

ARAVIND K. JOSHI

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Marital Status: Married (Susan Joshi)
Two children (Shyamala and Meera)

Date and Place of Birth: August 5, 1929, Poona, India

Citizenship: U.S.A.

Education

High School and Undergraduate education in India.

B.E. Pune University, Poona, India, November 1950.
(Electrical and Mechanical Engineering)

D.I.I.Sc. Indian Institute of Science, Bangalore, India
Graduate diploma (equivalent to M.S.) in Communication Engineering.

M.S. University of Pennsylvania, Philadelphia, PA,
June 1958, (Electrical Engineering).

Ph.D. University of Pennsylvania, Philadelphia, PA,
June 1960, (Electrical Engineering).

Research Activities

My early research was in information theory and communication theory. Since 1958, I have been working almost continuously on problems that overlap computer science and linguistics. Much of this research is now classified under formal linguistics, natural language processing, artificial intelligence, or cognitive science, depending on the topic. These categories are not necessarily exclusive. More specifically, I have been working on syntactic and semantic representations for language structure, relationship of language structure to logic, mathematical linguistics, theory of computation as it relates to natural language processing, parsing algorithms, design and implementation of various systems for natural language processing, especially question-answer systems as interfaces to databases, theories of representation and inferencing in natural language, computational aspects of discourse, psychological implications of processing models, problems in processing certain kinds of bilingual utterances, some aspects of language learning, and other related problems. Recently, I have been looking at the applications of natural language processing techniques for modeling secondary and higher structures of biological sequences.

Professional Experience

- 1952 Research Assistant, Indian Institute of Science, Bangalore, India.
- 1953 Research Assistant, Tata Institute of Fundamental Research, Bombay, India.
- 1954–1958 Professional Engineer, Radio Corporation of America, Camden, New Jersey.
- 1958–1961 Research Assistant, Department of Linguistics, University of Pennsylvania, Philadelphia, PA.
- 1961–1967 Assistant Professor, (Electrical Engineering) University of Pennsylvania, Philadelphia, PA.
- 1964–1967 Assistant Professor, (Linguistics), University of Pennsylvania, Philadelphia, PA.
- 1967–1972 Associate Professor (Electrical Engineering) Member of the Graduate Group in Linguistics, University of Pennsylvania, Philadelphia, PA.
- 1972–1983 Professor (Computer and Information Science), Member of the Graduate Group in Linguistics, University of Pennsylvania Philadelphia, PA.
- 1972–1985 Chair of the Department of Computer and Information Science, University of Pennsylvania, Philadelphia, PA.
- 1983–present Henry Salvatori Professor of Computer and Cognitive Sciences
Secondary appointment in the Department of Linguistics
Secondary appointment in the Department of Psychology
Director of Artificial Intelligence Center
- 1979–2002 Co-Director of the Cognitive Science Program at the University of Pennsylvania, Philadelphia, PA.
- 1990–2002 Co-Director, Institute for Research in Cognitive Science, University of Pennsylvania, Philadelphia, PA.
- 1991–2002 Co-Director, National Science Foundation Science and Technology Center for Research in Cognitive Science, University of Pennsylvania, Philadelphia, PA.
- 1994 Visiting Professor, University of Paris 7, May - June 1994.

Honors

- 1971–72 Appointed as a Guggenheim Fellow by the Guggenheim Memorial Foundation, New York.
- 1971–72 Appointed as a Member of The Institute For Advanced Study, Princeton.
- 1970 Appointed as a “Distinguished Visitor” for the IEEE Computer Group for 1970. In this capacity, several lectures were given based on my research at a number of institutions in U.S.A.
- 1975 President, Association for Computational Linguistics.
- 1976 Elected as a Fellow of the Institute of Electrical and Electronics Engineers (IEEE), for contributions to natural language processing and mathematical linguistics.
- 1976–79 Member of the Advisory Panel for Computer Science and Engineering, National Science Foundation.
- 1983 Appointed Henry Salvatori Professor of Computer and Cognitive Science, University of Pennsylvania
- 1987 Best Paper Award, National Conference on Artificial Intelligence (AAAI-87).
- 1988–present Member of the Advisory Panel for the Division of Information, Robotics, and Intelligent Systems, National Science Foundation.
- 1990 Elected as a Founding Fellow of the American Association for Artificial Intelligence (AAAI).
- 1994 Elected as a Member of the International Joint Committee on Computational Linguistics.
- 1995 Elected as a Permanent Member of the International Committee on Computational Linguistics.

Honors con't.

1997	Recipient of Research Excellence Award of the International Joint Conference of Artificial Intelligence (IJCAI), 1997 Award.
1998	Elected Fellow of the Association for Computing Machinery.
1999	Elected to the National Academy of Engineering.
2000	Honorary Chair, ACL 2000, Hong Kong
2002	Honorary Doctorate (Doctor Honoris Causa), University of Paris 7
2002	Lifetime Achievement Award, Association for Computational Linguistics (ACL), awarded at the Philadelphia meeting, July 2002
2003	David Rumelhart Prize for 2003, Cognitive Science Society, to be awarded at the COGSCI 2003 meeting in Boston, August 2003
2005	Franklin Medal for Cognitive Science, Franklin Institute, Philadelphia, April 2005

Teaching Activities

Prior to 1965, I have taught courses in Information Theory, Probability and Statistics, and Coding Theory. Since 1965, I have taught courses in Formal Languages and Automata Theory, Theory of Computation, Mathematical Linguistics, Natural Language Processing, Artificial Intelligence, and cognitive science courses at various levels. I have taught courses in the Department of Computer and Information Science, the Department of Linguistics, and in the Cognitive Science Program at large.

Professional Societies

- Member A.C.M (Association for Computing Machinery)
- Member A.C.M. (Special Interest Group on Theory of Computation)
- Member A.M.S. (American Mathematical Society)
- Member L.S.A. (Linguistic Society of America)
- Member A.C.L. (Association for Computational Linguistics)
- Member of the Executive Committee of A.C.L.
- President of A.C.L., 1975.
- Fellow IEEE (Institute for Electrical and Electronics Engineers)
- Member, CSS (Cognitive Science Society)
- Member, AAAI (American Association for Artificial Intelligence)
- Founding Fellow, AAAI

Keynote Speaker or Invited Speaker

Following are some of the institutions where invited talks on various aspects of my research were given (not necessarily in chronological order).

- Department of Mathematics, Princeton University, May, 1960. (Topic: Information theory)
- Department of Computer Science, Carnegie Mellon University, May, 1965. (Topic: Transformational analysis)
- National Institute of Health, Bethesda, Maryland, October, 1966. (Topic: Transformational decomposition)
- Battelle Memorial Institute, Columbus, Ohio, February, 1968, (Topic: Transformational analysis)
- Department of Computer Science, University of Maryland, April, 1970. (Topic: Natural language processing).
- Department of Computer Science, University of Montreal, January, 1971. (Topic: Types of Context-sensitivity)
- Department of Computer Science, University of Michigan, October, 1971. (Topic: Local transformation)
- Department of Computer Science, Courant Institute, New York University, November, 1971. (Topic: Local transformation)
- Department of Computer Science, University of Delaware, January, 1972. (Topic: Natural language interface)
- Department of Psychology, Princeton University, April, 1972. (Topic: Lexical decomposition)
- Tata Institute of Fundamental Research, Bombay, India, January, 1973. (Topic: Language and Computation)
- Blaise Pascal Institute and University of Paris, February, 1972. (Topic: Language and computation)
- INRIA, Paris, October, 1971. (Topic: Formal grammars)
- University of Bonn, June, 1972. (Topic: Lexical decomposition)
- National Science Foundation, Washington, D.C., November, 1973. (Topic: Language and Computation)
- Department of Computer Science, University of Colorado, Boulder, Colorado, August, 1972. (Topic: Computation of presuppositions)
- Department of Computer Science, University of Toronto, Canada, 1972. (Topic: Computation of presuppositions)
- Invited member of the Mathematical Social Science Board Workshops in “Tree mappings in linguistics” at Santa Cruz, California (August, 1972) and in “Human and Computer Comprehension of Language” at Teton Village, Wyoming (August, 1973).
- Invited participant in various workshops in Cognitive Science, especially at Stanford, University of Texas at Austin, M.I.T., and University of California at Irvine during 1978-1980.
- Invited lecturer at the Charles University, Prague, Czechoslovakia, December, 1979.
- A workshop in computational linguistics organized by the Hungarian Academy of Science, held at Visegrad, 1980.
- Social Science Research Council (SSRC) “Colloquium on Mutual Knowledge” held at the University of Surrey, Guildford, England, 1980.
- Invited Lecture on “Inference in Language” in the Machine Intelligence section of the American Association of Advancement of Science (AAAS) meeting, January, 1981.
- Department of Psychology, University of Pennsylvania, April, 1981.
- Invited to a panel organized by the Applied Artificial Intelligence Division of the Naval Research Laboratory (NRL) to prepare a report describing the state of the art and recommendations for the future for the development of natural language interfaces for databases, Stanford, August, 1981.
- Joint colloquium by the departments of Computer Science, Linguistics, and the Cognitive Science Center at Brown University, Providence, R.I., April, 1982.
- Invited participant and U.S. Organizer of a U.S.-France Joint Seminar on Discourse Comprehension sponsored by NSF (USA), July, 1982.
- Department of Computer Science, Ohio State University, Columbus, Ohio, May, 1982.
- Second International Conference on Foundations of Theoretical Computer Science and Software Engineering, Bangalore, India, December, 1982.

- Session on Linkages between Cognitive Science and Computer Science, IEEE Symposium on Future Directions for Engineering Education, Worcester, MA, October, 1983.
- Naval Research Laboratory, Applied Artificial Intelligence Center, March, 1983. (Topic: Some aspects of user models).
- American Mathematical Society, Regional meeting, Millersville, PA, March, 1983 (Topic: Mathematics and Linguistics).
- Workshop on Natural Language Processing, Ohio State University, Columbus, Ohio, May, 1983. (Topic: Formal grammars)
- Conference on Theoretical Computer Sciences, National Software Center, Bangalore, India, December, 1983. (Topic: Computational aspects of grammars)
- IBM-Japan Workshop on Theoretical Computer Science, Amagi Center, Japan, May, 1984. (Topic: Inference in language)
- International Conference on Computer Science, Jerusalem, May, 1984. (Topic: Cooperative interaction)
- Workshop on Mathematics of Language, University of Michigan, Ann Arbor, Michigan, October, 1984. (Topic: Mathematical Linguistics)
- Annual Conference of North East Linguistics Society (NELS), December, 1984. (Topic: Tree adjoining grammars)
- Cognitive Science Program, MIT, Cambridge, MA, October, 1985. (Topic: Tree adjoining grammars)
- Cognitive Science Program, Princeton University, Princeton, NJ, December, 1985. (Topic: Tree adjoining grammars)
- AAAI Workshop on Foundations of Artificial Intelligence, Las Cruces, NM, January, 1986. (Topic: AI and Linguistics)
- Workshop on Bilingualism — Code Switching, Stanford University, October, 1986. (Topic: Code-switching)
- Distinguished Speakers in Artificial Intelligence, IBM Thomas J. Watson Research Laboratories, Yorktown Heights, NY, October, 1986. (Topic: Locality and Linguistic Structure)
- Panel on code-switching, N-WAV (New Ways of Analyzing Variation) Meeting, Stanford University, CA, October, 1986.
- Panel on Unification and New Grammatism, TINLAP3 (Theoretical Issues in Natural Language Processing), New Mexico State University, Las Cruces, New Mexico, January, 1987.
- Panel on Natural Language Generation, TINLAP3 (Theoretical Issues in Natural Language Processing), State University of New Mexico, Las Cruces, New Mexico, January, 1987.
- Workshop on Grammatical Formalism and Processing, Center for the Studies of Language and Information (CSLI), Stanford University, Stanford, CA, January, 1987.
- Mathematical Theories of Language, Oberwolfach, Germany, March, 1987.
- Constrained Grammatical Systems, Department of Computer Science, University of Maryland, October, 1988.
- Convergence of Grammatical Formalisms, Yale University, February, 1988.
- Processing of Crossed and Nested Dependencies, City University of New York (CUNY) Workshop on Sentence Processing, March, 1988.
- Embedding Tree Adjoining Grammars in a Unification Framework, Workshop on Unification Grammars, Tite-see, Germany, April, 1988.
- Workshop on Speech and Language, Organized by University of Edinburgh, Sperlonga, Italy, May, 1988.
- Department of Computer Science and Program in Cognitive Science, University of Rochester, Rochester, NY, November, 1988. (Topic: Constrained grammatical systems).
- Invited tutorial, “Constrained Grammatical Formalisms,” presented at the *27th Meeting of the Association for Computational Linguistics (ACL)*, Vancouver, BC, June, 1989.
- Invited faculty, Summer Institute of Linguistics, Linguistics Society of America, Tucson, AZ, July, 1989.
- Department of Computer Science, University of Toronto, Toronto, Canada, November, 1989. (Topic: Processing Crossed and Serial Dependencies)

- Conference on Knowledge Based Systems, Conference sponsored by the United Nations Development Program, held at the National Centre for Software Development, Bombay, India, December, 1990.
- Constrained grammatical formalisms, Indian Institute of Science, Bangalore, India, December, 1990.
- Cooperative natural language interfaces, Indian Institute of Science, Madras, India.
- Workshop on Tree Grammars and Tree Automata, Le Touquet, France, June, 1990 (workshop organized by Maurice Nivat, University of Paris, France).
- Coordination in tree adjoining grammars, University of Paris, June, 1990.
- Coordination in tree adjoining grammars, Workshop on Tree Adjoining Grammars, Dagstuhl, Germany, August, 1990 (workshop arranged by the AI Center, University of Saarlandes, Saarbrücken, Germany).
- Invited panelist, Current state and properties of work in formalisms in natural language processing, International Conference on Computational Linguistics (COLING 90), Helsinki, August, 1990.
- First International Conference on Natural Language Processing, Seoul, Korea, November, 1990.
- Invited speaker and tutorial presentation, Second International Conference on Knowledge Based Systems, Pune, India, December, 1990.
- Invited course, Mathematical Linguistics, Summer Institute, Linguistic Society of America, UC at Santa Cruz, Santa Cruz CA, July, 1991.
- Psycholinguistic Relevance of Tree Adjoining Grammars, Cognitive Science Society of Korea, NSF: U.S.– Korea Joint Workshop, Seoul, Korea, August, 1991.
- Tree Adjoining Grammars and Generation, presented at the Meaning-Text Workshop, organized by the Academies of Science of USSR and Georgia, Borjomi, Georgia, September, 1991.
- Locality in Grammars, Department of Computer Science & Cognitive Science Center, Johns Hopkins University, Baltimore MD, October, 1991.
- Locality in Grammars, Cognitive Science Department, University of Michigan, Ann Arbor MI, November, 1991.
- Computational and Psycholinguistic Aspects of Scrambling, Sentence Processing Workshop, City University of New York (CUNY), February, 1992.
- Statistical Natural Language Processing, 10th Army conference on Applied Mathematics and Computing, West Point, NY, June, 1992.
- Cognitive Science – What’s in it for Computer Science, Computer Science Research Board Meeting, Snowbird, Utah, July, 1992.
- Tree-Adjoining Grammars, Department of Computer Science, India Institute of Technology, Kanpur, India, August, 1992.
- Tree-Adjoining Grammar and Machine Translation, US-India Cooperative Research in Computer Science, NSF Workshop, Bangalore, India, August, 1992.
- Processing crossed dependencies, Cognitive Science Colloquium, University of Michigan, Ann Arbor, October, 1992.
- Categorical Grammars and Tree-adjoining Grammars, Mathematics of Language Workshop, Austin, TX, November, 1992.
- Unfolded types as building blocks for categorial grammars, University of Amsterdam, Amsterdam, January, 1993.
- Word Order Variation and Complexity of Processing, Sentence Processing Workshop, University of Massachusetts, Amherst MA, March, 1993.
- Lexicalized grammars, University of Barcelona, Barcelona, April, 1993.
- Unfolded proof trees as building blocks for categorial grammars, Workshop on Logic and Grammars, Summer Linguistic Institute, Columbus OH, August, 1993.
- Constrained Grammars: Mathematical, Computational, Linguistic, and Processing Aspects, University of Louisville, Louisville KY, November, 1993.
- Statistical Natural Language Processing, Speech/Language Workshop, Atlanta GA, March, 1994.
- Lexicalized Grammars, Department of Linguistics, Cornell University, Ithaca, October, 1994.

- Processing crossed and nested dependencies, Cognitive Science Program, Cornell University, Ithaca, NY, October, 1994.
- Summer School of the Charles University, Prague, Czech Republic, April, 1994.
- Research in Natural Language Processing Conference, Bulgarian Academy of Science, Tzgov Chark, Bulgaria, September, 1995.
- Conversational Conventions and Processing Considerations, AAI Workshop on Computational Models of Grician Implicatures, Stanford University, Stanford, CA, March, 1996.
- A Parser from Antiquity, Workshop on Empirical Methods for Natural Language Processing, University of Pennsylvania, Philadelphia, May, 1996.
- Workshop on Computational Models of Human Syntactic Processing, NIAS, Wassenaar, The Netherlands, June, 1996.
- An Early Application of Finite State Transducers for Natural Language Processing, ECAI '96, Workshop on "Extended Finite State Models of Language," Budapest, Hungary, August, 1996.
- Partial Proof Trees: Resource Sensitive Logics and Syntactic Constraints (co-author: S. Kulick), Logical Aspects of Computational Linguistics, Nancy, France, September, 1996.
- Representation and processing of non-local dependencies, Innovations Program, Potsdam University, Potsdam, Germany, October, 1996.
- Natural Language Processing, University of Tokyo, December 1996.
- Natural Language Processing, Institute of Systems Science, National University of Singapore, Singapore, December 1996.
- Natural Language Processing, Hitachi Laboratory and University of Tokyo Workshop, Hatoyama, Japan, April 1997.
- Tree-Adjoining Grammars, TAL Workshop, University of Grenoble, Grenoble, France, June 1997.
- Resource Sensitive Grammars, Workshop on Logic and Language, University of Rome, November 1997.
- Natural Language Processing, Hitachi Laboratory and University of Tokyo Workshop, Kokubunji, Japan, May 1998.
- Lexicalized Semantics, University of Rennes, France, January 1998.
- Strong Generative Capacity, Cambridge University, Cambridge, UK, March 1999.
- Strong Generative Capacity, University of Edinburgh, Scotland, March 1999.
- Constrained Grammatical Formalisms, Michigan State University, March 1999.
- Constrained Grammatical Formalisms, Duke University, March 1999.
- Explorations of a Domain of Locality, University of Utrecht (CLIN Meeting), December 1999.
- Syntactic Complexity, North American Asso. for Comp. Ling. (NAACL), Seattle, May 2000.
- Three talks on various topics. Acedemia Sinica, Taipei, May 2000.
- Making primitives more complex pays off, Computer Science Colloquium, Stanford University. May 2001.
- Internationalization of ACL, Hong Kong University of Technology, Hong Kong, October 2001.
- NLP Techniques for Modeling Biological Sequences, North American Asso. for Comp. Ling. (NAACL), Seattle, June 2001.
- XTAG project at the University of Pennsylvania, in *Proc. Int. Conference on Parsing Technology*. Peking University, Beijing, China, October 2001.
- NLP Techniques for Modeling Biological Sequences, Pacific Symposium on Biocomputing, Kauai, Hawaii, Jan. 2002.
- NLP Techniques for Modeling Biological Sequences, Indian Insitute of Technology, Chennai, India, Jan. 2002.
- Natural Language Processing, Lousiana State University, Baton Rouge, LA. March 2002.
- Complexity of primitives pays off, Computer Science Distinguished Lecture Serires, University of Texas at Dallas, Dallas, TX, Nov. 2002.

- Complicate Locally, Simplify Globally, International Conference on Computational Linguistics, Indian Institute of Information Technology, held at Karghar, India, December 2002.
- How much hierarchical structure is necessary for sentence description? The Legacy of Harris Symposium, University of Pennsylvania, Philadelphia, January 2003.
- Complexity of primitives pays off, Centro de Investigacion en Computacion Linguistics Conference, Mexico City, Mexico, February 2003.
- Recent Advances in Mathematical Linguistics, in honor of Walter Savitch on the occasion of his 60th birthday, University of California at San Diego, San Diego, June 2003.
- Applications of NLP techniques to modeling biomolecular sequences, MOL Workshop at NASLI summer institute, Indiana University, Bloomington, Indiana, June 2003.
- Complexity of Primitives, University of Paris, April 2003
- Complexity of Primitives, Celebration for Walter Savitch, University of California at San Diego, La Jolla, CA, June 2003.
- Starting with Complex Primitives Pays off: Complicate Locally, Simplify Globally, David Rumelhart Award Lecture, 2003 Cognitive Science Society Meeting, Boston, August 2003.
- Complexity and Locality, European Graduate Collquium, held at Trier and Dagstuhl, sponsored by University of Saarlandes, Saarbrucken and University of Edinburgh, September 2003.
- About recursion, ESSLI 2005 Workshop on Formal and Processing Aspects of Grammars, Edinburgh, August 2005.

Organization of Panels, Programs, Consulting, etc.

- Organizer and chairman of panels on Natural Language Processing at the National Computer Conferences in 1973 and 1976.
- Organizer of the Sloan workshop at the University of Pennsylvania on computational aspects of language structure and discourse setting (May 1978).
- Organizer and chairman of the panel on Natural Language Interface for Very Large Data Bases at the Third International Conference on Very Large Data Bases, Rio De Janeiro, Brazil, October 1979.
- Co-director of the Cognitive Science Program at the University of Pennsylvania (sponsored by the Sloan Foundation), 1979–present.
- Chair of the Natural Language Processing section of the Program Committee for the International Joint Conference on Artificial Intelligence, Karlsruhe, August, 1983.
- Chair, Program Committee for IJCAI 85 (International Joint Conference on Artificial Intelligence), Los Angeles, CA, August 1985.
- Organizer of a Workshop on Mathematical Theories of Language, in conjunction with the Summer Institute of the Linguistic Society of America (LSA), Stanford University, CA July 11–August 7, 1987.
- Member of the Advisory Committee for the Advanced Technology Center of Southeastern Pennsylvania (Ben Franklin Partnership Program), Computer Science Section, May 1986–present.
- Panel Member, ARO (Army Research Office) Workshop on Artificial Intelligence, Crystal City, June 1986.
- Organizer of workshop on *Mathematics of Language*, Summer Linguistics Institute, Stanford University, Stanford, CA, July–August, 1987.
- Panel Member, Language Acquisition Workshop, Cornell University, Ithaca, NY, March 1992.
- Organizer of workshop on Tree Adjoining Grammars, Institute for Research in Cognitive Science, University of Pennsylvania, June 1992.
- Panel Chair, Machine Translation Workshop, University of Manchester, Institute of Technology, (UMIST), Manchester, UK, August 1992.
- Program Chair, Association for Computational Linguistics Meeting (ACL '96), Santa Cruz, CA, June, 1996.
- Program Committee, International Conference on Computational Linguistics (COLING-96), Copenhagen, Denmark, August, 1996.
- Program Committee, Conference on Knowledge Based Computer Systems (KBCS-96), Bombay, India, December, 1996.
- Program Committee, International Joint Conference on Artificial Intelligence (IJCAI '97).
- Organizer of Workshop on Tree Adjoining Grammars and Related Formalisms, Institute for Research in Cognitive Science, University of Pennsylvania, July-August, 1998.
- Organizer of Workshop on Computational Linguistics in South East Asia, at ACL2000, Hong Kong, October 2000.
- Organizer of Workshop on Natural Language Processing Techniques for Modeling Biological Sequences, Feb. 2001, University of Pennsylvania, sponsored by NSF.
- Tutorial, NLP Techniques in Modeling Biological Sequences, COLING 2002, Taipei, Taiwan, August 2002.
- Tutorial, annotation of Discourse Relations, COLING-ACL 2006, Sydney, Australia, July 2006 (with Rashmi Prasad and Bonnie Webber).

Advisory Panels, Reviewer, Review Panels, Site Visits, and Editorial Boards

Advisory Panel NSF (Division of Computer and Information Science Engineering (CISE))
DOD Advisory Panel (TARA)

Reviewer Journal of ACM
Information and Control
Communications of ACM
Computing Sciences
Journal of Computer and Systems Sciences
IEEE Trans. on Information Theory
IEEE Trans. on Electronic Computers
IEEE Transaction on Pattern Analysis and Machine Intelligence
Journal of Computational Linguistics

Review Panels and Site Visits

NSF ARO
NIH ARPA

Editorial Boards IEEE Transactions on Pattern Analysis and Machine Intelligence
The Behavioral and Brain Studies (Board of Editorial Commentators)
Expert Systems
Data and Knowledge Engineering
Journal of Intelligent Systems
Artificial Intelligence Series, Springer Verlag
Computational Linguistics
Linguistics in Language Technology

Editor: Series in Natural Language Processing sponsored by the Association for Computational Linguistics (ACL) and Cambridge University Press, 1983–1988.

Editor: Series in Natural Language Processing sponsored by the Association for Computational Linguistics (ACL) and MIT Press, 1988–1994.

Publications

- Computation of Syntactic structure, in *Information Retrieval and Machine Translation*, Interscience Publishers, vol. II, 1961 (chapter 32).
- A note on a certain theorem stated by Kullback, *IEEE Transactions on Information Theory*, vol. 10, no. 1, 1964.
- Informationally equivalent sentences, *Proceedings International Conference on Information Theory*, Tokyo, Japan, September, 1964.
- A randomized decision feedback system, *Proceedings IEEE Symposium on Information Theory*, Boulder, Colorado, June, 1964, (Co-author N. Zaino).
- Minimum rejection communication systems, *Information and Control*, vol. 10, no. 5, 1967 (co-authors R. Mulholland and J.T. Chu).
- Retransmission schemes, *IEEE Transactions on Information Theory*, vol. 4, no. 1, 1968 (co-authors R. Mulholland and J.T. Chu).
- A measure of transmission rate, *Journal of the Franklin Institute*, vol. 285, no. 3, 1968 (co-authors R. Mulholland and J.T. Chu).
- On approximating information sources, *Proceedings IEEE Adaptive Processes Symposium*, Chicago, May 1963.
- Transformational decomposition, *Proceedings Second International Conference on Computational Linguistics*, Grenoble, France, 1967 (co-author D. Hiz).
- Transformational analysis by computer *Proceedings National Institutes of Health Symposium on Computational Linguistics*, Bethesda, Maryland, U.S. Department of H.E.W., 1968.
- String adjunct grammars, *Proceedings Tenth Annual Symposium on Automata Theory*, Waterloo, Canada, 1969 (co-authors S.R. Kosaraju and H. Yamada).
- Properties of mixed grammars and their linguistic relevance, *Proceedings Third International Symposium on Computational Linguistics*, Stockholm, Sweden, 1969.
- Some results in tree automata, *Proceedings Third ACM Symposium on Theory of Computing*, Cleveland, May, 1970, (co-author L.S. Levy).
- How much hierarchical structure is necessary for sentence description? *Proceedings International Conference on Computational Linguistics*, Debrecen, Hungary, 1971.
- A survey of mathematical results relevant to natural language processing, in *Natural Language Processing* (ed. R. Rustin), Algorithmic Press, New York, 1972.
- String adjunct grammars I local and distributed adjunction, *Information and Control*, vol. 21, September, 1972 (co-authors S.R. Kosaraju and H. Yamada).
- String adjunct grammars II null symbols and linguistic relevance, *Information and Control*, vol. 21, October, 1972 (co-authors S.R. Kosaraju and H. Yamada).
- A tree generating system in *Formal Languages and Programming, and Automata*, (ed. M. Nivat), Mouton, The Hague, 1972.
- Tree adjunct grammar, *Journal of Computer and System Science*, vol. 21, no. 2, 1975 (co-authors L.S. Levy and M. Takahashi).
- A class of transformational grammars, in *The Formal Analysis of Natural Languages* (ed. M. Gross, M. Halle and M. P. Schutzenberger), North Holland, Amsterdam, 1973.
- Some results in tree automata, *Mathematical Systems Theory*, vol. 6, no. 3, 1972. (co-author L.S. Levy). (Revised and extended version of an earlier paper).
- Relevance of natural language structure for pattern analysis, *Pattern Recognition*, December, 1974.
- Factorization of verbs analysis of verbs of seeing, in *Semantics and Communication*, (ed. C. Heidrich), North Holland, 1974.
- Developmental tree adjunct grammars, *Proceedings of the Symposium on Biologically Motivated Automata Theory*, June, 1974. (Co-author L.S. Levy)

- What is a cube? *Proceedings of the IEEE Symposium on Pattern Recognition and Data Structures*, Anaheim, California, 1975. (Invited paper) (co-author L. S. Levy).
- Constraints on structural descriptions local transformations, *SIAM Journal of Computing*, June, 1977. (An earlier version was presented at the IFIP Congress on Information Processing, Stockholm, 1974).
- Computation of a unique subclass of inferences Presupposition and Entailment, *American Journal of Computational Linguistics*, January, 1977. (co-author R. Weischedel).
- Some frills for modal tic-tac-toe semantics of predicate complement constructions, *Transactions of IEEE Computer Society Special Issue on Artificial Intelligence*, April, 1976 (An earlier version was presented at the International Joint Conference on Artificial Intelligence, Stanford, August, 1973) (co-author R. Weischedel).
- A formalism for relating lexical and pragmatic information its relevance to recognition and generation, *Proceedings of an Interdisciplinary Workshop on Theoretical Issues in Natural Language Processing*, Cambridge, Mass., June, 1975 (Working paper) (co-author S. Rosenschein).
- Problems of inferencing and its relation to decomposition. Invited paper presented at a plenary session of the *International Conference on Computational Linguistics*, Ottawa, June, 1976. (co-author S. Rosenschein). Also appears in a special issue of SMIL (Swedish Journal of Computational Linguistics), 1977, devoted to the invited papers at this meeting.
- Some extensions of a system of inferencing on partial information, presented at the *Workshop on Pattern-Directed Inferencing*, Hawaii, in May, 1977. Also appears in *Pattern-Directed Inference Systems* (ed. F. Hays-Roth and D. Waterman), Academic Press, New York, 1978.
- Recent advances in Mathematical Linguistics, *Proceedings on the NSF Workshop on Theory of Computation*, The John Hopkins University, Baltimore, March, 1977.
- Approximate responses from a Data Base Management Systems, *Proceedings of the Fifth International Joint Conference on Artificial Intelligence (IJCAI)*, Cambridge, Massachusetts, August, 1977 (co-authors: J. Kaplan and R. Lee).
- Skeletal structural descriptions, *Information and Control*, December, 1979 (co-author: L. S. Levy).
- A partially ordered world model and natural outdoor scenes in *Computer Vision*, (ed. A. Hanson and E. Reisman), Academic Press, 1978 (co-author: R. Bajcsy).
- Local constraints in the syntax and semantics of programming languages, *Proceedings of the 5th Annual Symposium on Principles of Programming Languages (POPL)*, Tucson, Arizona, January, 1978 (co-author: L. S. Levy and K. Yueh).
- Cooperative responses: An application of discourse inference to data base query systems, *Proceeding of the 2nd National Conference of Canadian Society for Computational Studies of Intelligence*, Toronto, Canada, July, 1978 (co-author: S. J. Kaplan).
- A note on partial matching of descriptions: Can one simultaneously question (retrieve) and inform (update)?, *Proceedings of the 2nd Workshop on Theoretical Issues in Natural Language Processing*, University of Illinois, July, 1978.
- The problem of naming shapes: Vision-language interface, *Proceedings of the 2nd Workshop on Theoretical Issues in Natural Language Processing*, University of Illinois, July, 1978 (Co-author: R. Bajcsy).
- A technique for managing the lexicon in a natural language interface to a changing data base, *Proceedings of the Sixth International Joint Conference on Artificial Intelligence (IJCAI)*, Tokyo, August, 1979 (co-authors: S. J. Kaplan and E. Mays).
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