEVAL

Phillip Ein-Dor  
School of Business Administration  
Tel-Aviv University  
Israel

*INFOR: Canadian Journal of Operational Research & Information Processing*, 12, 1, 87-108, February, 1974

Inverted lists and tree structures are compared in terms of their efficiency as indexes for document retrieval. The relative efficiency of search is shown to depend on the structure of the information file, the form of queries posed to it, and the interaction between them. Formulae are developed for computing the amount of search required in each case and examples provided.

Documentation

## COMPUTER-ASSISTED DISCOURSE ANALYSIS OF A JARGON

Irwin D. J. Bross                      and                      David F. Stermole  
Roswell Park Memorial Institute    Department of Anthropology  
Buffalo    University of Toronto

*Computer Studies in the Humanities and Verbal Behavior*, 4, 2, 65-76  
August 1973

A procedure for the Automated Coding of Report Narrative (ACORN) has been applied to discourse analysis of surgical reports. Information was extracted in the form of standardized 'kernels'. Variations in reporting by surgical departments and by individuals; selection of paraphrases.

DEVELOPMENT OF LANGUAGE ANALYSIS PROCEDURES  
WITH APPLICATION TO AUTOMATIC INDEXING

Carol Elizabeth Young  
Computer and Information Science Research Center  
Ohio State University, Columbus

Report No. OSU-CISRC-TR-73-2, April 1973

A theoretical framework within which relationships among words are defined and algorithms used to identify these relationships. The algorithms assign each word to a grammatical class, identify phrases and clauses, and assign case grammar roles. These linguistic analysis procedures are to be used to construct graphical representations of sentences. The graphs are proposed as the basis of a generalized indexing system. Portions of this document are not fully legible. [PB-227 088/2GA; PC \$7.25, MF \$1.45]

Translation

## DEVELOPMENT OF GERMAN - ENGLISH MACHINE TRANSLATION SYSTEM

Winfred P. Lehmann  
Linguistics Research Center  
University of Texas  
Austin

Report No. RADC-TR-73-260, August 1973.

The theoretical basis of an operational system for machine translation of German scientific and technical literature into English; the linguistic and programming effort carried out to demonstrate the validity of that theory. Lexicographic work was aimed at the addition of semo-syntactic information adequate to translate German text of specific subject matter in accordance with the system discussed in two earlier reports. Descriptions of the grammatical analysis and the programming effort carried out to demonstrate the selected approach to machine translation. [AD-769 704/8GA; PC \$3.75, MF \$1.45]

## THE GENERATION OF FRENCH FROM A SEMANTIC REPRESENTATION

Annette Herskovits  
Department of Computer Science  
Stanford University  
California

Report No. STAN-CS-73-384, AIM-212, August 1973

A brief description of preference semantics. The analysis algorithm which transforms phrases into semantic items called templates has been considered in detail elsewhere. The second phase of analysis binds templates together into a higher level semantic block corresponding to an English paragraph, and interlocks with the French generation procedure. The semantic relations between templates are extracted, pronouns are referred and those word disambiguations are done that require the context of a whole paragraph. These tasks require items called paraplates which are attached to key words such as prepositions, subjunctions and relative pronouns. The system chooses the representation which maximizes "semantic density". A system for the generation of French sentences is based on the recursive evaluation of procedural generation patterns called stereotypes. [AD-769 379/9GA; PC \$3.00, MF \$1.45]

Translation

## NOTES ON THE FEASIBILITY OF HIGH QUALITY MECHANICAL TRANSLATION

Maurice Gross

Laboratory for Automation in Documentation and Linguistics  
University of Paris*Report No. EOARD-TR-73-27, October 1973*

Mechanical translation has often been criticized from the point of view of syntactic analysis. These criticisms are updated and restated within the framework of recent theoretical work in syntax. The role of semantic information is examined. Limitations are considered, and possible ways of improvement are indicated. [AD-770 755/7GA; PC \$3.00, MF \$1.45]

## COMPUTERS AS TRANSLATORS

*Newsweek, 49-50, February 26, 1973*

According to this report, linguists were optimistic about MT but so unsuccessful at it that NSF cut them off in 1966. Yet Logos Development Corporation, and Latsec, Inc. are doing (or developing) MT for commercial and technical purposes, having renounced (at last?) belltristic translation.



## A PLANNING SYSTEM FOR ROBOT CONSTRUCTION TASKS

Scott Elliott Fahlman  
Artificial Intelligence Laboratory  
Cambridge, Mass

*Artificial Intelligence, 5, 1-49 (1974)*

BUILD generates plans for building specified structures out of simple objects such as toy blocks. A powerful heuristic control structure enables BUILD to use a number of sophisticated construction techniques in its plans. Among these are the incorporation of pre-existing structure into the final design, pre-assembly of movable sub-structures on the table, and the use of extra blocks as temporary supports and counterweights in the course of construction.

BUILD can maintain several world models at once, and contains modules for displaying states, testing them for inter-object contact and collision, and for checking the stability of complex structures involving frictional forces.

## INTELLIGENT MACHINES ARE ON THE WAY

Oscar Firschein and  
Martin A. Fischler &  
Lockheed Research Laboratory

L. Stephen Coles and  
Jay M. Tenenbaum  
Stanford Research Institute

*IEEE Spectrum, 41-48, July 1974*

Speculation about robots and other intelligent machines has long been the unchallenged preserve of the science-fiction writer and properly so, as long as the technology needed to realize these machines was a distant dream. Asserting that chunks of the technology required for robots, etc. are at hand, the authors encourage engineers to speculate about automated intelligence systems, talking typewriters, voice-response order takers, automatic identification systems, automatic diagnosticians, industrial robots, robot tutors, universal game players, computer-controlled artificial organs, etc.

CATEGORICAL BIBLIOGRAPHY OF LITERATURE IN THE FIELD OF ROBOTICS

L. Stephen Coles  
Artificial Intelligence Center  
Stanford Research Institute  
Menlo Park, California 94025

*SRI Publication No. 2104*

More than 200 references in the field of robotics are divided into the following categories: Historical Robots, Robots in Literature, The SRI Robot Project, The Stanford University Hand/Eye Project, MIT Robot Projects, The Edinburgh Robot Project, The Berkeley Robot Project, The JPL Robot Project, Other Robot Projects (USA, England, USSR, Japan), General References, Tele-operators, Industrial Robots, Orthotic/Prosthetic Systems, Philosophical Implications, Social Implications, Robots in Popular Magazines, and Robots in Films.

As a current version will be maintained in machine-readable form on the ARPA Network, readers are invited to send corrections or additions to the author.

ASSOCIATION FOR  
LITERARY AND  
LINGUISTIC  
COMPUTING

BULLETIN

Volume 2 Number 2  
Summer Term 1974

Editor  
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6 Sevenoaks Ave  
Heaton Moor, Stockport  
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ON THE DISTINCTION BETWEEN A NOVEL AND A ROMANCE:  
A DISCRIMINANT ANALYSIS

B. Brainerd  
Department of Mathematics  
University of Toronto

*Computers and the Humanities*, 7, 5, 259-270, May 1973.

Since an author's use of articles and (personal) pronouns is particularly sensitive to the variation in the degree of formality of his writing, it might seem that the terms of the opposition (romance, novel) might be quantitatively distinguished, using information about articles and pronouns. Author chooses fifty 50-word passages at random in the works of four 'novelists' and three 'romancers' and computes the average number of articles and personal pronouns over these passages as an index.

Literature

ON THE NUMBER OF WORDS A CHARACTER SPEAKS  
IN THE PLAYS OF SHAKESPEARE

B. Brainerd  
University of Toronto

*Computer Studies in the Humanities and Verbal Behavior* 4,2,57-63  
August 1973

The number of words a character speaks is roughly an exponential function of his rank. We test this hypothesis and two other models: a power-function model (essentially Zipf's Law) and a log-normal distribution. Finally, taking each of the three basic genres (tragedies, history plays, and comedies) as a whole and taking other possible parameters into effect, we can quite satisfactorily account for the data using the expression  $w = a \exp(bi + di^x)$  where  $a, b,$  and  $d$  are constant coefficients and  $w$  is the number of words spoken by the  $i^{th}$  ranking character in a play containing  $x$  characters. For tragedies and histories these coefficients resemble each other closely while the comedy coefficients are quite different.



METHODOLOGICAL ASPECTS OF THE SEGMENTATION AND THE CHARACTERIZATION OF TEXTUAL DATA IN ARCHAEOLOGY; APPLICATION TO THE MECHANIZED PROCESSING OF THE CORPUS OF LATIN INSCRIPTIONS

J. Virbel

In *The Explanation of Culture Change*, edited by Colin Renfrew. Gerald Duckworth & Co. Ltd., London, 1973 141-148

The mechanized utilization of the Corpus of Latin Inscriptions in many fields (general, economic, social, military history; archaeology; history of language and epigraphy) depends on the extremely variable nature of information contained in the inscriptions (date; location; social purpose; physical and stylistic nature: literary form etc.), on their present state of preservation, implying some work of restoration and interpretation, as well as on the constraints of explicitness and completeness made necessary by the use of computers. The methodological problems raised by the fundamental operations of segmentation (i.e. division of the data into 'segments' or elemental units) and characterization, specific to each analysis, are here defined.

MATHEMATICAL, LINGUISTIC, AND INFORMATIC ELEMENTS OF AN INTEGRATED AUTOMATIC SYSTEM FOR PROCESSING TEXTUAL AND GRAPHIC INFORMATION

A. Borillo, M. Borillo, L. Bourrelly, E. Chouraqui, W. Fernandez de la Véga, A. Guénoche, A. Hesnard, J. Tognotti, and J. Virbel  
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*Information Storage Retrieval*, 9, 527-560 Pergamon Press 1973

Real-time answers to natural-language questions about the shapes of amphorae. Shape is described both in everyday terms (long, thick, different) and in technical terms (type Dressel 1, ovoid). Shapes are processed by pencil-follower input, automatic curve segmentation, numerical taxonomy; global and local characteristics are derived and correlated with names. Syntactic-semantic analysis of questions connects them with stored information.

A THEORY FOR THE NEURAL BASIS OF LANGUAGE

PART 1: A NEURAL NETWORK MODEL

Robert J. Baron  
Department of Computer Science  
University of Iowa  
Iowa City

*International Journal of Man-Machine Studies* 6, 13-48 (1974)

A theory and corresponding model for the neural basis of language. A detailed functional description of (1) encoding of visual patterns, (2) the representation of visual experience in memory, (3) the mechanisms of association between different types of visual and verbal information, (4) the neural representation of phrases and simple sentences; (5) the recognition of simple sentences and the concept of meaning, and (6) verbally-directed recall of visual experience.

Operational definitions; neural networks; control strategies. Computer-simulation of (1) verbally directed visual recall; (2) verbal understanding; (3) aspects of learning and forgetting; (4) dependence on contextual information; and (5) sentence generation.

A THEORY FOR THE NEURAL BASIS OF LANGUAGE

PART 2: SIMULATION STUDIES OF THE MODEL

Robert J. Baron  
Department of Computer Science  
University of Iowa  
Iowa City

*International Journal of Man-Machine Studies*, 6, 155-204, (1974)

A theory and corresponding model for the neural basis of language was presented in Part 1 of this paper. Computer simulation studies of the proposed model are presented here. Processes demonstrated are (1) verbally directed recall of visual experience; (2) understanding of verbal information; (3) aspects of learning and forgetting; (4) the dependence of recognition and understanding on context; and (5) elementary concepts of sentence production. A particular choice of control functions for the model are described, and algorithms for all major computational processes are given. All programming was done in FORTRAN IV and executed on an IBM 360/65 computer.

## DESIGN AND TEST OF A COGNITIVE MODEL

Michael A. Cunningham and Harry J. Gray  
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University of Pennsylvania  
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*International Journal of Man-Machine Studies*, 6, 49-104, 1974

In spite of our growing understanding of brain mechanisms, it is still difficult to see just how such complex behavior as language, problem solving and concept formation might be explained in terms of neural systems. The theories of Hebb and Piaget are two important alternatives to a strictly behavioral blackbox approach to the problems of psychology. Neither of these two investigators are content to observe and abstractly describe behavior without reference to possible internal mechanisms, processes, or representations. Therefore, their work should be of interest to persons working in artificial intelligence where the objects of primary concern and manipulation are precisely internal mechanisms, processes, and representations. Steps are taken in a Hebb-Piaget synthesis. The model is formulated as a computer program. A rigorous demonstration would consist of the program's behavior going through Piaget's stages. However we do not expect our first computer program to get through very many of Piaget's stages. Our aim is to give a full demonstration of the stages of sensorimotor intelligence only at the end of a sequence of successive approximations.

# END

