

 **THE FINITE STRING** 

LETTER OF THE ASSOCIATION FOR COMPUTATIONAL LINGUISTICS

UME 11 - NUMBER 4

DECEMBER 1974

This issue was released for production on March 28, 1975. It contains abstracts of preprints and publications available to the editors on March 20.

NOTICE TO AUTHORS

In science, those who read also publish. The help of the reader-become-author makes announcement journals more helpful,

On preparing drafts for semipublic circulation: send a copy to the editorial office to be abstracted.

On receiving notice of acceptance for publication in a book or journal: inform the editor, giving full citation (as much as known)

With the collaboration of the readers, The Finite String will provide much more timely information.

BIBLIOGRAPHY

General	3
<i>Current trends in linguistics 12: adjacent arts & sciences</i>	3
<i>Information Processing 74: proceedings of IFIP Congress</i>	8
<i>Prague Bulletin of Mathematical Linguistics 21</i>	10
Phonetics	12
Speech recognition	15
Speech synthesis	23
Orthography	24
Concordance	25
Lexicography	27
Grammar	30
<i>Word order and word order change</i>	30
<i>A system for automatic inflectional analysis (Russian)</i>	31
Parsers	35
Semantics	36
<i>Lexical semantics: synonymic means of language</i>	36
Discourse	40
Comprehension	41
Expression	47
Information structures	48
Inference	49
Dialectology	50
Acquisition	51
Instruction	52
Documentation	54
Translation	56
Programming	60
<i>Computers, programming, and natural languages</i>	60
<i>Study and compilation of computer languages</i>	61
<i>String and list processing in SNOBOL4</i>	62
<i>Fortran techniques</i>	63
Picture analysis	65
Literature	67
<i>Computers in the Humanities: Proceedings ICCH I</i>	67
<i>Association for Literary and Linguistic Computing Bulletin</i>	70
Mathematics	73
NAME INDEX	74

CURRENT TRENDS IN LINGUISTICS

Thomas A. Sebeok, Editor
Research Center for the Language Sciences
Indiana University

VOLUME 12: LINGUISTICS AND ADJACENT ARTS AND SCIENCES

Associate Editors:
Arthur S. Abramson, Dell Hymes, Herbert Rubenstein
Edward Stankiewicz

Assistant Editor:
Bernard Spolsky

Assistants to the Editor:
Alexandra Di Luglio
Lucia Hadd Zoercher

MOUTON

The Hague • Paris

1974

CONTENTS

Editor's Introduction	V
Master List of Abbreviations	XIII

PART ONE: LINGUISTICS AND PHILOSOPHY

Linguistics and Philosophy, by J. M. E. Maravcsik	3
On Logic and Theoretical Linguistics, by Yehoshua Bar-Hillel, Jonathan Malino, Avishai Margalit	37
Linguistics and Semantics, by Eugenio Coseriu and	

VOLUME 12: LINGUISTICS AND ADJACENT ARTS AND SCIENCES (CONT'D.)

Paralinguistics, by David Crystal	265
Facial Expression and Body Movement, by Harvey B. Sarles .	297
Proxemics, by O. Michael Watson	311
Classification and Description of Sign Languages, by William C. Stokoe, Jr.	345
Writing and Writing Systems, by George L. Trager	373
Speech Surrogates: Drum and Whistle Systems, by Donna Jean Umiker	497
Formalized Languages: Scientific, by Sanda Golopentia-Eretescu	537
Zoosemiotics: Ethology and the Theory of Signs by W. John Smith	561

PART THREE: LINGUISTICS AND THE VERBAL ARTS

Structural Poetics and Linguistics, by Edward Stankiewicz.	629
Linguistics and Folkloristics, by William O. Hendricks . .	661
Folk Poetry: General Problems, by V. N. Toporov	683
Folk Poetry: History and Typology, by K. Horalek	741
Folk Narrative, by Dorothy Clement and Benjamin N. Colby .	809
Growth of the Theoretical Framework of Modern Poetics, by Vyacheslav V. Ivanov.	835
Theoretical Poetics in the Twentieth Century, by F. Svejksky	863
Rhetoric and Stylistics, by P. Guiraud	943
Literary Genres, by Tzvetan Todorov	957
Metrics, by John Lotz	963

PART FOUR: SPECIAL LANGUAGES

New Formal Devices for Linguistics, by Maurice Gross . .	985
--	-----

VOLUME 12: LINGUISTICS AND ADJACENT ARTS AND SCIENCES (CONT'D.)

PART SIX: LINGUISTICS AND PSYCHOLOGY

Psycholinguistics: An Overview, by Herbert Rubenstein . . .	1071
An Historical View of Psycholinguistics, by Arthur L. Blumenthal	1105
Some Aspects of Language Acquisition, by Ursula Bellugi .	1136
The Interaction of Perception and Linguistic Structures: A Preliminary Investigation of Neo-Functionalism, by T. G. Bever	1159
Syntactic Factors in Memory, by Samuel Fillenbaum	1235
Semantics and Comprehension, by Herbert H. Clark	1291
Social Perception of Speech, by Moshe Anisfeld	1429

PART SEVEN: ANTHROPOLOGY AND SOCIOLOGY

Anthropology and Sociology: An Overview, by Dell Hymes . .	1445
Some New Developments in Ethnosemantics and the Theory and Practice of Lexical/Semantic Fields, by Oswald Werner, with William Hagedorn, George Roth, Emile Schepers, and Luis Uriarte	1477
Social Class, Language, and Socialisation, by Basil B. Bernstein	1545
Ethnomethodology, by Aaron V. Cicourel	1563
Sociolinguistics, by J. B. Pride	1607
The Sociology of Language: An Interdisciplinary Social Science Approach to Language in Society, by Joshua A. Fishman	1629

PART EIGHT: LINGUISTICS AND ECONOMICS

Linguistics and Economics, by Ferruccio Rossi-Landi . . .	1787
---	------

PART NINE: LINGUISTICS AND EDUCATION

VOLUME 12: LINGUISTICS AND ADJACENT ARTS AND SCIENCES (CONT D)

Linguistics and the Language Arts in Elementary and Secondary Education, by Rudolph C. Troike	2117
Linguistics and Second Language Pedagogy, by E. Glyn Lewis	2131

PART TEN PHONETICS

Phonetics: An Overview, by Arthur S. Abramson	2187
Phonetics in the Twentieth Century, by D. B. Fry	2201
Speech Acoustics, by John M. Heinz	2241
Physiological Aspects of Articulatory Behavior, by Katherine S. Harris	2281
Laryngeal Research in Experimental Phonetics, by Masayuki Sawashima	2303
The Perception of Speech, by Michael Studdert-Kennedy	2349
On Time and Timing in Speech, by Leigh Lisker	2387
A Study of Prosodic Features, by Philip Lieberman	2419
Speech Synthesis for Phonetic and Phonological Models, by Ignatius G. Mattingly	2451
Phonetic Fieldwork, by J. C. Catford	2489
Cross-Language Phonetics, by Andre Malecot	2507

PART ELEVEN: BIO-MEDICAL APPLICATIONS

Language in a Biological Frame, by J. Bronowski	2539
Basic Problems of Neurolinguistics, by A. R. Luria	2561
Language Behavior and Disorders Associated with Brain Damage, by Orlando L. Taylor and Joseph P. Fox	2595
Speech Pathology, by Eugene T. McDonald	2641
Language and Psychiatry, by Harley C. Shands	2657

PART TWELVE: COMPUTER APPLICATIONS

VOLUME 12: LINGUISTICS AND ADJACENT ARTS AND SCIENCES (CONT D)

PART THIRTEEN: LINGUISTICS AS A PILOT SCIENCE

Linguistics as a Pilot Science, by Solomon Marcus	2871
Specialty Trends in the Language Sciences, by Paul L. Garvin	2889
Biographical Notes	2911
Indexes	2931
Index of Topics	
Index of Names	
Index of Languages	

General

INFORMATION PROCESSING 74

PROCEEDINGS OF IFIP CONGRESS 74
Stockholm, August 5-10, 1974

Jack L. Rosenfeld, Editor
Computer Sciences Department
IBM Thomas J. Watson Research Center

North-Holland Publishing Company
Amsterdam & New York
1974

PARTIAL CONTENTS

- Data communications and public networks.* G. C. Allery
- Composing music and generating sound by computer.* P. Barbaud
- Social implications of computer technology.* H. Borko
- A programming methodology for operating system design.* P. Brinch Hansen
- Recent investigations in relational data base systems.* E. Codd
- Real-time computer animation.* C. A. Csuri
- Cost and benefits of information systems.* J. C. Emery
- Extensible languages.* B. A. Galler
- Computer experience with selected secondary and primary school children.* D. S. Henderson
- The impact of LSI technology on computer systems.* G. B. Herzog
- Complexity of computer computations.* J. Hopcroft
- Resource allocation in computer systems and computer-communication networks.* L. Kleinrock
- Information systems.* B. Langefors

INFORMATION PROCESSING 74.

PARTIAL CONTENTS

Current and future trends in data base management systems. T. W. Ollé

Two-level grammars in action. J. E. L. Peck

Alphabetic and numeric data processing: a view from the humanities.
J. Raben

Theoretical impediments to artificial intelligence. M. O. Rabin

Systems programming as an emerging discipline. G. Seegmüller

Multiplexing problems in computer communications. J. Seidler

Software implementation studies: problems and prospects.
M. R. Shura-Bura

On the design of programming languages. N. Wirth

General

THE PRAGUE BULLETIN OF
MATHEMATICAL LINGUISTICS

21

TABLE OF CONTENTS

Language types in classic and new typology. <i>Die Sprachtypen in der klassischen und der neuen Typologie</i> P. Sgall	3
On one type of dependency grammars A. Goralcikova	11
<p>Gaifman showed that in a certain theory of dependency the number of dependents at a node could not exceed an integer fixed for each grammar. Fitialov suggested oriented grammars, rewrite grammars with a governor marked in each rule; obviously such a grammar does not suffer Gaifman's limitation. A <u>specialy ordered</u> grammar divides rules in which the symbol on the left occurs in the string on the right into recursive rules, which can be applied to their own output, and pseudo-recursive rules which cannot. SO grammars are weakly equivalent to CF grammars.</p>	
Questions of graphs and automata in a generative description of language. - M. Platek	27
<p>Z-grammar derives a dependency tree from a start symbol by rules of six types: (1) replace a node with a governor and one dependent; (2) change the label at a node; (3) replace the labels of a governor and one dependent simultaneously; (4) change the label of a terminal node; (5) change the label at the origin; (6) move a dependent across its governor from left-to-right or from right-to-left.</p>	

General

LANGUAGES AMONG COMPUTERS, MACHINES, ANIMALS AND MEN

Lawrence M. Clark

Computers and People, 24, 1, January 1975, 7-13

Reports on a number of aspects of language, discusses some significant problems of designation of meaning, and indicates some probable future developments in language. Computers make extensive use of language to fulfill their functions. To place computer languages in the perspective of languages in general is helpful.

DECODING METHODOLOGY AS A TOOL FOR LINGUISTIC RESEARCH

Methode de dechiffrage, outil de recherche en linguistique

B. V. Suhotin

Russian Language Institute

Moscow

T. A. Informations, 1974, 2, 3-43

These methods of analysis are among those that will work for any language without prior knowledge other than what is gained from linguistically prior analyses. The examples presented are algorithms for (1) classification of letters into vowels and consonants, (2) morpheme classification, (3) determining the structure of simple phrases, (4) phonetically transcribing syllabic letters, (5) determining the pronunciation of letters.

PhoneticsCOMPARISON OF THE FORMANT SPACES OF RETROFLEXED AND
NON-RETROFLEXED VOWELS.

Iris Kameny

IEEE Transactions on Acoustics, Speech and Signal Processing
ASSP-23, 1975, 38-49

The formant 1 (F1) and formant 2 (F2) frequency movements of vowels next to /r/ are compared with the same vowels next to other consonants. With the exception of /i/ the effect of initial /r/ on the following syllable nuclei is minimal. The effect of final /r/ on the syllable nuclei preceding it is appreciable. Algorithms are postulated to define a retroflexed vowel space for vowels preceding /r/ in terms of the non-retroflexed vowel space.

THE HUMAN VOCAL CORDS: A MATHEMATICAL MODEL

Ingo R. Titze
Dept. of Physics & Astronomy
Brigham Young University
Provo, Utah

Phonetica 28, 129-170, 1973

A mathematical model for digital computer simulation of human-like utterances is developed. The overall system consists of a period structure of 16 coupled masses for each of the vocal cords, an 18-section cylindrical tube approximation of the pharynx and mouth, and a similar 12-section nasal tract. Special care has been taken to model separately the functions of the vocal ligament the vocalic muscle, and the mucosa. Simulated phonation in modal, mixed and falsetto registers is possible. The parameters which control the nature of the phonation are lung pressure, external tension applied to ligament, vocalic, and mucosa, and the internal muscular action of the vocalis. Applications are cited in areas which include physiology, pathology and pedagogy.

Phonetics

NARROW PHONETIC TRANSCRIPTION ON THE COMPUTER: TAKING THE PHONE OFF THE HOOK

Gerald C. Keil
Leeds University
England

Computers and the Humanities 8, 4, 217-229

The IMPAC project of the Survey of English Dialects has developed a system for the machine representation of narrowly transcribed phonetic data. The external machine representation seeks to maintain some proximity to the IPA system and to have the minimum number of symbols used to represent each phone. The internal code can be considered as a matrix in which members of each row or column share a common property. An internal property table expresses the characteristics of each phone.

COMPUTER CONTROLLED RADIOGRAPHY FOR OBSERVATION OF MOVEMENTS OF ARTICULATORY AND OTHER HUMAN ORGANS

O. Fujimura, S. Kiritani and H. Ishida
Research Institute of Logopedics and Phoniatrics,
Faculty of Medicine
University of Tokyo

Computers in Biology and Medicine, 3, 371-384, 1973

On-line computer control of a flying spot X-ray microbeam generator is proposed for substantial reduction of radiation dose and automatic processing of radiographic data. A small X-ray microbeam generator was used in a pilot study. Preliminary experiments have demonstrated its applicability in studies of articulatory gestures and cerebral blood flow measurements. Monitoring of the position of a fiberscope in the pharynx during speech utterances has been tested in real time successfully with use of an integrated dose of approximately 16 mR cm²/min at an

Phonology

COMPUTER EXPLORATION OF FAST-SPEECH RULES

Joyce Friedman

Department of Computer and Communication Sciences

University of Michigan

Ann Arbor

IEEE Transactions on Acoustics, Speech, and Signal Processing,
ASSP-23, February 1975, 100-103

A set of fast-speech rules has been tested on the computer using the phonological grammar tester (PGT) program of Friedman and Morin. We examine the types of difficulties encountered in the rules and discuss ways in which the program can be made more useful for studying fast-speech rules.

Speech recognition

SYSTEM FOR ACOUSTIC-PHONETIC ANALYSIS OF CONTINUOUS SPEECH

Clifford J. Weinstein and
 Stephanie S. McCandles
 Lee F. Mondschein
 MIT Lincoln Laboratory
 Lexington, Mass

Victor W. Zue
 Department of Electrical
 Engineering
 M.I.T
 Cambridge, Mass

IEEE Transactions on Acoustics, Speech, and Signal Processing
 ASSP-23, February 1975, 54-67

Spectrum analysis via linear prediction, computation of parameters of the spectrum and fundamental frequency extraction. Preliminary segmentation and classification yields categories of vowel; volume dip within vowel; fricative; stop. The decision tree is based on energy measurements in selected frequency bands, derivatives and ratios of these measurements, a voicing detector, and a few editing rules. More detailed classification of diphthongs, semivowels, and nasals; detected vowel segment to stored formant positions in a speaker-normalized vowel table; a fricative identifier, which employs measurement of relative spectral energies in several bands to group the fricative segments into phoneme-like categories; stop consonant classification based on the properties of the plosive burst.

MULTIDIMENSIONAL ANALYSIS OF THE PERCEPTUAL UNIQUENESS OF 31 ENGLISH CONSONANTAL CLUSTERS

John W. Black, Sadanand Singh and Elizabeth Janocosek
 Department of Speech Communication
 Ohio State University, Columbus

Report No. TR-16, March 1974. AD-776 649/6GA

Acoustic recordings were made of 31 'doublet' consonant-clusters with five vowels by 12 speakers. The pairs of syllables were heard by twelve listeners who assigned values to the aural differences between each pair in the manner of magnitude estimation'. The clusters were treated as two groups, 18 non-sibilant clusters and 13 sibilant clusters. The responses of each listener became the data for multidimensional analysis. Four-dimensional space provided the most efficient analysis for both sets of data. The interpretations of these dimensions were in terms of the features either of the first or of the second member of the consonant clusters. In the instance of the non-sibilant clusters on dimension one the perceptual feature was determined by the groupings of the second members, on dimensions two and three by the first members.

Speech Recognition

PERCEPTUAL CONTINUOUS SPEECH RECOGNITION

H. Yilmaz, L. Ferber, W. Park, H. Kellett, and E. Koprucu
Perception Technology Corporation
Winchester Mass

Report No. RADC-TR-74-180, July 1974

The objective is to study and investigate the recognition of connected speech composed of a context-free limited vocabulary. A new method of segmentation is based on the recognition of vowels and vowel-like phonetic segments. This is coupled with a speaker transformation that maps the vowels of each speaker into a standard space thus reducing inter-speaker variations. A method of extending these principles to the recognition of consonants is presented. [AD-783 899/8GA; PC \$3.75, MF \$2.25]

THE OPTIMUM COMB METHOD OF PITCH PERIOD ANALYSIS OF CONTINUOUS DIGITIZED SPEECH

James A. Moorer
Department of Computer Science
Stanford University
Stanford, California

IEEE Transactions on Acoustics, Speech, and Signal Processing, ASSP-22, 5, October 1974, 330-338

The method is shown to be of similar accuracy as the Cepstrum technique. Since the method involves only additions, no multiplication, it is shown to be faster than the SIFT algorithm. The basis of the method is searching for a minimum in the magnitude of the difference between a speech segment and a delayed speech segment. This is shown to be equivalent to selecting the comb filter which best annihilates the input signal. The computational complexity of the Cepstrum technique thus is proportional to $N \cdot \log N$ where N is the number of points in the window in question.

Speech recognitionWHERE THE PHONEMES ARE: DEALING WITH AMBIGUITY IN ACOUSTIC-
PHONETIC RECOGNITION

Richard Schwartz and John Makhoul
Bolt Beranek and Newman Inc.
Cambridge, Mass

IEEE Transactions of Acoustics, Speech, and Signal Processing
ASSP-23, 1975, 50-53

Errors in acoustic phonetic recognition occur not only because of the limited scope of the recognition algorithm, but also because certain ambiguities are inherent in analyzing the speech signal. Examples of such ambiguities in segmentation and feature extraction are given. A lattice representation of the segmentation allows for multiple choices that can be sorted out by higher level processes.

INVERSE FILTER FOR SPEAKER IDENTIFICATION

Larry L. Pfeifer
Speech Communications Research Lab Inc.
Santa Barbara, California

Report No RADC-TR-74-214, August 1974

The objective is to determine if a sample can be associated with reference talkers. The method of comparing feature vectors from individual sound elements was chosen for experiments using the inverse filter analysis technique (the autocorrelation method of linear prediction). Ten male talkers supplied speech samples bandlimited to 3250 Hz. Thirteen sound units, 10 vowels and 3 nasals, were studied. Many additional identification tests were performed for the purpose of evaluating different distance functions and different feature vectors. [AD-787 860/6GA; PC \$5.25, MF \$225]

Speech recognition

THE ROLE OF PHONOLOGICAL RULES IN SPEECH UNDERSTANDING RESEARCH

Beatrice T. Oshika	Victor W. Zue	Rollin V. Weeks
Joseph Aurbach		
Helene Neu		
Speech Communications	M.I.T., Lincoln	System Development
Research Laboratory	Laboratory	Corporation
Santa Barbara, Cal.	Lexington, Mass	Santa Monica, Cal.

IEEE Transactions on Acoustics, Speech, and Signal Processing
ASSP-23, February 1975, 104-112

This paper presents some phonological rules which describe systematic pronunciation variation occurring in natural continuous speech. It is argued that a speech understanding system must account for such variation by incorporating phonological rules, either implicitly or explicitly, into the system. Spectrographic evidence for the phonological phenomena described by the rules is included.

RESEARCH ON SPEECH COMMUNICATION AND AUTOMATIC SPEECH RECOGNITION

David J. Broad
 Speech Communications Research Laboratory
 Santa Barbara, California

Report No. AFOSR-TR-74-0582, February 1974

Theory of phonology: a theory of symbolization, a large computer-based quasi-phonemic/orthographic dictionary of American English, dialect description, and the formalization of a functional phonemic theory. Logical procedures for the interpretation of acoustic phonetic data: a massive investigation of formant frequency transitions in CVC syllables as well as an analysis of the segment durations in the same syllables: the use of formant frequency information in automatic speech recognition; segmentation using formant dynamics and the sources of formant frequency variability; the relations between applied basic problems in speech and language.

Speech recognition

SYLLABLE AS A UNIT OF SPEECH RECOGNITION

Osamu Fujimura
Bell Laboratories
Murray Hill, N.J.

IEEE Transactions on Acoustics, Speech, and Signal Processing
ASSP-23, February 1975, 82-87

Basic problems involved in automatic recognition of continuous speech are discussed with reference to the recently developed template matching technique using dynamic programming. Irregularities in phonetic manifestations of phonemes are discussed and it is argued that the syllable, phonologically redefined, will serve as the effective minimal unit in the time domain. English syllable structures are discussed from this point of view using the notions of "syllable features" and "vowel affinity".

A DESCRIPTION OF A PARAMETRICALLY CONTROLLED
MODULAR STRUCTURE FOR SPEECH PROCESSING

N. Rex Dixon and Harvey F. Silverman
Computer Sciences Department
IBM Thomas J. Watson Research Center
Yorktown Heights, N.Y.

IEEE Transactions on Acoustics, Speech, and Signal Processing
ASSP-23, February 1975, 87-91

The modular acoustic processor (MAP) has been designed for speech recognition. The parametrically controlled (spectral) analyzer (PCA), serves as input to an hierarchically operated string transcriber (HOST). PCA allows parametric selection of several analysis methods, including discrete Fourier transform, linear predictive coding, and chirp z-transform (CZT), and of smoothing, normalization, interpolation, and F_0 estimation methods. PCA develops spectrographic representations and performs spectral-similarity matching and training. HOST does segmentation, classification, and prosody analysis. PCA is a packaged, debugged, running system. A first version of HOST is operational.

Speech recognitionREAL-TIME LINEAR-PREDICTIVE CODING OF SPEECH
ON THE SPS-41 TRIPLE-MICROPROCESSOR MACHINE

Michael J. Knudsen
 Computer Science Department
 Carnegie-Mellon University
 Pittsburgh, PA

IEEE Transactions on Acoustics, Speech, and Signal Processing
 ASSP-23, February 1975, 140-145

SPS-41, a commercially available system, is composed of three dissimilar micro-processors working in parallel. Using user-written microcode, one processor performs I/O and master control, the second handles loop indexing and counting, and the third does the actual arithmetic on data. Such parallelism allows 2×10^6 I/O operations and 4×10^6 multiplications/s, but actually realizing this potential requires fresh approaches to some old algorithms. Most important is a new autocorrelation scheme. The present program converts frames of 256 16-bit samples into 14 coefficients and then into 128 points of logarithmic power spectrum at 100 frames/s.

EXPERIMENTS WITH A TREE-SEARCH METHOD FOR CONVERTING
NOISY PHONETIC REPRESENTATION INTO STANDARD ORTHOGRAPHY

C. C. Tappert
 Speech Processing Group
 IBM Thomas J. Watson Research Center
 Yorktown Heights, N.Y.

IEEE Transactions on Acoustics, Speech, and Signal Processing
 ASSP-23, February 1975, 129-135

A 250-word lexicon and a finite-state grammar specify the tree. The search is performed in a best-first manner. Phonetic variants for each word are generated automatically by a set of phonological rules. Substantial improvement over earlier performance on the same data was realized.

Speech recognition

MINIMUM PREDICTION RESIDUAL PRINCIPLE APPLIED TO SPEECH RECOGNITION

Fumitada Itakura
Acoustics Research Department
Bell Laboratories
Murray Hill, N.J.

& Electrical Communications Lab
Nippon Telephone & Telegraph
Public Corporation
Musashino, Tokyo

IEEE Transactions on Acoustics, Speech, and Signal Processing
ASSP-23, February 1975, 67-72

Isolated words, spoken by a designated talker, are recognized through calculation of a minimum prediction residual. A reference pattern for each word is stored as a time pattern of linear prediction coefficients (LPC). The total log prediction residual of an input signal is minimized by optimally registering the reference LPC onto the input autocorrelation coefficients. The input signal is recognized as the reference word which produces the minimum prediction residual. In a 200-word recognition experiment, the recognition rate for a designated male talker is 97.3 percent for telephone input, and the recognition time is about 22 times real time.

PITCH DETECTION BY DATA REDUCTION

Neil J. Miller
Artificial Intelligence Laboratory
Department of Computer Science
Stanford University
Stanford, California

IEEE TRANSACTIONS ON ACOUSTICS, SPEECH, AND SIGNAL PROCESSING
ASSP-23, February 1975, 72-79

An algorithm determines fundamental frequency by segmenting the signal into pitch periods. Segmentation is achieved by identifying the beginning of each pitch period. Segmentation has three phases. First, using zero crossing and energy measurements, a data structure is constructed. Next, the number of candidate pitch period markers is reduced utilizing syllabic segmentation, coarse pitch frequency estimations, and discrimination functions. Finally, the remaining markers are corrected. This algorithm processes both male and female speech, provides a voiced-unvoiced decision, and operates in real time on a medium speed, general purpose computer.

Speech RecognitionA PHONETIC-CONTEXT CONTROLLED STRATEGY
FOR SEGMENTATION AND PHONETIC LABELING OF SPEECH

Paul Mermelstein
Haskins Laboratories
New Haven, Conn.

IEEE Transactions on Acoustics, Speech, and Signal Processing
ASSP-23, February 1975, 79-82

In a sequential strategy processes are applied to a labeled speech segment and result in a possible subsegmentation; the subsegments are labeled by the process. No more segments are considered than those actually differentiated by the analysis steps. The extraction of acoustic cues pertinent to a phonetic feature can be tuned to classes of sounds separated on the basis of other cues, increasing the reliability of segment labeling. The analysis sequence yields a structure for the syllabic units of the speech signal that can be used to retrieve similar syllabic units for detailed comparison.

AN OBJECTIVE PARALLEL EVALUATOR OF SEGMENTATION/
CLASSIFICATION PERFORMANCE FOR MULTIPLE SYSTEMS

Harvey F. Silverman and N. Rex Dixon
Speech Processing Group
IBM Thomas J. Watson Research Center
Yorktown Heights, N.Y.

IEEE Transactions on Acoustics, Speech, and Signal Processing,
ASSP-23, February 1975, 92-99

The system provides for concurrent objective evaluation of up to five methods against a single referent. For segmentation, the evaluator provides first-order statistics, at the phonetic, class and summary levels, for four types of errors: Missed, Adventitious, Misplaced, and Adventitious and misplaced events. For classification, the evaluator gives confusion matrices at the phonetic, class and summary levels. The system is still in the developmental process, is operational and currently used.

Speech Synthesis

PERFORMANCE OF A SPEECH SYNTHESIS SYSTEM

W. A. Ainsworth
Communication Department
University of Keele
Keele, Staffordshire, U.K.

International Journal of Man-Machine Studies 6, 493-511, 1974

A string of phonetic symbols representing the sentence to be uttered is transformed into the control signals required by a parametric speech synthesizer using a small digital computer. The performance of the system was investigated by listening tests. In the first set of experiments consonant-vowel syllables were synthesized, and presented to listeners for identification. The vowels were readily identified, but the fricatives less so. In the second set of experiments the intelligibility of synthesized sentences was examined. It was found that after about an hour of transcribing the sentences, listeners identified about 90% of the words correctly.

A PROGRAMMING SYSTEM FOR STUDIES IN SPEECH SYNTHESIS

P. V. S. Rao, R. B. Thosar
Tata Institute for Fundamental Research
Bombay,

IEEE Transactions on Acoustics, Speech, and Signal Processing,
ASSP-22, 3, 217-225, 1974

This paper describes a speech synthesis system which is particularly suitable for experimental investigations. The synthesis is accomplished in two stages. The concatenation stage generates a schematized spectrographic representation corresponding to the symbolic input. The second stage consists in generating the corresponding acoustic signal. The steady state characterization of each phoneme is supplied as data. Independent concatenation procedures incorporate context dependent effects such as format transitions, changes in the normal duration of vowels, etc. The parameter values for these procedures are obtained by a set of rules. Applicability of a rule is determined by attributes assigned to the phonemes.

OrthographyA THEORETICAL APPROACH FOR CHARACTER RECOGNITION
BASED ON PHENOMENOLOGICAL ATTRIBUTES

B. Blesser, R. Shillman, T. Kuklinski, C. Cox, M. Eden and J. Ventura
 Research Laboratory of Electronics
 Massachusetts Institute of Technology
 Cambridge, Mass.

International Journal of Man-Machine Studies, 6, 701-714

A theory based on ambiguities, rather than on the classical archetypal shape of letters, leads to algorithms which will perform more accurately. Letters are described in terms of an abstract set of functional attributes, each of which can be related to a type of ambiguity between two letters. The relations between the functional attributes, which specify the letter's identity, and the physical attributes, which are derived from the physical image, are called graphical context rules. These rules can be determined from psychological experimentation.

PROBLÈME DE LA CLASSIFICATION DES CARACTÈRES CHINOIS
(THE CHINESE CHARACTER CLASSIFICATION PROBLEM)

M. R. Finley, Jr.
 Department of Mathematics
 University of Laval
 Quebec

Proceedings of the Second Open Conference on Information Science in Canada, edited by A. Gamache & R. Penner. Ottawa: Canadian Association for Information Science, 1974, 163-180

The classification problem is presented for the set of 40,000 two-dimensional patterns known as the Chinese characters. The traditional classification according to certain meaning patterns termed radicals is sketched together with some variants derived from it. Using the notion of two-dimensional formal grammar, a classification is outlined yielding a quasi-algebraic formula for each character. Also mentioned are spin-offs on the development of Chinese text composition devices using graphic-display techniques and mini-computers.

Concordance

PHRASE DICTIONARY DISTRIBUTION ANALYSIS AND GROWTH PREDICTION REPORT

J. H. Waite, R. Boehm, J. G. Fisher, S. D. Epstein, D. J. Stewart
Cryptanalytic Computer Sciences Inc.
Cherry Hill, N.J

This study of the DDC Phrase Glossary includes a computer program to tabulate work frequencies for blocks of phrases of optional sizes. On the basis of these distributions, empirical and statistical analyses are made including two prediction models. Two-word distributions are also included. Based upon the available distributions, a two-word Phrase Glossary size of 320,000 two-word phrases was determined. Also included are analyses of various techniques, such as suffix truncation, imbedded phrases, and query effectiveness. Comparisons are made of the DDC system to other plain language machine retrieval systems. [AD-780 957/7GA PC \$3.75, MF \$1.45 April 1974]

THE LANGUAGE OF THE 'PETERBOROUGH CHRONICAL'

J. L. Mitchell

Computers in the Humanities, J.L. Mitchell, Editor, 1974, 132-145

As a necessary prerequisite to a syntactic investigation of the chronicle the following analyses are produced: alphabetized list of every word of the corpus, cumulative frequency, alphabetized frequency list, rank of every word, cumulative absolute frequency of every group of words, percentage and cumulative frequency of the text represented by each word and group of words, a concordance, a frequency list for grammatical categories, and the text with each word tagged for syntactic category.

Concordance

JEUDEMO: A TEXT HANDLING SYSTEM

P. Bratley, S. Lusignon, and F. Ouelette

Computers in the Humanities, J. L. Mitchell, Editor, 234-249, 1974

In a typical text-processing task, the structure of the text must be described, the operations, with any restrictions to be performed defined, and the format of results given. The present system allows, for the first part, the definition of the alphabet of a corpus, the word separators, tags (for homograph separation, category markers, etc.), and the language of the text. Allowable operations are: the listing of all words present; KWIC concordances; the building of indexes; the searching for words, or word patterns; and searches as in the previous operation, but with restrictions to words of specified frequency, or to sections of the corpus.

FROM A WORD-FORM CONCORDANCE TO A DICTIONARY-FORM CONCORDANCE

D. J. Koubourlis

Computers in the Humanities, J.L. Mitchell, Editor, 225-233, 1974

A word-form concordance does not conjoin inflected forms of the same lexeme, nor does it separate homographs. By manually editing the output of a word-form concordance for these two phenomena and resorting, a dictionary-form concordance is produced.

DEVELOPMENT OF A TEXT CONCORDANCE AND STATISTICS PROGRAM

Lance S. Smith
Brigham Young University

Proceedings of the [BYU] Linguistics Symposium, 1973

The system has seven basic phases: (1) Entry of source text; (2) Main dictionary update; (3) Creation of upgraded text for processing; (4) Upgraded text pre-edit for processing; (5) Production of KWIC concordance; (6) Production of keyword in phrase concordance; (7) Production of word frequency, parts list, reverse alphabetical word list, and various statistics, e.g. average number of words per sentence. In (2) an exhaustive list of words in the text but not in the dictionary is produced, and an interactive program requests information for each new word. This information is merged into the main dictionary. In (3) information from the dictionary is appended to each word of the text and ambiguities resolved by interactively interrogating the user.

Lexicography

AUTOMATIC IDENTIFICATION OF PHRASAL VERBS.

Godelieve L. M. Berry-Rogghe

Computers in the Humanities, J. L. Mitchell, editor, 16-26, 1974

A phrasal verb is an idiomatic phrase of verb plus particle, e.g. 'look after'. The author seeks to automatically construct a lexicon of phrasal verbs given an adequately large quantity of data, and statistical procedures.

The statistical procedure used is 'collocation'--the probability of syntagmatic association of two items occurring separated by n items. An analysis of the particle 'in' shows that verbs from phrasal verbs are more closely collocated with this particle than non-idiomatic constituent verbs.

SHAD: A SHAKESPEARE DICTIONARY

M. Spevack, H. J. Neuhaus, and T. Finkenstaedt

Computers in the Humanities, J. L. Mitchell, editor, 111-123, 1974

SHAD merges information from a concordance of Shakespeare, a computer dictionary (drawn from the Shorter Oxford English Dictionary), and data from semi-automatic lemmatization.

Lexicography

A COMPUTERIZED LEXICON OF ENGLISH

E. R. Maxwell, and R. N. Smith

Computers in the Humanities, J. L. Mitchell, editor, 124-131, 1974

An autonomous theory for lexical structure, called Semantic Field Theory, is presented. There is a set of primitives (about 20): sameness, difference, events, rest, motion, space, emotion, etc. Neutral concepts are defined by primitive relations to the primitives, e.g., cause, change. A semantic field (SF) is taxonomically related to a neutral concept. For example, the semantic field 'punch' is a member of the neutral concept 'hit', with 'fist' as 'instrument', and 'hit' is an 'event' involving a motion against an object (object being defined as experiencer's body or immediate environment) by another object, the two objects being different.

A COMMON STRUCTURE FOR LEXICOGRAPHIC DATA

D. Sherman

Computers in the Humanities, J. L. Mitchell, Editor, 215-224, 1974

Libraries in the US and the UK have developed a standard structure for data exchange, termed MARC--MACHINE Readable Catalog. Each record has a fixed length leader of format defined by the MARC standard, which gives the general record status and control information. Following the leader is a table of contents and inventory of all data fields in the record. The data part of a record is divided into fields, each of which is tagged by a 3-digit number; sub-fields are headed by a symbol of the form \$n, where n is an identifier code. The system is used to encode Webster's Seventh Collegiate Dictionary, giving the WEBMARC file.

LexicographyTHE 'THESEE' THESAURUS FOR ELECTRICITY AND ELECTRONICS;
DESCRIPTION AND METHOD OF USE*'Thesee' thesaurus pour l'electricite et l'electronique:
description et methode d'utilisation*A. Dewèze
Grenoble*T. A. Informations, 1974, 1, 2-51*

This trilingual thesaurus, with both orthographic and magnetic tape implementations, contains about 11,000 terms. Its five indexes are (1) dictionary, (2) relations of substitution, descriptors with terms, (3) related terms, (4) polyhierarchical classification trees, (5) semantic fields.

LEXICOGRAPHY FOR A STRING GRAMMAR OF FRENCH

*La lexicographie pour une grammaire en chaînes du français*Morris Salkoff and Anne Zribi
Laboratoire d'Automatique Documentaire et Linguistique
Université de Paris*Rapport de Recherches No. 3*

The structure of a dictionary to accompany Salkoff's grammar (cf. AJCL Microfiche 6:64). Subclasses, selectional constraints on verbs, treatment of multiple classification, idioms, homonyms, etc. An extensive analysis of the French lexicon.

WORD ORDER AND WORD ORDER CHANGE

Charles N. Li, Editor
Linguistics Program
University of California
Santa Barbara

University of Texas Press
Austin and London
1975

TABLE OF CONTENTS

<i>Influences on word order change in American sign language</i> Susan Fischer	1
<i>Dynamic aspects of word order in the numeral classifier</i> Joseph H. Greenberg	27
<i>Serial verbs and syntactic change: Niger-Congo.</i> Talmy Givon	47
<i>On the change from SOV to SVO: Evidence from Niger Congo</i> Larry M. Hyman	113
<i>A discussion of compound and word order</i> Winfred P. Lehmann	149
<i>The semantic function of word order: A case study in Mandarin</i> Charles N. Li and Sandra A. Thompson	163
<i>On some factors that affect and effect word order</i> Susan Steele	197
<i>An explanation of drift</i> Theo Vennemann	269
<i>Order in base structure</i> Emmon Bach	307
<i>The presentative movement, or why the ideal word order is V.S.O.P.</i> Robert Hetzron	346
<i>On the explanation of constituent order universals</i> Gerald Sanders	389
<i>Verb-anchoring and verb movement</i> Arthur Schwartz	437

ISBN 0-292-79002-3

LC Card 74-17620

\$12.50

Grammar

A SYSTEM FOR AUTOMATIC INFLECTIONAL ANALYSIS IMPLEMENTED FOR RUSSIAN

Anna-Lena Sagvall

Almqvist & Wiksell
Stockholm
1973

Part I.	On automatic test analysis	13
1.	Introduction	13
2.	General considerations concerning the construction of a system for automatic text analysis	13
3.	Some comments on the development of systems for automatic text analysis	16
Part II.	Designing a system for automatic inflectional analysis of Russian texts	19
1.	Background to the construction of a system for Russian inflectional analysis	19
2.	Specifying the new code (NC)	20
3.	Studying the original code (OC)	26
4.	Some basic problems	27
5.	Choosing the dictionary representations	31
6.	Verifying compatibility between the dictionary segment (DS) and the second segments (SSs) for basic class 7	47
7.	Classifying the stems	49
8.	Selectional criteria	55
9.	A presentation of the second segment system for basic class 1, 2 and 3	69
10.	A presentation of the third segment system for basic class 7	74
11.	Demands on the algorithm for the dictionary search	77
Part III.	Processing Russian text	81
1.	Preparatory processing of the text material	81
2.	Inputting and organizing the text material	82
3.	Processing in AUTLEX	83
4.	Program lists	90
5.	Technical information	107
Conclusion	108
Appendices	109
References	141

Grammar

CONCERNING THE STRUCTURE OF A COHERENT TEXT
ON THE MORPHOLOGICAL LEVEL

Felix Dreizin
Mathematics Department
Bar-Ilan University
Ramat-Gan, ISRAEL

Hebrew Computational Linguistics No. 8, 1974

The proposed set of rules for characterizing agreement (= concord) phenomena in Modern Hebrew is sub-divided as follows: a) Gender and Number concord within the NP; b) Definiteness assignment; c) Subject -- Main Verb concord -- in turn sub-divided into cases where the Main Verb is a "full" verb and those where it is a copula. The formation of these rules is preceded by a brief descriptive statement of types of redundancy rules which inter-act with agreement phenomena (e.g. certain types of nominals are inherently [+Definite]). The phenomenon of agreement-assignment is viewed as a transformational process of "feature-assignment" whereby a specific feature or set of features (e.g. Gender, Number) is copied from one term to other terms within a given syntactic configuration. The process involved is essentially one of "daughter-adjunction". Note is made of the ordering agreement assignment with respect to other processes such as passivization or nominalization.

JUNCTION GRAMMAR AS A BASE FOR AUTOMATIC LANGUAGE PROCESSING

E. Lytle, and D. Packard
Brigham Young University
Provo, Utah

Preprint, Annual Meeting, Association for Computational Linguistics 1974

Junction-rule schemata interrelate constituent operands via adjunction, conjunction, or subjunction. These fundamental relations are further subdivided in terms of: (1) operand categories; (2) operand junction attributes; and (3) operand scope. Constraints imposed upon the form and content of junctions exclude those not evidenced by natural language data. At the highest level of specificity, junction markers represent an interaction of individual indices, class indices, and a variety of functional entities.

Grammar

MACHINE TRANSLATION AND GERMAN VERB CLASS SYSTEM

Mark Strong
Brigham Young University

Proceedings of the [BYU] Linguistics Symposium, 1972

German verbs have 25 forms per verb, and can use either 'have' or 'be' as an auxiliary. A verb class system is proposed in which information about the complete conjugation can be stored in two hexadecimal digits (i.e. in less than 32 classes). This compares with a detailed traditional verb class system that makes 47 distinctions and could not be contained in the space available.

PROCEDURES FOR ORDERING WELL-FORMED SYNTACTIC STATEMENTS

Floyd H. Billings, Jr.
Brigham Young University

Proceedings of the [BYU] Linguistics Symposium, 1973

In junction grammar representations of sentence structure, the relations between lexical items is logical but not linear. Lexical ordering rules are thus independent from the syntactic representation. Some rules can be assigned by knowing which junction rule is involved e.g. in English the rule joining a preposition to its object is always left-to-right, but in German prepositions have to be classified as either preceding or following. A second type of ordering rule involves the operands of a junction rule being more closely related to each other than to any outside element. An example is the processing of articles; an unmodified noun immediately follows the article, but is realized elsewhere when the noun is modified. Discontinuous orderings are omitted at their actual locations and processed at a designated insertion point.

Grammar

CORPUS OF MODERN FRENCH VERB-AFFIX NOMINALIZATIONS

Corpus des nominalisations verbo-affixales du Français moderne

Laurent Bourbeau
Groupe de recherches pour la traduction automatique
Université de Montreal

Working Papers in the Linguistics of Machine Translation, 1974

A study of productive affixes serving as lexical indicators. One program edits a deck and writes a matrix of verbs. A second lists the verbs by categories of various codes. A third lists all nominalizations indicated by codes. The results are tools for research. Tables of codes, card formats, etc.

LA NOMINALISATION

Laurent Bourbeau
Groupe de recherches pour la traduction automatique
Université de Montreal

Working Papers in the Linguistics of Machine Translation, 1974

Theories of Grevisse, Tesnière, Dubois, Tutescu. Coding of verbs: morphology, complements, genders of nouns derived.

Parsers

A BEST-FIRST PARSER

William H. Paxton
Artificial Intelligence Center
Stanford Research Institute
Menlo Park, California

SRI Publication No. Z108 April 1974

A parser for a speech understanding system is described. The parser uses a best-first strategy in which alternative paths are assigned priorities and paths are suspended as long as there is a higher priority alternative to explore. Discussions are included on the types of steps in a parse, the assignment of priorities, cooperation among competing parses, and experimental results.

THE LINGUISTIC STRING PARSER

R. Grishman, N. Sager, C. Raze, and B. Bookchin
New York University

Proceedings of the National Computer Conference, 1973, 427-434

The string grammar has three components: (1) A set of some 300 BNF definitions for combining elementary strings into sentences (2) A set of restrictions on the strings. (3) A word Dictionary. The parser is top-down serial with automatic backup. It produces all parse trees of a sentence. Restrictions are written in a subset of English and translated by the parser into lists of basic operations recognized by the restriction interpreter. For conjunctions, satisfaction of an element of their definition causes an interrupt to insert in the tree a process node that later causes zeroed slots to be filled in by links to other subtrees.

L E X I C A L S E M A N T I C S

SYNONYMIC MEANS OF LANGUAGE

Leksiceskaja Semantika
Sinonimiceskie Sredstva Jazyka

Ju. D. Apresjan

Science Press
 Moscow
 1974

Table of Contents

FOREWORD	3
1. The fundamental ideas of modern semantics	6
Sources of semantics	6
Modern semantics as part of a general theory of language	11
The "Meaning ---- Text" model and its evolution	36
2. Semantic language as a means of interpreting lexical meaning	56
The linguistic sign and the concept of lexical meaning	56
Elements of a language for the interpretation of lexical meaning	70
Dictionary of the semantic language	70
Syntax of the semantic language	77
Laws of interaction of signs	79
Requirements for interpretation and for induced expression	95
Experiments in the interpretation of signs	107
Samples of interpretation	107
Test of the correctness of interpretation	113
The role of semantic language for descriptive linguistics	114
From interpretation to deep syntactic structure: a model of government	119
The semantic valence of a word	119
A model of word government	133

LEXICAL SEMANTICS (CONTINUED)

General characteristics of the means of paraphrasing	156
3. Word formation and polysemy	164
Word formation in the proper meaning of the word	164
Suppletive word formation	168
Polysemy (semantic derivation)	175
Types of ambiguity in language and speech.	176
Polysemy and word formation	187
Regular polysemy of substantives	193
Actant meaning	193
Other types of meaning	200
Regular polysemy of verbs	203
'Caustion' - 'extraction' - 'liquidation' - 'removal' - 'elaboration' - 'deformation'.	205
'Action' - 'caustion of action'	208
Other causative meanings	209
Other types of meaning	209
Regular polysemy of adjectives	211
Causative meaning	212
Purposive meaning	212
Parametric meaning	213
Other types of meaning	214
4. Lexical synonyms	216
Definition of lexical synonyms	216
Status of the question	216
Lexical synonymy: analysis and definition	220
Sources of lexical synonyms	224
Combinability distinctions among synonyms	230
Inclusion of combinabilities	232
Intersection of combinabilities	233
Full coincidence of combinabilities	234
Quasisynonyms	235
Geno-specific distinction	235
Specio-specific distinction	237
Neutralization of semantic distinction	239

LEXICAL SEMANTICS (CONTINUED)

On the concept of nuance of meaning	243
Series of quasisynonyms and semantic role	248
5. Lexical converses	256
Preliminary remark and definition	256
Sources of lexical converses	263
Ready made converses	263
Regular methods of formation of converses	265
Basic types of converses	266
Syntactic types	266
Semantic types	268
Two-place converses	268
Three-place converses	272
Combinability types	273
Quasiconverses	275
Definition and basic types	275
Neutralization of semantic distinctions among quasiconverses	281
6. Lexical antonyms	284
Preliminary remark	284
Semantic analysis of antonyms	288
The 'begin' - 'end' type	288
The 'action' - 'annihilation of the result of action' type	290
The 'R' - 'not R' type	292
The 'more' - 'less' type	295
Other types of antonyms	297
Complex antonymy and the definition of antonyms	301
Other questions in the theory of antonyms	302
Semantic asymmetry of antonyms	302
Combinability distinction of antonyms	305
Means of formation of antonyms	306
Quasiantonyms	312

LEXICAL SEMANTICS (CONTINUED)

7. Deep syntactic transformation	316
Introductory note	316
Some new rules of paraphrasing	324
Equimeaning transformations	326
Implicative transformations	333
Syntagmatic restrictions imposed on transformation (filters)	335
Conclusion	344
Bibliography	346

Discourse

THE STRUCTURE OF TASK ORIENTED DIALOGS

Barbara G. Deutsch
Artificial Intelligence Center
Stanford Research Institute
Menlo Park, California

SRI Publication No. Z106 April 1974

The discourse and task information in task oriented dialogs and their use in a speech understanding system are discussed. The results of analyzing some task oriented dialogs are given. A preliminary model of the structure of these dialogs and heuristics for building and using it in a speech understanding system are presented.

Comprehension

THE SRI SPEECH UNDERSTANDING SYSTEM

Donald E. Walker
Artificial Intelligence Center
Stanford Research Institute
Menlo Park, California

SRI Publication No. 2107 April 1974

This paper describes the structure of the SRI speech understanding system and presents the available data on its performance. The system is distinctive in the way that knowledge of various sources is coordinated by a "best-first" parser to predict the sequence of words in an utterance, and in the use of word functions --programs that represent the acoustic characteristics of a word-- to test the predictions.

THE BELIEVER SYSTEM

G. Brown
Department of Computer Science
Rutgers University
New Brunswick, N.J.

Report No. CBM-TR-34, 1974

Attempts to understand and interpret natural language descriptions of human action. Plans and episodes must replace sentences as units of human action to facilitate interpretation of motivation. A plan is an action or a sequence of actions caused by a person in order to achieve a foreseeable goal. An episode is a sequence of acts containing a single plan or several inter-related plans. The Believer System uses Schmidt's theory of intention and personal causation to isolate a plan from a series of acts which may be mostly unrelated to the plan.

Comprehension

SEMANTICS AND SPEECH UNDERSTANDING

Bonnie L. Nash-Webber
Bolt Beranek and Newman Inc.
Cambridge, Mass

Report No. BBN-2896, AI-19, October, 1974

Syntactic constraints and expectations are based on the patterns formed by a given set of linguistic objects, e.g. nouns, verbs, adjectives, etc. Pragmatic ones arise from notions of conversational structure and the types of linguistic behavior appropriate to a given situation. The bases for semantic constraints and expectations are an a priori sense of what can be meaningful and the ways in which meaningful concepts can be realized in actual language. The paper describes how semantics is being used in several recent speech understanding systems and discusses in detail some actual problems that have arisen. [Ad-787 616/2GA; PC \$4.25; MF \$2.25]

THE CASPERS LINGUISTIC ANALYSIS SYSTEM

John W. Klovstad and Lee F. Mondshein
M.I.T. Lincoln Laboratory
Lexington, Mass.

IEEE Transactions on Acoustics, Speech, and Signal Processing
ASSP-23, February 1975, 118-123

CASPERS (Computer-Automated Speech Perception System) is a user-modifiable facility for translating strings of acoustic symbols into sentences. Three distinctive aspects of the system's design are the dynamic application of acoustic-phonological rules across word boundaries, an acoustic-unit splitting-and-merging strategy for treating the dictionary matching problem, and an extensive capability for handling semantic routines within an augmented context-free grammar.

Comprehension

MOTIVATION AND OVERVIEW OF SPEECHLIS: AN EXPERIMENTAL PROTOTYPE FOR SPEECH UNDERSTANDING RESEARCH

W. A. Woods
Bolt Beranek and Newman Inc.
Cambridge, Mass.

IEEE Transactions on Acoustics, Speech, and Signal Processing
ASSP-23, 1975, 2-10

Syntactic, semantic, pragmatic and lexical knowledge interact with acoustical and phonological information in the process of speech understanding. A feature-extraction component produces a segment lattice of phonetic descriptions of the acoustic signal. Words from a lexicon are matched against the input signal. A syntactic component judges the grammaticality of hypothesized interpretations, and a semantic component judges meaningfulness. A pragmatic component judges the likelihood of a sentence being uttered in the situation by the speaker. The control component uses the above components predictively to construct 'theories' that can be evaluated by other components or used to set monitors, that, when triggered, initiate procedures to assimilate the event.

A PROSODICALLY GUIDED SPEECH UNDERSTANDING STRATEGY

Wayne A. Lea, Mark F. Medress, and Toby E. Skinner
Sperry Univac
St. Paul, Minnesota

IEEE Transactions on Acoustics, Speech, and Signal Processing
ASSP-23, 1975, 30-38

Prosodic features break up continuous speech into sentences and phrases, and locate stressed syllables in those phrases. The most reliable phonetic data are obtained by performing a distinguishing feature analysis within the stressed syllables and by locating sibilants and other robust feature information in unstressed syllables. The numbers and locations of syntactic boundaries and stressed syllables are used to select likely syntactic and semantic structures, with which words are hypothesized to correspond to the partial distinguishing features matrices obtained from the segmental analyses.

Comprehension

CONTROL CONCEPTS IN A SPEECH UNDERSTANDING SYSTEM

Paul Rovner, Bonnie Nash-Webber, and William A. Woods
Bolt Beranek and Newman Inc.
Cambridge, Mass

IEEE Transactions on Acoustics, Speech; and Signal Processing
ASSP-23, 1975, 136-140

An entirely accurate and precise acoustic transcription of speech is unattainable. Applying knowledge about the phonology, syntax, and semantics of a language, and the pragmatic constraints imposed by a task domain can resolve much of the acoustic ambiguity. Lexical retrieval and word matching programs map segments of phonetic transcriptions of the acoustic signal. Syntactic, semantic and pragmatic components of the system form hypotheses about the original utterance which change as evidence for or against them is found. Theories set traps to catch evidence; when a trap is triggered, an evaluation is made to decide if or when to reprocess. A component can also make a 'proposal' which is a request to try immediately to match words against part of the utterance.

SEMANTIC SUPPORT FOR A SPEECH UNDERSTANDING SYSTEM

Bonnie Nash-Webber
Bolt Beranek and Newman Inc.
Cambridge, Mass

IEEE Transactions on Acoustics, Speech, and Signal Processing
ASSP-23, 1975, 124-129

The principal data structures of the BBN SPEECHLIS semantic system are a semantic network and case frame tokens. The network represents associations among words and concepts. The case frames describe how the semantic relationships may be expressed in an utterance. The semantic system proposes words that might have occurred in the original utterance but have not yet been recognized, constructs meaningful sets of word matches from possible ones, and evaluates the consistency of syntactic structures and semantic hypothesis. Two further tasks for it are under investigation: (1) to guide syntax, and (2) to turn the best theory about an utterance into a formal procedure for operating on a data base.

Comprehension

A PRACTICAL APPLICATION OF A REAL-TIME ISOLATED-WORD RECOGNITION SYSTEM USING SYNTACTIC CONSTRAINTS

Jean-Paul Haton
Laboratoire d'Electricite et d'Automatique
Universite de Nancy,
Nancy, France

IEEE Transactions on Acoustics, Speech, and Signal Processing
ASSP-22, December 1974, 416-419

The recognition of sentences of a language used in numerical command of machine tools is described. The acoustic level operates with dynamic matching procedure and knowledge about syntactics and semantics of the language is used to predict the incoming words. With such a syntax-directed system, real-time recognition of sentences pronounced word-by-word is very accurately achieved, even for several speakers.

A COMPUTER PROGRAM THAT LEARNS TO UNDERSTAND NATURAL LANGUAGE,

Sara R. Jordan

Computers in the Humanities, J. L. Mitchell, editor, 205-214, 1974

Underlying the system is a memory in graph structure form. Concept nodes are related by the following relations: transforms to, combines to form fact, member/subset of this class, class membership in, equivalence, description. Each concept node 'transforms to' words in natural languages, in this case French, German, and English. Mechanical translation is performed by 'transforming to' one language from another for the concepts of the input. Question answering is carried out by inferences on set membership.

Comprehension

PROGRESS IN NATURAL LANGUAGE UNDERSTANDING--AN APPLICATION

W. A. Woods
Bolt Beranek and Newman
Cambridge, Massachusetts

Proceedings of the National Computer Conference, 1973, 441-450

The BBN LUNAR system is described. It enables users to interrogate two data files, using a large subset of English: (1) Analyses of Apollo 11 lunar rock samples; (2) A key phrase index to reports of the first annual Lunar Science Conference. An augmented transition network grammar translates natural language requests into a formal query language, a generalization of the predicate calculus, which operates on the data base.

SOME PRINCIPLES OF COMPUTERIZED LANGUAGE ANALYSIS

R. Brent Thompson
Brigham Young University

Proceedings of the [BYU] Linguistics Symposium, 1972

The four stages in automatic language analysis are (1) Determining the kinds of linguistic elements in the input sentence; (2) Determining the structural relationships among elements; (3) Finding the referential information that may be present; (4) Finding the contextual information that may be present. The BYU group uses junction grammar for (2) and is beginning to work on (3-4)

TOWARD COMPUTER RECOGNITION OF SPOKEN LANGUAGE

R. Byron Purves
Brigham Young University

Proceedings of the [BYU] Linguistics Symposium, 1973

A syntactic recognizer utilizing binary rules is applied to the testing of random strings drawn from a vocabulary of 800 words. Use of the recognizer in a set of 80 utterances gave 65% error-free results; this compared with 35% when only a lexical recognizer was used.

Expression

SENTENCE PARAPHRASING FROM A CONCEPTUAL BASE

Neil M. Goldman
Stanford University
Stanford, California

Communications of the A.C.M. 18, 1975, 96-106

A model of natural language based on Schank's representation of meaning. A program produces sentence paraphrases which demonstrate understanding with respect to a given context. This generator operates in conjunction with a combined memory and inference model. The model encompasses several diverse classes of linguistic knowledge, which include (1) executable tests of conceptual properties stored in discrimination nets, (2) information relating conceptual and syntactic rules, stored in a word sense dictionary, and (3) surface grammatical knowledge stored in a formal grammar.

MODELLING PROPP AND LEVI-STRAUSS IN A
META-SYMBOLIC SIMULATION SYSTEM

Sheldon Klein, John F. Aeschlimann, Matthew A. Appelbaum,
David F. Balsiger, Elizabeth J. Curtis, Mark Foster, S. David
Kalish, Scott J. Kamin, Ying-Da Lee, Lynne A. Price, David F.
Salsieder
Computer Sciences Department
University of Wisconsin
Madison

Technical Report #226, October 1974 WIS-CS-226-74

The plot of several myths is given in relational form; the structure Propp suggested is given similarly. Compatibility of selections of characters, objects, and functions is controlled by subscripts, etc. Programs, grammars, traces, and output are exhibited and commented.

Information structuresINFORMATION SYSTEMS: RECORDS, RELATIONS,
SETS, ENTITIES, AND THINGS

Michael E. Senko
Mathematical Sciences Department
IBM Research Laboratory
Yorktown Heights, N.Y.

Information Systems, 1, 1975, 3-13

This article reviews progress in the creation of a scientific discipline for information systems. It discusses contributions from four sources of fundamental knowledge: (1) Information Systems Technology; (2) Scientific Computation Technology; (3) Linguistics; and (4) Mathematics. It then selectively reviews progress on an information systems science in the most active areas of study: name-based representations, stored representations, access languages, and information systems performance. This discussion relies on the definition of a series of abstract, structured levels for the description, design, and implementation of generalized data base management systems.

Inference

A HEURISTIC APPROACH TO INDUCTIVE INFERENCE IN FACT RETRIEVAL SYSTEMS

C. William Skinner
North Carolina State University
Raleigh

Communications of the ACM, 17, December 1974, 707-712

The procedures make use of a similarity structure which is imposed on the data base using nonnumerical clustering algorithms. They are implemented in a model fact retrieval system which uses a formal query language and a property-list data structure. The procedures are used in a program of experiments with test data bases which are altered by deleting part of the data and by purposely introducing false data. The system can infer the correct response under a variety of conditions involving incomplete and inconsistent data.

REPRESENTATIONS OF THE LANGUAGE RECOGNITION PROBLEM FOR A THEOREM PROVER

Jack Minker and Gordon J. VanderBrug
Department of Computer Science
University of Maryland
College Park

*International Journal of Computer and Information Sciences, 3, 3,
1974 217-250*

Two representations of the language recognition problem for a theorem prover in first-order logic are presented and contrasted. One of the representations is based on the familiar method of generating sentential forms of the language, and the other is based on the Cocke parsing algorithm. An augmented theorem prover is described which permits recognition of recursive languages. The state-transformation method developed by Cordell Green to construct problem solutions in resolution-based systems can be used to obtain the parse tree. In particular the end-order traversal of the parse tree is derived in one of the representations. The paper defines an inference system, termed the cycle inference system, which makes it possible for the theorem prover to model the method on which the representation is based. The general applicability of the cycle inference system to state-space problems is discussed. Given an unsatisfiable set S , where each clause has at most one positive literal, it is shown that there exists an input proof. The clauses for the two representations satisfy these conditions as do many state-space problems.

Dialectology

A COMPUTER MODEL FOR THE ONTOGENY OF PIDGIN & CREOLE LANGUAGES

Sheldon Klein and
Linguistics Department
University of Wisconsin
Madison

V. Rozencvejk
I MGPIIYa
Laboratoriya Machinnogo Perevoda
Moskva

*Technical Report #238, December 1974, Computer Sciences Department
University of Wisconsin*

A system for simulation of language contact as a function of sociocultural, demographic and historical factors; computer model for the generation and growth of Pidgin and Creole languages purely in terms of structural principles and mechanisms. A generative semantic grammar is required for each language. The system contains representations of speakers interacting conversationally. They negotiate and bargain, trying to communicate, selecting constructions that minimize the problems of semantic parsing.

A METHOD FOR ASSESSING VARIABLE RULE AND IMPLICATION SCALE
ANALYSES OF LINGUISTIC VARIATION

D. Sankoff, and P. Rousseau

In: Computers in the Humanities, J. L. Mitchell, editor, 3-15, 197

There are currently two theories of linguistic variation. One suggests that there is an underlying probabilistic component in the competence of each speaker; the other considers the variation to be an artefact of grouping speakers with discretely different grammars--there being an implicational scaling relation among the possible grammars.

A rigorous comparison is made by making a variable rule analysis and an implicational scaling model for data on the deletion of the complementizer QUE in Montreal French. Using the probabilities predicted by the variable rule, the errors expected in fitting the data to the proposed scale are calculated by Monte Carlo simulation techniques. If the actual number of scaling errors is significantly less than predicted, then the variable rule analysis should be rejected. But the number is found to be exactly as expected from a variable rule analysis.

Acquisition

NATURAL LANGUAGE ACQUISITION

Larry R. Harris
Dartmouth College
Hanover, N.H.

Report No. TR-74-1, October, 1974

Adaptive techniques for lexical correlation and grammatical inference suitable for natural language processing are described. These techniques form the basis for a natural language understanding system that improves its performance with time. [AD-787 805/1GA; PC \$3.75, MF \$2.25]

InstructionINFORMATION PROCESSING MODELS AND COMPUTER AIDS
FOR HUMAN PERFORMANCE: SECOND-LANGUAGE LEARNING

Daniel N. Kalikow
Bolt Beranek and Newman Inc.
Cambridge, Mass.

Report No. BBN-2841; AFOSR-TR-74-1730, June 1974

Description of the second field evaluation experiment on the Mark II model of the Automated Pronunciation Instructor (API) system. Two matched groups of students were studied. All were native speakers of Spanish, and all were enrolled in the Intensive English Program at the University of Miami. One group was tested and trained with the API system; the other was simply tested within the same time frame. [AD-787 876/2GA; PC \$6.25, MF \$2.25]

A SEMANTICALLY CENTERED PARSING SYSTEM FOR MIXED INITIATIVE
CAI SYSTEMS

R. R. Burton
Bolt Beranek and Newman
Cambridge, Mass.

Preprint, Annual Meeting, Association for Computational Linguistics, 1974

SOPHIE is a CAI system for teaching electronics. It uses AI techniques to perform question-answering, hypothesis verification and theory formation. Most of its capabilities are derived from using simulation models. It includes a highly tuned structural parser for allowing the student to communicate in a subset of English.

Instruction

A MODEL DRIVEN QUESTION-ANSWERING SYSTEM FOR A CAI ENVIRONMENT

J. S. Brown
Air Force Human Resources Laboratory
Lowry AFB
Colorado

Mimeographed 1973

A question answering system which permits a computer-assisted instruction (CAI) student greater initiative in the variety of questions he can ask is described. A method is presented to represent the dynamic processes of a subject matter area by augmented finite state automata, which permits efficient inferring about dynamic processes and provides a satisfactory deep structure for paragraph generation. A CAI system dealing with meteorology is described which uses this automation model.
[EDRS EDO77195; \$0.65-MF, \$3.29-HC]

TOM SWIFT AND HIS ELECTRIC BILINGUAL GRANDMOTHER

T. Manwell

ACM SIGCUE Bulletin, 7, January 1973, 5-17

A description of a prototype computer assisted instruction system for teaching Russian. Although the course stresses the Russian morphological system, the construction of the computer program is applicable to other languages and language teaching specialties.

Documentation

ON AUTOMATIC QUESTION MODIFICATION IN FREE TEXT SEARCH

Christine Schaab

ZMD-A-26 Zentralstelle für maschinelle Dokumentation
Beuth-Vertrieb GmbH. Berlin 30. May 31, 1974

To increase the hope of a hit in free-text search, questions can be expanded by the addition of broader terms, narrower terms, related terms, and synonyms. To reduce the chance of false drops, expansions can carry fractional weights; a match is accepted only above a threshold. Examples are analyzed.
[ISBN 3-410-44026-7]

SUPPLEMENTARY PROGRAMS FOR INPUT TO STAIRS IN THE I & D - AREA

ZMD-A-27 Zentralstelle für maschinelle Dokumentation
Beuth Verlag GMBH. Berlin 30. July 15, 1974

STAIRS is an IBM program. The additions improve I-O operations in information and documentation use. Content: Data bank construction; dictionary improvements; data input; parameter input; dialogue retrieval; batch retrieval; user accounting.
[ISBN 3-410-44027-5]

STATISTICAL RELATIONS BETWEEN TEXT WORDS AND DESCRIPTORS

Rainer Kragenings

ZMD-A-25 Zentralstelle für maschinelle Dokumentation
Beuth-Vertrieb GmbH. Berlin 30. May 2, 1974

From six issues of Food Science and Technology Abstracts, containing 8405 abstracts, the conditional probability Z of a descriptor given a text word was computed. In a seventh issue, containing 12,705 descriptor applications, the automatic assignment of descriptors was tested. With $Z = 0.3$ as cutoff, 28,251 applications include 9,139 correct; with $Z = 0.7$, 4,936 applications include 3,782 correct. [ISBN 3-410-44025-9]

Documentation

AUTOMATIC EXTRACTION OF CONTENT-SIGNIFICANT SENTENCES

J. M. Carroll and J. Cakarnis
Computer Science Department
University of Western Ontario

In Proceedings of the Second Open Conference on Information Science
in Canada; edited by A. Gamache & R. Penner. Ottawa: Canadian
Association for Information Science, 1974, 73-78

Content-significant sentences can be extracted automatically in decreasing order of importance from scientific papers available in machine-sensible format. Ordering is accomplished according to multiple regression of a non-linear combination of variables. The dependent variable is a subjective weighting of sentence importance. The independent variables include each word's relative frequency, the type-to-token ratio, mean-word length, and the predominant parts of speech encountered.

TranslationSOME SEMANTIC CONSIDERATIONS IN RUSSIAN-ENGLISH
MACHINE TRANSLATION

Larissa Toma, Paul Garrett, Ludek Kozlik, Donald Perwin,
and Chuck Starr
Latsec Inc.
La Jolla, California

Report No. RADC-TR-74-189, August 1974

The final RADC supported optimization phase of the SYSTRAN Russian-English translation system. The primary thrust of this effort was directed at implementing the use of semantic analysis in both source language analysis and target language synthesis. This project has shown semo-syntactic analysis to be a highly feasible means of sophisticating machine translation and decreasing the need for post-editing. [AD-787 671/7GA; PC \$5.75, MF \$2.25]

MACHINE TRANSLATION. A BIBLIOGRAPHY WITH ABSTRACTS

E. J. Lehmann
National Technical Information Service

Report No. COM-73-1171/8, October 1973 Price \$20.00

Bibliography containing 100 selected abstracts of research reports retrieved using the National Technical Information Service on-line search system. Research on machine translation of various languages is covered. Topics concerning syntax, computer programming, computer hardware and semantics are included.

TranslationUSERS EVALUATION OF MACHINE TRANSLATION, GEORGETOWN
GEORGETOWN MT SYSTEM, 1963 - 1973

Bozena Hennisz Dostert
Texas A&M University

Report No. AD-768 451

The utility of unedited Russian-English machine translation in operational environment. The study is based on the performance of the Georgetown MT system at the AEC Oak Ridge National Laboratory and EURATOM Common Research Center. Production volume, suppliers/users of machine translation services, production cost, computer environment, and improvements since 1963. Methodology of collection and analysis of individual assessments. A wide range of uniformly favorable responses elicited by questionnaire and personal interview from users in the USA, Italy, Belgium, Germany and Holland.

MACHINE-AIDED EDITING

Peter P. Toma, Jerry A. Carlson, David R. Stoughton, Joann P. Ryan
Latsec Inc.
La Jolla, California

Report No. RADC-TR-73-368, December 1973

SYSTRAN system displays simultaneously on a CRT a Russian input sentence and the English output, plus some context. The editor can delete, insert, rearrange, etc, via key-board operations. Recommendations for optimization of this system include how editing functions might best be carried out on video editing terminals in conjunction with a computerized typesetting system. Various criteria for choosing a typesetter are considered, and a Photon Pacesetter Mark II is recommended to best serve the future needs of the Technical Translation Division at Wright-Patterson AFB. Explores the feasibility of automatically flagging SYSTRAN output through application of English well-formedness criteria. Includes a survey of the distribution in English of adnominal genitive constructions, compound nouns, and possessive-noun plus noun constructions and an illustration of how the findings of this survey might be applied to improve the English output of Russian adnominal genitive structures.
[AD-775 160/5GA, PC \$500, MF \$1.45]

Translation

DEVELOPMENT OF CHINESE-ENGLISH MACHINE TRANSLATION SYSTEM

William S-Y Wang, and Stephen W. Chan
 University of California
 Berkeley

Report No. RADC-TR-74-22, February 1974

Describes a 2-1/3 year effort to further develop the prototype Chinese-English Machine Translation System. Additional rules were incorporated into the existing grammar for Chinese analysis and interlingual transfer, with emphasis on the latter. CHIDIC was updated and revised. Approximately 16,000 new entries were added to CHIDIC, bringing the total available entries to over 73,000. Linguistic work on a random access dictionary incorporating feature notation was carried out. A new design for the translation system was initiated and partially programmed for conversion of the current system from a CDC 6400 version into an IBM version. Better control of the parsing process was achieved by improving the segmentation procedures during input, and by addition of more revealing diagnostic printouts as steps toward reduction of spurious ambiguities. The Model 600D Chinese Teletypewriter System was used for the first time to prepare large batches of texts for input. A total of 307 pages of machine readable texts, comprising 300,000 characters were prepared during this report [AD-776 813/8GA; PC \$4.75, MF \$1.45]

THE EVOLUTION OF A COMPUTER MODEL OF AUTOMATIC TRANSLATION
 BASED ON JUNCTION GRAMMAR

Lance S. Smith
 Brigham Young University

Proceedings of the [BYU] Linguistics Symposium, 1972

Initially the system was applied to Russian analysis and English synthesis. Later versions have Russian and English synthesis, and English, French, Spanish, Portuguese, German, and Japanese synthesis. Analysis is based on the junction grammar model of syntax, and has a vertical cycle, i.e., all the tests are applied to a single node before moving on to the next node. Reverse Polish notation is used to represent the analysis. A skeleton supervisor calls in language specific routines for language specific problems, for example, in the interlingual transfer process.

Translation

INTERACTIVE SENTENCE PARSING AND TRANSFER

Alan K. Melby
Brigham Young University

Proceedings of the [BYU] Linguistics Symposium, 1973

The system for manipulating syntactic analyses generated using the junction grammar formalization. The system is used to construct inputs for synthesis routines and to study comparative grammars of languages. In addition to operating on syntactic structures, semantic ambiguities are resolved by requests to the user.

ON THE FRENCH EQUIVALENTS OF ENGLISH PASSIVE CONSTRUCTIONS

Irena Bellert
Groupe de Recherches pour la Traduction Automatique
Universite de Montreal

Etudes de linguistique appliquee a la traduction automatique, 1974

Selection of passive, impersonal (il, on), reflexive, active. Keys are anaphora, modal, adverbs, quantifiers, by-phrase, heaviness.

Programming

COMPUTERS, PROGRAMMING, AND NATURAL LANGUAGES
Ordinateurs, Programmation, et Langues Naturelles

Jacques Andre and Catherine Fuchs

*Maison 4M Mame
49 Boulevard Preuilly
37017 Tours Cedex
France*

TABLE OF CONTENTS

- I. Algorithms, programming, and computers
- II. Hardware and software
- III. Basic notions of a programming language
- IV. Simple modes
- V. Syntax and semantics
- VI. Tests
- VII. Iteration instructions
- VIII. Tables
- IX. Structures
- X. References
- XI. Routines
- XII. Lists and trees
- XIII. A concrete realization

Described as a book for students in linguistics, sociology, psychology, and history. Analysis of linguistic deep structure using a language based on Algol 68.

35.00 Francs

Programming

STUDY AND COMPILATION OF COMPUTER LANGUAGES

Y: Wallach
 Department of Electrical Engineering
 Technion-Israel Institute of Technology
 Haifa, Israel

Gordon and Breach Science Publishers
New York, London, and Paris
 1974

TABLE OF CONTENTS

I.	Motivation	I
II.	Language descriptions	7
III.	A PL/I subset	57
IV.	Introduction to compiling techniques	91
V.	Parsing methods	141
VI.	List processing	217
VII.	Precedence method	273
VIII.	Grammar transformations	335
IX.	Algol	397
X.	Additional language features	483
	References	607

ISBN 0 677 04010 5
 LC Card 73-89202

\$45.00

Programming

STRING AND LIST PROCESSING IN SNOBOL4: TECHNIQUES AND APPLICATIONS

Ralph E. Griswold
Department of Computer Science
The University of Arizona

*Prentice-Hall, Inc.,
Englewood Cliffs, New Jersey
1975*

TABLE OF CONTENTS

1. Pattern matching	1
2. Defined functions	20
3. Structures	47
4. Applications in Mathematics	95
5. Cryptography	122
6. Document preparation	160
7. Additional applications	192
Appendix A. Character sets	226
Appendix B. Solutions to selected exercises	231
References	275
Defined functions	279
Subject index	282

"SNOBOL4 is usually described as a string-processing language...[but] is...a general-purpose language that stresses 'nonnumerical' facilities. The list-processing facilities in SNOBOL4 are not as well known as the string-processing facilities." p. xi

ISBN 0-13-853010-6

Programming

F O R T P A N T E C H N I Q U E S
WITH SPECIAL REFERENCE TO NON-NUMERICAL APPLICATIONS

A. Colin Day

Cambridge
at the University Press
1972

TABLE OF CONTENTS

1. Basic techniques	1
2. Numbers and characters	14
3. Plotting graphs on the lineprinter	20
4. Searching a table	35
5. Characters and words	43
6. Stacks and queues	51
7. List processing	64
8. Sorting	71
9. Symbol-state tables	83
Bibliography	94
Index	95

ISBN 0 521 08549 7 hard cover

0 521 09719 3 paperback

LC Card 72-78891

\$3.95 paperback

Programming

A MULTI-PROCESSING APPROACH TO NATURAL LANGUAGE

Ronald M. Kaplan
Harvard University
Cambridge, Massachusetts

Proceedings of the 1973 National Computer Conference, 435-440.

The General Syntactic Processor (GSP) incorporates basic facilities of Woods's augmented transition network grammar and Kay's 'powerful parser'. The former is a top-down system that can needlessly repeat computation on backtracking. The latter is a bottom-up parser that exhaustively forms every wellformed string in a sentence. GSP overcomes the disadvantages of these systems through use of a transition network as the formalism for the grammar, and charts as parse structures. In a chart each constituent is represented only once; thus a chart represents in one structure all possible parses of a sentence. The subnetworks of GSP are conceived as a collection of asynchronous processes which operate on overlapping chart sections and use the chart to communicate with each other.

ENGLISH ANALYSIS: WHAT YOU SEE IS WHAT YOU GET

Daryl Gibb
Brigham Young University

Proceedings of the [BYU] Linguistics Symposium, 1973

In processing an English sentence, humans bring into play a vast amount of experience and logic. In the BYU system, the automatic analysis is assisted by human interaction to resolve problems of antecedents of proforms, the noun phrase modified by a prepositional phrase, etc. The system is being used to study the problems that arise in language analysis and to form a base for extending the automated system.

Picture analysis

ISIS: AN INTERACTIVE FACILITY FOR SCENE ANALYSIS RESEARCH

J. M. Tenenbaum, T. D. Garvey, S. A. Weyl, and H. C. Wolf
Artificial Intelligence Center
Stanford Research Institute
Menlo Park, California

SRI Publication No. Z111 June 1974

Summarizing initial progress in developing a computer system that can be rapidly programmed to analyze any class of pictorial scenes. Scene analysis programs have been awkward to develop using conventional programming systems because of the difficulty of formulating pictorial descriptions in symbolic terms. Picture processing techniques are inherently ad hoc and must be deduced empirically for each application.

An interactive system specifically designed for expressing and experimenting with perceptual strategies, it allows an experimenter to describe basic perceptual concepts to a computer in terms of pictorial examples. Examples are designated graphically by encircling areas of a displayed scene with a cursor. A concept is represented internally by values of primitive feature-extraction operators that distinguish it from examples of previously defined concepts. Concepts so defined constitute a common vocabulary, shared by man and machine, that can be used symbolically in describing objects and specifying scene analysis procedures.

The system has been used to formulate interactively descriptions that distinguish objects in indoor room scenes and programs that locate these objects in images.

Picture analysisA RELATIONAL DATA BASE SCHEMA FOR DESCRIBING COMPLEX PICTURES
WITH COLOR AND TEXTURE

Tosiyasu L. Kunii, Stephen Weyl and Jay M. Tenenbaum
Information Science Artificial Intelligence Center
 Laboratories Stanford Research Institute
University of Tokyo Menlo Park, California

SRI Publication No. Z109 June 1974

The potential for applying computers to large masses of pictorial information, such as remotely sensed earth resource data or medical photographs, leads to the necessity for carefully designing underlying data structures. This paper presents a relational schema for describing complex pictures having color and texture. The schema is in abstract form free from any specific implemented storage structure. It provides a means for extending the lifetime of pictorial data by divorcing it from particular hardware and applications programs. Furthermore, it allows integration with shared data bases that include symbolic and numerical information.

The schema presented uses Codd's relational formalism to achieve modularity and associativity of data. Since this formalism was originally developed for commercial applications, this paper provides an outline of the relevant concepts. To accommodate picture-processing applications, procedures for reducing relations to canonical form, based on a world model, are considered from an inductive viewpoint.

Literature

COMPUTERS IN THE HUMANITIES

J. L. Mitchell, Editor
University of Minnesota

Edinburgh University Press
University of Minnesota Press
Minneapolis
1974

TABLE OF CONTENTS*Linguistics*

A method for assessing variable rule and implicational scale analyses of linguistic variation D. Sankoff and P. Rousseau	3	50
Automatic identification of phrasal verbs Godelieve L. M. Berry-Rogghe	16	27
The creation of a set of alphabets for the Chinese language - K. L. Su	27	
Why and how do we study the sounds of speech? W. S-Y. Wang	39	

Literary Stylistics

The semantic significance of spatial movement in narrative verse: patterns of regressive imagery in the <u>Divine Comedy</u> . - C. Martindale	57	72
On the authenticity of the Baligant episode in the <u>Chanson de Roland</u> . - J. R. Allen	65	71
Authorship attribution in Jacobean dramatic texts W. M. Baillie	73	71
Measuring alliteration: a study in method. N. B. Wright	82	
An EYEBALL view of Blake's <u>Songs of Innocence and Experience</u> . - D. Ross	94	71

A summary of this paper appears on the indicated frame of this
fiche.

COMPUTERS IN THE HUMANITIES

TABLE OF CONTENTS (Continued)*Lexicography and Language*

SHAD: a Shakespeare dictionary M. Spevack, J. J. Neuhaus and T. Finkenstaedt . . .	111	27
A computerized lexicon of English E. R. Maxwell and R. N. Smith	124	28
The language of the <u>Peterborough Chronicle</u> J. L. Mitchell	132	25

Information Retrieval

A list of French prose fiction, 1751-1800: a progress report. - R. L. Frautschi	149	
A computerized bibliography of Scottish poetry G. R. Roy, R. L. Oakman and A. C. Gillon	168	
Computer-output microfiche in the Catalog of American Portraits. - W. P. Cole	175	
New approaches to epigraphic problems in Roman history E. J. Jory	184	
An information system for the Joint Caesarea Maritima (Israel) archaeological excavations. - D. D. Fisher	191	

Systems for the Humanities

A computer program that learns to understand natural language. - Sara R. Jordan	205	45
A common structure for lexicographic data D. Sherman	215	28
From a word-form concordance to a dictionary-form concordance. - D. J. Koubourlis	225	26
JEUDEMO: a text-handling system P. Bratley, S. Lusignan and Francine Ouellette . .	234	26

COMPUTERS IN THE HUMANITIES

TABLE OF CONTENTS (Continued)

FORTTRAN as a medium for language analysis	
R. H. Rasche	250
<i>Music</i>	
Analysis of tonal music at the level of perception	
I. A. Morton '	261
MUSTRAN II: a foundation for computational musicology	
J. Wenker	267
<i>Art and Poetry</i>	
Computer-assisted poetry: the writing machine is for everybody. - R. W. Bailey	283
Randomly generated graphics	
H. Kawano	296
Computer graphics	
Ruth Leavitt	298
Textured animated poetry and the film <u>Morning Elevator</u>	
A. Layzer	300
SPLAT: a computer language for artists	
D. Donohue and J. Skelton	301

ASSOCIATION FOR LITERARY AND LINGUISTIC COMPUTING

B U L L E T I N

Volume 2 Number 3
 Michaelmas Term 1974

CONTENTS

R. Hirschmann, Guest editorial	2
Nona Newman, The use of general-purpose statistical packages in linguistics research	4
G. P. Zarri, A project of a new and updated edition of the fifth volume of the Corpus Inscriptionum Latinarum, with automatic preparation of indexes	7
L. A. Ule, Cluster analysis	16
J. W. Lewis, Courses for humanities students - a personal viewpoint	22
Jitka Stindlova, Fonds lexical tcheque implante sur cartes perforees et sur bandes magnetiques: l'achevement de la premiere etape du travail	25
J. L. Dawson, Suffix removal and word conflation	33
J. E. G. Dixon, A prose concordance: Rabelais	47
N. D. Thomson, Literary statistics IV: on hypothesis testing	55
J. J. Helm, APA Computer colloquium: December 1973	62
J. R. Allen, Computers and critics: a report on the 1973 MLA Convention	65
W. Lenders, Bericht über die LDV-fittings in München im Februar 1973 und im Januar 1974	70
K. Hölker, The role of grammar in non-automatic and auto matic text processing: Conference at the ZiF of the University of Bielefeld, West Germany, February 1974	73

LiteratureON THE AUTHENTICITY OF THE BALIGANT EPISODE IN THE 'CHANSON
DE ROLANDE

J. R. Allen

Computers in the Humanities, J. L. Mitchell, editor, 65-72, 1974

There is a dispute over the authenticity of one episode of the poem. The author uses a vocabulary distribution test to show that there is a significant indication of stylistic differences between the Baligant episode and the rest of the poem.

AUTHORSHIP ATTRIBUTION IN JACOBAN DRAMATIC TEXTS.

W M. Baillie

Computers in the Humanities J. L. Mitchell, editor, 73-81, 1974

Using the EYEBALL program for stylistic analysis, statistics are found for function-word modifiers, complements, noun modifiers and coordinators/subordinators that distinguish the writings of Fletcher from those of Shakespeare. This data is to be applied to Henry VIII, the authorship of which is disputed between the two writers.

AN EYEBALL VIEW OF BLAKE'S SONGS OF INNOCENCE AND OF EXPERIENCE

D. Ross

Computers in the Humanities, J. L. Mitchell editor, 94-108, 1974

Starting from a text in natural language the EYEBALL system provides statistics of vocabulary distribution, the number of syllables per word, and an augmented text with annotations for each word which indicate syllable length, grammatical category and function, locations in clause, sentence and text. Analyses of word and clause length, distribution of word classes, and properties of combined word classes are also produced. The system is illustrated by application to Blake's early poems.

LiteratureTHE SEMANTIC SIGNIFICANCE OF SPATIAL MOVEMENT IN NARRATIVE VERSE:
PATTERNS OF REGRESSIVE IMAGERY IN THE DIVINE COMEDY

C. Martindale

Computers in the Humanities, J. L. Mitchell, editor, 57-64, 1974

Using COUNT, a content analysis program of the General Inquirer ilk, with a content analysis dictionary, the Regressive Imagery Dictionary, the hypothesis that a quantitative translation from the imagery of downward spatial movement into psychoanalytic regression, and ascending movement into movement away from regression, is substantiated.

ANNUAL BIBLIOGRAPHY FOR 1973:

LANGUAGE AND LITERATURE

Computers and the Humanities, 8, 1974, 100-108

An unannotated listing by author of some 310 articles.

MathematicsMATHEMATICAL DESCRIPTION OF RELATIONS IN AUTOMATIC
INDEXING AND RETRIEVAL

Hubert Hüther

ZMD-A-24 Zentralstelle für maschinelle Dokumentation
Beuth-Vertrieb GmbH. Berlin 30. April 30, 1974

The algebraic theory of relations on a set: transitivity, symmetry, equivalence, order. Statistical theory: distribution theory for relations, equivalence classes, growth. Application of matrix theory. No examples from documentation.
[ISBN 3-410-44024-X]

NAME INDEX

A J C L 1974

Names accompanied only by the title of a contribution or equally limited information are omitted. C is an opaque card.

A

- Abelson, Philip Problems in scientific publishing 6:11
Abramson, Arthur S. Current trends in linguistics 12 14:3
Adams, Scott NAS/NRC committee on international information 6:8
Adkinson, Burton Repackaging abstracts seminar 6:9
Aeschlimann, John F. Modelling Propp & Levi-Strauss 14:47
Agrawal, Arun On-line speech intelligibility measurement 6:55
Ainsworth, W. A. Performance of a speech synthesis system 14:23
Al-Bayati, H. A. Informatics in developing countries 9:23
Allen, J. R. Authenticity of an episode in 'Rolande' 14-71
Allen, Jonathan Reading aloud by computer 1:8, 6:59
Alford, M. H. T. Literary statistics summer school 1975 9:13
André, Jacques Computers, programming, and natural languages 14:60
Andreewsky, M. Computational linguistics summer school 1975 9:10-12
Appelbaum, Matthew A. Modelling Propp & Levi-Strauss 14:47
Apresjan, Ju. D. Lexical semantics 14:36
Arbib, Michael A. Automaton framework for neural nets 1:74
Atkinson, Richard C. NSF deputy director nominated 9:24
Aurbach, Joseph Phonological rules in speech understanding 14:18

B

- Bailey, Richard W. Lexicography: bibliography 1:9-15
MEMEM: a new approach to lexicography 1:36
Baker, Wm. J. Discriminant function analysis of genres C38, M11

C is an opaque card

13:13 is microfiche 13,

M is a microfiche

frame 13

- Baillie, W. M. Authorship of Jacobean dramas 14:71
- Balsiger, David F. Modelling Propp and Levi-Strauss 14:47
- Barnett, Jeffrey A vocal data management system 1:28
- Baron, Robert J. Neural network model of language 1:75, 6:94
- Beling, Gerd Procedures for thesaurus translation 1:66
- Bell W. ATS in the teaching of exposition 6:78
- Bellert, Irena French equivalents of English passives 14:59
- Benesova, E. Analysis of abstracts (relations, arguments) 1:64
- Berkeley, Edmund C. Computer programming in language 1:69
- Berry-Rogghe, Godelieve L. M. Phrasal verbs 14:27
- Bien, Janusz St. Marysia: a conversational system 6:70
Artificial intelligence in Poland: bibliography 6:26-38
- Bigelow, R. H. REL: English bulk data input 1:61
- Billings, Floyd H. Jr. Syntactic ordering 14:33
- Black, John W. English consonant clusters: perception 14:15
- Bledsoe, W. W. Man-machine theorem-proving system 6:74
- Blésser, B. Character recognition by abstract attributes 14:24
Character recognition: bibliography 6:62
- Bobrow, Daniel G. Programming languages for AI 6:86
- Bocşa, Minerva Rumanian alphabet 6:61, 9:38-52
- Boehm, Barry W. Reliable software conference 6:21
- Boehm, R. Phrase distributions and dictionary growth 14:25
- Book, Ronald V. Structure of context-sensitive grammars 1:39
- Bookchin, B. The linguistic string parser 14:35
- Borden, Ronald F. Microfiche viewer guide 1:3
- Borillo, A. Textual-graphic information system 6:93
Formalization of linguistic data about pictures 6:81
French interrogative constructions 6-81
- Borillo, M. Textual-graphic information system 6:93
- Bourbeau, Laurent French verb-affix nominalization 14:34
Nominalization 14:34
- Bourelly, L. Textual-graphic information system 6:93
- Brainerd, B. Discriminant analysis of novel, romance 6:91
Word counts of Shakespeare's characters 6:91

- Branstad, Dennis K. ACM guide to computer security 9:27
Bratley, P. JEUDÉMO text handling system 14:26
Breivik, Patricia On-line searching in libraries 6:10
Brenner, Everett H. Indexing course for UNESCO 6:9
Broad, David J. Speech recognition 14:18
Brooks, Ruven Computer psychodiagnostician 6:92
Bross, Irwin D. J. Analysis of a jargon 6:83
Brown, G. The believer system 14:41
Brown, J. S. Model-driven question-answering in CAI 14:53
Brown, W. Owen Speech processing: Walsh-Hadamard transforms 1:27
Bruderer, Herbert Survey of MT operations, experiments C29
Bruell, Peter Man-machine theorem-proving system 6:74
Brunnstein, Klaus Information structure in CAI 6:78, 1:60
Burchinal; Lee G. User aspects of information 6:9
Burke, D. Canadian bilingual legal vocabulary 1:36
Burton, Dolores SIGLASH treasurer 1973-1975 6:20
Burton, R. R. Semantic parser for mixed initiative CAI 14:52
Busa, Roberto Index Thomisticus goes to press 9:26
Buttelmann, H. William Semantic translation of CF languages C21 M7

C

- Cakarnis, J. Extraction of content-significant sentences 14:55
Carbonell, Jaime R. Natural semantics in AI. C10, M3
Carlson, Jerry A. Machine-aided editing 14:57
Carlson, Walter M. Information technology and privacy 6:39
Carroll, J. M. Extraction of content significant sentences 14:55
Cary, Charles D. Content analysis of Soviet politics C31
Chafe, Wallace L. Verbalization and Translation C37, M10
Chan, Stephen W. Chinese-English MT 14:58
Chen, David Time, causality, and coexistence in retrieval 1:63
Cherniavsky, V. S. PUSTO-NEPUSTO retrieval system 6:14
Chouraqui, E. Textual-graphic information system 6:93
Chu, Wesley W. Network communication structures C32
Clark, Lawrence M. Computers, machines, animals, men 14:11

- Cofer, Charles N. Structure of human memory 6:39
- Cohen, Jacques Theorem prover in Algol 68 6:76
- Colby, Kenneth Mark Computer models of thought & language 1:51
Recognition of natural language dialogue expressions C12, M5
- Coles, L. Stephen Intelligent machines are on the way 6:87
Robotics: bibliography 6:88
- Collins, Allan M. Natural semantics in AI C10, M3
- Courtin, J. Interactive parser for man-machine communication 1:42
- Cox, C. Phenomenological character recognition 14:24
Character recognition: bibliography 6:62
- Cunningham, Michael A. Neural net model of cognition 6:95
- Curtis, Elizabeth J. Modelling Propp & Levi-Strauss 14:47

D

- Dara-Abrams, Benay Parentheses in spoken algebra 1:29
- Day, A. Colin Fortran: non-numerical techniques 14:63
- DeHeer, T. Syntactic traces in retrieval 6:82
- Denisov, P. N. Principles of linguistic models 6:43
- Deutsch, Barbara G. Structure of task-oriented dialogs 14:40
- Deweze, A. French thesaurus for electronics 14:29
- Diller, Tim SOLAR project distributes materials 6:7
- Dilligan, Robert Computers and the humanities conference 9:14-18
- DiLuglio, Alexandra Current trends in linguistics 12 14:3
- Dixon, N. Ray Adaptive control in speech recognition 6:54
Sequential decoding for phonetic-graphic conversion 1:31
Parametric modular speech processor 14:19
Comparator for speech segmenters, classifiers 14:22
- Dostert, Bozena Henisz REL: information system 1:61
Evaluation of Georgetown MT system, 1963-1973 14:57
- Dreizin, Felix Morphological structure of coherent text 14:32
- Drennon, Gary G. CASE simulator of clinical encounters 6:77
GENESYS generating system for CASE 6:78

E

- Eden, M. Phenomenological character recognition 14:24
 Character recognition: bibliography 6:62
- Ein-Dor, P. Two dictionary structures for retrieval 1:62, 6:82
- Engel, Gerald L. Computer curriculum for undergraduates C19
- Elliott, A. Ronald Speech processing: Walsh-Hadamard 1:27
- Embry, Jonathan Vocabulary of young Navajo children 1:72
- Epstein, George Multiple-valued logic symposium 1975 C7
- Epstein, S. D. Phrase distributions and dictionary growth 14:25
- Erman, Lee D. Speech recognition model and system 1:26

F

- Fahlman, Scott Elliott Planning system for robot builder 6:87
- Faught, Bill Recognition of natural language expressions C12 M5
- Ferber, L. Perceptual continuous speech recognition 14:16
- Fernandez de la Vega, W. Textual-graphic system 6:93
- Findler, Nicholas V. Kinship structures revisited 1:73
 A few steps toward computer lexicometry C11, M4
 Time, retrieval of temporal relations, causality 1:63
- Finley, M. R., Jr. Chinese character classification 14:24
- Finkenstaedt, T. SHAD: a Shakespeare dictionary 14:27
- Firschein, Oscar Intelligent machines on the way 6:37
- Fischler, Martin A. Intelligent machines on the way 6:87
- Fisher, J. G. Phrase distributions and dictionary growth 14:25
- Fishman, Daniel H. Q* search algorithm for deductive Q-A 1-56
 MRPPS interactive proof procedure for Q-A system 6:74
- Fitch, H. Gordon Computer-furthered instruction 1:57
- Fitzpatrick, Eileen Lexical subclasses of the string parser C9 M2
- Fletcher, J. D. Reading: CAI: spelling-pattern transfer 1:59
- Foster, Mark Modelling Propp and Levi-Strauss 14-4
- Freed, M. M. Generation of freshman English exercises 1:57
- Friedman, Joyce Exploration of fast-speech rules 14:14

- Fu, K. S. Syllable detection in continuous speech 6:53
Speaker recognition by nasal spectra, coarticulation 6:53
- Fuchs, Catherine Computers, programming, natural languages 14:60
- Fujimura, Osamu Syllable as a unit of speech recognition 14:19
Computer-controlled radiography 14:13
Computational processing of palatographic patterns 6:51
- Fujisaki, H. Coarticulation: formant frequencies 6:48

G

- Gaddy, Dale Microform handbook 6:25
- Garrett Paul Semantics in Russian-English MT 14:56
- Garvey, T. D. ISIS: interactive facility for scene analysis 14:65
- Gibb, Daryl English analysis: interactive system 14:64
- Glaserfeld, Ernst von Yerkish language for nonhumans C39, M12
- Glave, Frederick E. Network communication structures C32
- Goenenc, G. Code decipherability and Turkish syllables 1:35
- Goldman, Neil M. Sentence paraphrasing from conceptual base 14:47
- Gomberg, S. The REL command language 1:61
- Goralcikova, A. A type of dependency grammar 14:10
- Gquin, A. R. Introduction to automatic translation 1:68
- Graham, George J. Concept collection in political science 6:20
- Grandy, Tom B. Network structures conference 1975 C32
- Gray, Harry J. Design and test of a cognitive model 6:95
- Green, Duff, III Educational data systems conference 6:11
- Greenfield, N. R. Computer system support for data analysis 1:65
- Grishman, R. The linguistic string parser 14:35
- Griswold, Ralph E. SNOBOL4: string and list processes 14:62
- Gross, Maurice Feasibility of high-quality MT 6:85-
- Gueguen, M. Man-machine dialogues, speech recognition 9:12
- Guenoche, A. Textual-graphic information system 6:93

- Hagamen, W. D. ATS for teaching exposition 6:78
- Hajicova, E. Negation in functional-generative grammar 1:44
- Harless, William G. CASE simulates clinical encounters 6:77
GENESYS generating system for CASE 6:77
- Harris, Brian International CL conference, Ottawa, 1976 C6 M9:3
- Harris, Larry R. Natural language acquisition 14:51
- Hartley, J. R. More intelligent CAI systems 1:57
- Haton, Jean-Paul Speech recognition: isolated words 14:45
- Hebenstreit Computers in education conference 1975 C8, M9:22
- Heidorn, G. E. Simulationprogramming in English 1:69
- Hendrix, Gary G. Simultaneous actions & continuous processes 1:70
- Hérault, Daniel Content analysis of scientific text 9:11
- Herskovits, Annette Generation of French 6:84
- Hesnard, A. Textual-graphic information system 6:93
- Hiki, Shizuo Personal vowel quality: acoustics 6:57
- Hirschmann, Rudolf Computers and the-humanities conference 9:14-18
- Hobbs, Jerry Robert Metalanguage for grammatical restrictions 6:68
- Hoffman, A. A. J. Computer curriculum for undergraduates C19
- Holliday, Babette Vocabulary of young Navajo children 1:72
- Holm, Wayne Vocabulary of young Navajo children 1:72
- Hoyle, W. G. Indexing; document classification 1:65
- Hughes, George W. Segment classification in speech 1:28
- Huther, Hubert Mathematical relations in retrieval 14:73
- Hyder, S. S. Generating Urdu-Farsi-Arabic script 1:35
- Hymes, Dell Current trends in linguistics 12 14:3

I

- Ichikawa, Akira Parameters of spoken digits 1:31
- Imagawa, H. X-ray scanner 6:48
- Isaacs, Richard Verbal analogy problems 6:72

- Ishida, H. Computer controlled radiography 14:13
Itahashi, Shuichi Discrete-word recognition 1:26
Itakura, Fumitada Speech recognition: minimum residual 14:21
Itoh, K. X-ray scanner 6:48
Ives, Kenneth H. Economy spelling computerized 1:35

J

- Jamison, Steven L. Computing careers for the deaf C35
Janocosek, Elizabeth English consonant clusters: perception 14:15
Jayant, Nuggehally S. Delta modulation for voice synthesis 1:33
Johnson, Emily G. Printed text discrimination 6:61
Jordan, Sara R. Program learns to understand language 14:45

K

- Kagaya, Ryohei Chinese character representation 6:48
Processing palatographic patterns 6:51
Kalikow, Daniel N. CAI in second-language pronunciation 14:52
Kalish, S. David Modelling Propp and Levi-Strauss 14:47
Kallikourdis, D. Theory of conversations & individuals 1:58
Kameny, Iris Retroflexed and nonretroflexed vowels 14:12
Kamin, Scott J. Modelling Propp & Levi-Strauss 14:47
Kaplan, Ronald M. Multiprocessing approach to language 14:64
Keenan, Stella Indexing course for UNESCO 6:9
Keil, Gerald C. Narrow phonetic transcription 14:13
Keller, Howard H. German root system 1:36
Kellelt, H. Speech recognition: perception 14:16
Kido, Ken'iti Speech recognition: phonology, dictionary 1:26
Kilmer, William L. Neural nets that learn 1:74
Kiritani, S. X-ray scanner 6:48
Kiritani, S. Computer controlled radiography 14:13
Klatt, Dennis Reading aloud by computer 6:59
Spectrogram-reading experiment 6:52

- Klein, Sheldon Discovery of deep-structure rules 1:54
 Ontogeny of pidgin & creole languages 14:50
 Modelling Propp & Levi-Strauss 14:47
- Klein, Wolfgang Functional generative grammar in Prague 6:45
- Klinger, Allen Computational linguistics: progress & goals 6:73
- Kloker, Dean R. Parentheses in spoken algebra 1:29
- Klovstad, John W. CASPERS speech recognition system 14:42
- Knudsen, Michael J. Speech recognition: triple microprocessor 14:20
- Kobayashi, Yo Chinese character recognition: code 6:48
- Koprucu, E. Perceptual continuous speech recognition 14:16
- Koubourlis, D. J. Manually edited concordance 14:26
- Kozlik, Ludek A. Rand data in SYSTRAN 6:63 6:67
 Semantics in Russian-English MT 14:56
- Kragenings, Rainer Statistical selection of descriptors 14:54
- Kuklinski, T. Phenomenological character recognition 14:24
 Character recognition: bibliography 6:62
- Kunii, Toshiyasu Relational storage of pictures with color 14:66
- Kuo, Nan-Hung Computer symposium in Taipei 1975 C33

L

- Landry, B. C. Computer-assisted language analysis system 1:41
- Langer, Andy Computer programming in natural language 1:69
- Lavoie, Jean Computer-aided learning system 1 58
- Lea, Wayne A. Syntactic recognition without phonetics 1:29
 Prosodically guided speech recognition 14:43
- Ledley, Robert S. Medical diagnosis: concept analysis 6:75
- Lee, Ying-Da Modelling Propp & Levi-Strauss 14:47
- Lehmann, E. J. MT: bibliography 14:56
- Lehmann, Winfred P. German-English MT system 6:84
- Leppo, M. ATS in the teaching of exposition 6:78
- Lesk, Michael Chairman, SIGLASH, 1973-1975 6:20
- Li, Charles N. Word order and word order change 14:30

- Li, Kung-Pu Segment classification in continuous speech 1:28
 Syllable detection in continuous speech 6:53
- Lindblom, Bjorn E. F. Segmental-nonsegmental interaction 6:56
- Linden, D. ATS in the teaching of exposition 6:78
- Lineweaver, J. Information languages with grammar 1:63
- Ljudskanov, A. Mathematics and computers in linguistics C16
- Lovins, Julie B. Pronunciation test system 6:48
- Łukaszewicz, Witold MARYSIA: a conversational system 6:70
- Lummis, Robert C. Speaker verification: intensity 1:27
- Lusignou, S. JEUEMO: a text handling system 14:26
- Lytle, E. Junction grammar as a base for CL 14:32

M

- Madden, J. D. Computer conference in Tokyo 1975 C18
- Maegard, B. Segmentation of French sentences 1:42
- Makhoul, John Spectral analysis: linear prediction 1:24
 Inference in speech recognition 6:71
 Ambiguity in acoustic-phonetic recognition 14:17
- Makino, Shozo Speech recognition: phonology, dictionary 1:26
- Maksym, Joseph N. Pitch extraction by waveform prediction 1:25
- Manwell, T. CAI: Russian morphology 14:53
- March, J. F. Indexing: value of document parts 1:64
- Marckworth, Mary Lois Discriminant analysis of genres C38, M11
- Marcus, Solomon Romanian investigations in math, CL 1:21
- Marichal, M. Informatics, philology conference 1974 6:18
- Marinov, V. Breadth-first search: surprising results 1:56
- Markel, John D. Formant analysis: digital inverse filter 1:25
- Martindale, C. Spatial movement in narrative verse 14:72
- Marxer, John J. CASE simulator of clinical encounters 6:77
 GENESYS generating system for CASE 6:78
- Matsumoto, Hiroshi Personal vowel quality: acoustics 6:57
- Maxwell, E. R. Lexicon of English 14:28
- McCandless Stephanie S. Formant extraction: prediction 6:55
 Acoustic-phonetic analysis of continuous speech 14:15

- McSkimin, James R. Q* search algorithm for deductive Q-A 1:56
 MRPPS interactive proof procedure for Q-A system 6:74
- Meara, N. M. Computer-assisted language analysis 1:41
- Medress, Mark F. Prosodic speech recognition strategy 14:43
- Melby, A. K. Junction grammar and machine assisted translation 1:54
 Interactive sentence parsing and transfer 14:59
- Mel'chuk, I. A. Surface-syntactic relations in English 1:38
- Meredith, Dennis L. Reading aloud by computer 6:59
- Mermelstein, Paul Segmentation and phonetic labeling 14:22
- Merwin, Richard E. Making computers easier to use C25
- Miller, George E. CASE simulator of clinical encounters 6:77
 GENESYS generating system for CASE 6:78
- Miller, Neil J. Pitch detection by data reduction 14:21
- Miller, Perry Lowell Locally organized parser 6:58
- Minker, Jack Language recognition for a theorem prover 14:49
 Q* algorithm for deductive Q-A system :56
 MRPPS interactive proof procedure for Q-A 6:74
- Mitchell, J. L. Computers in the humanities 14:67
- Mitchell, J. L. The language of the Peterborough Chronicle 14:25
- Mondschein, Lee F. The CASPERS speech perception system 14:42
 Acoustic-phonetic analysis of continuous speech 14:15
- Moore, Daniel Verbal analogy problems 6:72
- Moorer, James A. Optimum comb pitch period analysis 14:16
- Mori, Renato De Speech recognition: descriptive technique 1:24
- Mullen, Karen SIGLASH editor, 1973-1975 6:20

N

- Nakano, Yasuaki Speech recognition: parameters for digits 1:31
- Nakata, Kazuo Speech recognition: parameters for digits 1:31
- Nash-Webber, Bonnie Speech recognition: semantics 14:44
 Speech recognition: semantics 14:42
 Speech recognition: control concepts 14:44
 Workshop on CL theory 1975 9:4-9, C25

- Neely, Richard B. Speech recognition: model & system 1:26
 Neu, Helene Speech recognition: phonological rules 14:18
 Neuhaus, H. J. SHAD: a Shakespeare dictionary 14:27
 Nickel, Gerhard Applied linguistics conference 1975 C27
 Nickerson, Raymond S. Teaching speech to the deaf 1:60
 Niederjohn, Russell J. Continuant phonemes in English 1:32
 Niimi, S. Recording of laryngeal muscles, glottal shape 6:48
 Nilsson, Nils J. Artificial intelligence 6:49
 Nimura, Tadamoto Personal vowel quality: acoustics 6:57

O

- Oakman, R. L. CAI in the humanities at U. South Carolina 1:23
 Ohsuga, S. Extracting meaning from input sentences 1:53
 Olney, John SOLAR distributes first materials 6:7
 O'Malley, Michael H. What do standard TGs produce? 1:38
 Parentheses in spoken algebra 1:29
 Orne, Jerrold Bibliographic control seminar 6:9
 Oshika, Beatrice T. Speech recognition: phonology 14:18
 Otten, Casper Computer programming in natural language 1:69
 Ouellette, F. JEUEMO: a text handling system 14:26

P

- Packard, D. Junction grammar in CL 14:32
 Pagan, F. G. Representations for semantic relations 1:43, 6:69
 Paitich, Daniel CAPER: psychological examination 1:72
 Panevova, J. A model for synthesis of Czech 1:55
 Pardo, Francis Computer-assisted language analysis 1:39
 Park, W. Perceptual continuous speech recognition 14:16
 Parkison, Roger C. Recognition of expressions C12, M5
 Pask, G. A theory of conversations and individuals 1:58
 Patrick, Robert L. AFIPS system security review manual 9:27
 Paxton, William H. A best-first parser 14:35

- Pepinsky, Harold B. Metalanguage for communication research 6:71
Computer-assisted language analysis system 1:41
- Perwin, Donald Semantics in Russian-English MT 14:56
- Pfeifer, Larry L. Inverse filter for speaker identification 14:17
- Pfeifer, M. Automatic suffix analysis 1:41
- Phillips, Brian Topic analysis 1:53
Model of cognitive knowledge 6:15
- Platek, M. Automata in a generative description of language 14:10
- Plath, Warren J. String transformations in REQUEST C22, M8
- Porch, Ann Devices for preparing files of text 6:60
- Poythress, Vern Embedded pronoun reference 6:66
- Price, Lynne A. Modelling Propp & Levi-Strauss 14:47
- Purves, R. Byron Speech recognition experiment 14:46

R

- Raben, Joseph The humanist in the computer lab 6:50
- Rabiner, Lawrence R. Speech analysis-synthesis, Fourier 1:30
Algorithm for boundaries in ADPCM speech 6:52
- Rabinowitz, Arthur S. Sequential decoding of speech 1:31
- Radimsky, Anne-Louise Guichard Semantic analysis of English 1:52
- Rao, P. V. S. Programming system for speech synthesis 14:23
- Raphael, Bertram Programming languages for AI 6:86
- Raskin, Victor Restricted sublanguages in MT 9:28-37
- Rawson, D. Set-theoretic semantics for mathematical text 1:45
- Raze, C. The linguistic string parser 14:35
- Reddy, D. Raj Speech recognition: model & system 1:26
- Reed, Susan K. ACM guide to computer security 9:27
- Rich, A. Breadth-first search: surprising results 1:56
- Rickman, Jon Interactive on-line thesaurus 1:62
- Rieger, Chuck Understanding by conceptual inference C40, M13
- Riesbeck, C. K. Expectation as a mechanism of comprehension 1:53
- Roberts, A. Hood NSF grant for new journal of CL 1:2
- Robinson, Jay L. MEMEM: a new approach to lexicography 1:36
- Rondeau, Guy International CL conference, Ottawa 1976 C6, M9:3

- Root, Judith A. CASE simulator for clinical encounters 6:77
 GENESYS generating system for CASE 6:78
- Rosen, Barry K. Syntactic complexity 6:66
- Rosenberg, Aaron E. Speaker verification: human ability 1:30
- Rosenfeld, Jack L. IFIP congress 74 proceedings 14:8
- Rosenthal, L. H. Boundary detection in ADPCM speech 6:52
- Ross, D. An EYEBALL view of Blake's songs of innocence... 14:71
- Rothauser, Ernst H. Speech in digital communication 1:34
- Rousseau, P. Assessment of linguistic variation theories 14:50
- Rovner, Paul Control concepts in speech recognition 14:44
- Rozencvejg, V. Ontogeny of pidgin & creole languages 14:50
- Rubenstein, Herbert Current trends in linguistics 12 14:3
- Rubin, Andee Flowcharts of SHRDLU's grammar 6:67
- Rush, J. E. Computer-assisted language analysis system 1:41
- Rustin, Randall Natural language processing 1:19
- Ryan, Joann P. Machine-aided editing 14:57

S

- Sager, Naomi Lexical subclasses of the string parser C9, M2
 The linguistic string parser 14:35
- Sagvall, Anna-Lena Inflectional analysis of Russian 14:31
 Russian belles-lettres, schoolbook text file C34
- Sahin, Kenan E. Response routing in Selcuk networks 1:74
- Salkoff, Morris String grammar for French 6:64
 Lexicography for a string grammar for French 14:29
- Salsieder, David G. Modelling Propp & Levi-Strauss 14:47
- Salton, Gerard SMART retrieval system; descriptor sets 6:16
- Sankoff, D. Assessing linguistic variation theories 14:50
- Sargent, D. C. Syllable detection in continuous speech 6:53
- Sato, Y. Coarticulation in vowel sequence recognition 6:48
- Sawashima, M. Recording of laryngeal muscles, glottis 6:48
- Schaab, Christine Question modification in retrieval 14:54

- Schafer, Ronald W. Speech analysis-synthesis: Fourier 1:30
Boundaries in ADPCM speech 6:52
- Schank, Roger C. Causality and reasoning 1:43
Computer models of thought and language 1:51
Workshop on CL theory 1975 9:4-9
- Scheffler, F. L. Indexing value of parts of documents 1:64
- Schmidt, Joachim W. Structure and retrieval in CAI 1:60 6:78
- Schneider, Hans-Jochen Information systems journal 6:80
CL: summer school 1974 6:14
- Schnelle, Helmut Theoretical linguistics journal 1:18
- Schuck, Hans Jochen Procedures for translating thesauri 1:66
- Schumacher, H. H. Indexing value of parts of documents 1:64
- Schwartz, Richard Ambiguity in acoustic-phonetic conversion 14:17
- Scott, B. C. E. Theory of conversations and individuals 6:71
- Scott, Bernard E. The Logos MT system 6:5-6
- Sebeok, Thomas A. Current trends in linguistics 12 14:3
- Seljan, E. A hybrid retrieval language 1:66
- Senko, Michael E. Records, relations, sets, entities, things 14:48
- Sessions, Vivian S. Urban information systems 6:39
- Sgall, Petr Automatic text processing 1:20
Semantic and logical representation of the sentence 1:44
- Shapiro, Stuart C. Review of Grammar, meaning, CL (Wilks) 1:46-50
- Sherman, Donald Webster's Seventh Collegiate Dictionary 6:63
A common structure for lexicographic data 14:28
- Sherr, Lawrence A. Computer-furthered instruction 1:57
- Shillman, R. Character recognition: bibliography 6:62
- Shillman, R. Character recognition: phenomenology 14:24
- Shooman, M. L. Reliable software conference 1975 6:21
- Shum, F. Ying Y. Speech processing: Walsh-Hadamard transforms 1:27
- Siklossy, L. Breadth-first search: surprising results 1:56
LAWALY robot planning system 6:16
- Silverman, Harvey F. Parametric modular speech processor 14:19
Comparator for speech segmenters, classifiers 14:22
- Simmons, Robert Textual-graphic system 6:17
- Singh, Sadanand English consonant-cluster perception 14:15

- Skinner, C. William Heuristics of inference in retrieval 14:49
- Sleeman, D. H. More intelligent CAI 1:57
- Smith, Joan M. Literary & linguistic computing bulletin 6:89
- Smith, John B. Language analyzer: specifications 6:50
- Smith, Lance S. Concordance & statistics program 14:26
MT based on junction grammar 14:58
- Smith, R. N. Lexicon of English 14:28
- Snow, Thomas B. Segment classification in continuous speech 1:28
- Sone, Toshio Personal vowel quality: acoustics 6:57
- Sophar, Gerald Document access seminar 6:9
- Spang-Hanssen, E. Segmentation of French sentences 1:42
- Spevack, M. SHAD: a Shakespeare dictionary 14:27
- Spolsky, Bernard Vocabulary of young Navajo children 1:72
Current trends in linguistics 12 14:3
- Stankiewicz, Edward Current trends in linguistics 12 14:3
- Starr, Chuck Semantics in Russian-English MT 14:56
- Stechow, Arnim v, Functional generative grammar in Prague 6:45
- Stermole, David G. Discourse analysis of a jargon 6:93
- Stevens, Kenneth N. Spectrogram reading experiment 6:52
Teaching speech to the deaf 1:60
- Stevens, Mary Elizabeth AFIPS system security manual 9:27
- Stewart, D. J. Phrase distributions and dictionary growth 14:25
- Stokolova, N. A. Information languages with grammar 1:63
- Stoughton, David R. Machine-aided editing 14:57
- Strong, Mark MT: German verb=class system 14:33
- Strong, Suzanne Marvin Structural surrogates of English text 1:52,6:72
Computer assisted language analysis system 1:41
- Su, Lo-Soun Speaker identification: nasal spectra 6:53
- Sugita, Shigeharu English-Japanese MT 1:68
- Sukhotin, B. V. Determination of simple-sentence structure 1:42
Deciphering extraterrestrial messages 1:71
Decoding methodology as a linguistic research tool 14:11
- Svensson, Stig-Goran Segmental-nonsegmental interactions 6:56

- Szanser, A. J. Automatic error correction in text 1:65
 Szepe, Gyorgy Considerations for a future analysis (MT) 1:21
 Szpakowicz, Stanisław MARYSIA: a conversational system 6:70

T

- Tappert, C. C. Tree search in phonetic-orthographic mapping 14:20
 Adaptive control of classification, decoding 6:54
 Sequential decoding in phonetic-graphic conversion 1:31
 Tatsumi, I. F. Processing of palatographic patterns 6:51
 Teñenbaum, Jay M. Intelligent machines are on the way 6:87
 ISIS: interactive facility for scene analysis 14:65
 Relational schema for scenes with color, texture 14:66
 Ter-Misakyants, E. T. Frequency dictionary of mathematics 1:37
 Thomas, Ian B. Continuant phoneme recognition in English 1:32
 Thompson, R. Brent Stages of computerized language analysis 14:46
 Thosar, R. B. Speech synthesis programming system 14:23
 Titze, Ingo R. Human vocal system: mathematical model 14:12
 Tognotti, J. Textual-graphic information system 6:93
 Toma, Larissa Semantics in Russian-English MT 14:56
 Toma, Peter P. Machine-aided editing 14:57
 Rand corporation data in SYSTRAN 6:67 6:63
 Trilling, Laurent Theorem prover in Algol 68 6:76
 Tuggle, Francis D. Verbal analogy problems 6:72
 Computer-furthered instruction 1:57
 Turn, Rein Speech for man-computer communication 6:58

U

- Ucuzoglu, Nathan SOLAR distributes first materials 6:7

V

- Valley, J. A. Computer-assisted language analysis 1:41
 Van de Craen, P. Conjugation of Dutch verbs 1:30

- VanderBrug, Gordon J. Language recognition in a theorem prover 14:49
- Vauquois, Bernard Automatic translation 9:11
- Veenhuis, A. A. M. Informatics in developing countries 9:23
- Venezky, Richard L. Computer applications in lexicography 1:37
- Ventura, J. Phenomenological character recognition 14:24
Character recognition: bibliography 6:62
- Vestal, Stanley C. Verbal analogy problems 6:72
- Virbel, J. Corpus of Latin inscriptions 6:93
Textual-graphic information system 6:93
- Vleduts, E. Information languages with grammar

W

- Wachal, Robert SIGLASH secretary 1973-1975 6:20
- Waite, J. H. Phrase distributions and growth prediction 14:25
- Waite, Stephen SIGLASH vice-chairman, 1973-1975 6:20
- Walden, W. E. Interactive thesaurus structures 1:62
- Walker, Donald E. SRI speech understanding system 14:41
Directory of workers in AI 6:4
- Wallach, Y. Study and compilation of computer languages 14:61
- Wang, William S.-Y. Chinese-English MT system 14:58
- Wasserman, Paul Library and information services today 1:22
- Weber, J. C. ATS in the teaching of exposition 6:78
- Weeks, Rollin V. Phonological rules in speech recognition 14:18
- Wegner, Peter Theorem prover in Algol 68 6:76
- Weil, Ben H. Information interface meeting 1975 6:9, 9:19-20
- Weinstein, Clifford J. Acoustic-phonetic analysis 14:15
- Weinstock, John Nordic and General linguistics conference C28
- Wersig, Gernot Procedures for thesaurus translation 1:66
- Weyl, S. A. ISIS: interactive scene analysis 14:65
Relational schema for color and texture of scenes 14:66
- Wilks, Yorick Natural language inference 6:75
Grammar, meaning, and the machine analysis of language 1:46-50

- Wilson, Linda L. CASE simulator of clinical encounters 6:77
GENESYS generating system for CASE 6:78
- Wisbey, R. A. Chairman, ALLC 1:7
- Wolf, H. C. ISIS: interactive scene analysis 14:65
- Wolfart, H. Christoph Computer-assisted linguistic analysis 1:39
- Woods, William A. LUNAR retrieval system 14:46
SPEECHLIS: speech understanding system 14:43
Inference problems in speech understanding 6:71
Control concepts in speech understanding 14:44

Y

- Yeh, R. T. Reliable software conference 6:21
- Yilmaz, H. Perceptual continuous speech recognition 14:16
- Yong, C. E. Computer-assisted language analysis system 1:41
- Yoshida, M. Vowel sequence recognition: coarticulation 6:48
- Young, Carol Elizabeth. Automatic indexing procedures 6:83

Z

- Zampolli, Antonio Ariosto concordance 6:18
International CL conference 1973: proceedings 6:42
Summer school on CL 1974 6:12-13
- Zelkowitz, Computer networks conference C17
- Zoercher, Lucia Hadd Current trends in linguistics 12 14:3
- Zribi, Anne Lexicography for a string grammar of French 14:29
- Zue, Victor W. Acoustic-phonetic analysis 14:15
Phonological rules in speech understanding 14:18

END

