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## EDUCATION

PhD (computer science) 1989, Stanford University. Dissertation: *Parsing and Type Inference for Natural and Computer Languages.*

AB (applied mathematics) summa cum laude 1981, Harvard University.

## PROFESSIONAL EXPERIENCE

Harvard University. Gordon McKay Professor of Computer Science, 1996–present.

Harvard University. John L. Loeb Associate Professor of the Natural Sciences, 1993–1996.

Harvard University. Assistant Professor of Computer Science, 1989–1993.

University of California at Santa Cruz. Visiting professor, summer, 1991.

Artificial Intelligence Center, SRI International. Research computer scientist, 1981–1989.

Center for the Study of Language and Information, Stanford University. Research fellow, 1983–1989.

## HONORS

Presidential Faculty Fellow, 1993–present.

Presidential Young Investigator, 1991–1993.

SRI Exceptional Achievement Award, 1985.

Phi Beta Kappa (junior twelve), 1980.

Detur Prize, 1978.

## JOURNAL ARTICLES

Direct parsing of ID/LP grammars. *Linguistics and Philosophy*, volume 7, number 2, pages 135–154, 1984.

Criteria for designing computer facilities for linguistic analysis. *Linguistics*, volume 23, number 3, pages 189–211, 1985.

Evidence against the context-freeness of natural language. *Linguistics and Philosophy*, volume 8, pages 333–343, 1985.

An algorithm for generating quantifier scopings (with Jerry Hobbs). *Computational Linguistics*, volume 13, numbers 1–2, pages 47–63, 1987.

Semantic-head-driven generation (with Gertjan van Noord, Fernando C. N. Pereira, and Robert Moore). *Computational Linguistics*, volume 16, number 1, pages 30-41, 1990.

Ellipsis and higher-order unification (with Mary Dalrymple and Fernando Pereira). *Linguistics and Philosophy*, volume 14, pages 399–452, 1991.

Generation and synchronous tree-adjoining grammars (with Yves Schabes). *Computational Intelligence*, volume 7, number 4, pages 220–228, 1992.

The problem of logical-form equivalence. *Computational Linguistics*, volume 19, number 1, pages 179–190, 1993.

Variations on incremental interpretation (with Mark Johnson). *Journal of Psycholinguistic Research*, volume 22, number 2, pages 287–318, 1993.

An alternative conception of tree-adjoining derivation (with Yves Schabes). *Computational Linguistics*, volume 20, number 1, pages 91–124, 1994. Also available as cmp-lg/9404001.

Automating the layout of network diagrams with specified visual organization (with Corey Kosak and Joe Marks). *Transactions on Systems, Man, and Cybernetics*, volume 24, number 3, pages 440–454, 1994.

Lessons from a restricted Turing test. *Communications of the Association for Computing Machinery*, volume 37, number 6, pages 70–78, 1994. Also available as cmp-lg/9404002.

Restricting the weak-generative capacity of synchronous tree-adjoining grammars. *Computational Intelligence*, volume 10, number 4, pages 371-385, November 1994. Also available as cmp-lg/9404003.

Principles and implementation of deductive parsing (with Yves Schabes and Fernando C. N. Pereira). *Journal of Logic Programming*, volume 24, number 1–2, pages 3–36, July/August 1995. Also available as cmp-lg/9404008.

An empirical study of algorithms for point feature label placement (with Jon Christensen and Joe Marks). *Transactions on Graphics*, volume 14, number 3, July 1995.

Easily searched encodings for number partitioning (with Wheeler Ruml, J. Thomas Ngo, and Joe Marks). *Journal of Optimization Theory and Applications*, volume 89, number 2, pages 251–291, May 1996.

Interactions of scope and ellipsis (with Mary Dalrymple and Fernando C. N. Pereira). *Linguistics and Philosophy*, volume 19, number 5, pages 527–552.

Predicting individual book use for off-site storage using decision trees (with Craig Silverstein). *Library Quarterly*, volume 66, number 3, pages 266–293, July 1996.

A general cartographic labeling algorithm (with Shawn Edmondson, Jon Christensen, and Joe Marks). *Cartographica*, volume 33, number 4, pages 13–23, Winter 1997.

Anaphoric dependencies in ellipsis (with Andrew Kehler). *Computational Linguistics*, volume 23, number 3, 1997.

Automatic yellow-pages pagination and layout (with Ramesh Johari, Joe Marks, and Ali Partovi). *Journal of Heuristics*, volume 2, number 4, pages 321–342, 1997.

## BOOKS

*An Introduction to Unification-Based Approaches to Grammar*. CSLI Lecture Notes Series, volume 4. Stanford, California: Center for the Study of Language and Information. 1986. Spanish translation, 1989. French translation, 1990.

*Prolog and Natural-Language Analysis* (with Fernando C. N. Pereira). CSLI Lecture Notes Series, volume 10. Stanford, California: Center for the Study of Language and

Information. 1987. Italian translation, 1992.

*Foundational Issues in Natural Language Processing*, ed. (with Peter Sells and Thomas Wasow). Cambridge, Massachusetts: MIT Press, 1991.

*Constraint-Based Grammar Formalisms.* Cambridge, Massachusetts: MIT Press, 1992.

## BOOK CHAPTERS

Separating linguistic analyses from linguistic theories. In P. Whitelock, M. M. Wood, H. L. Somers, R. Johnson, P. Bennett, eds., *Linguistic Theory and Computer Applications*, pages 1–36, London: Academic Press, 1987. Reprinted in U. Reyle and C. Rohrer, eds., *Natural Language Parsing and Linguistic Theories*, pages 33–68, Dordrecht, Holland: D. Reidel Publishing Company, 1988.

Evidence against the context-freeness of natural language. Reprinted in Walter J. Savitch, Emmon Bach, William Marsh, and Gila Safran-Navah, eds., *The Formal Complexity of Natural Language*, pages 320–334, Dordrecht, Holland: D. Reidel Publishing Company, 1987. Reprinted in Jack Kulas, James H. Fetzer, and Terry L. Rankin, eds., *Philosophy, Language, and Artificial Intelligence*, pages 79–92, Dordrecht, Holland: Kluwer Academic Publishers, 1988.

Natural-language processing: grammar formalisms. In William Bright, ed., *The Oxford International Encyclopedia of Linguistics*, pages 61–64, New York, NY: Oxford University Press, 1991.

Placing text labels on maps and diagrams (with Jon Christensen and Joe Marks). In Paul Heckbert, ed., *Graphics Gems IV*, Cambridge: Academic Press, 1994.

## REFEREED CONFERENCE PAPERS

Translating English into logical form (with Stanley Rosenschein). *Proceedings of the 20th Annual Meeting of the Association for Computational Linguistics*, pages 1–8, 1982.

Formal constraints on metarules (with Susan U. Stucky, Hans Uszkoreit, and Jane J. Robinson). *Proceedings of the 21st Annual Meeting of the Association for Computational Linguistics*, pages 22–27, 1983.

Sentence disambiguation by a shift-reduce parsing technique. *Proceedings of the Eighth International Joint Conference on Artificial Intelligence*, pages 699–703, 1983.

The design of a computer language for linguistic information. *Proceedings of the Tenth International Conference on Computational Linguistics*, pages 362–366, 1984.

The semantics of grammar formalisms seen as computer languages (with Fernando C. N. Pereira). *Proceedings of the Tenth International Conference on Computational Linguistics*, pages 123–129, 1984.

Using restriction to extend parsing algorithms for complex-feature-based formalisms. *Proceedings of the 23rd Annual Meeting of the Association for Computational Linguistics*, pages 145–152, 1985.

A simple reconstruction of GPSG. *Proceedings of the 11th International Conference on Computational Linguistics*, pages 211–216, 1986.

Unification and grammatical theory (with Ivan A. Sag, Ronald Kaplan, Lauri Karttunen, Martin Kay, Carl Pollard, and Annie Zaenen). *Proceedings of the 1986 West Coast Conference on Formal Linguistics*, pages 238–254, 1986.

A uniform architecture for parsing and generation. *Proceedings of the 12th International Conference on Computational Linguistics*, pages 614–619, 1988.

A semantic-head-driven generation algorithm for unification-based formalisms (with Gertjan van Noord, Robert Moore, and Fernando C. N. Pereira). *Proceedings of the 27th Annual Meeting of the Association for Computational Linguistics*, pages 7–17, 1989.

Generation and synchronous tree-adjoining grammars (with Yves Schabes). In *Proceedings of the Fifth International Workshop on Natural Language Generation*, pages 9–14, 1990.

Synchronous tree-adjoining grammars (with Yves Schabes). In *Proceedings of the 13th International Conference on Computational Linguistics*, volume 3, pages 253–258, 1990.

A design environment for scientific and program visualizations (with several authors). In *Proceedings of the First International Conference on Computational Graphics and Visualization Techniques (Compugraphics '91)*, pages 321–332, 1991.

A parallel genetic algorithm for network diagram layout (with Corey Kosak and Joe Marks). In *Proceedings of the Fourth International Conference on Genetic Algorithms*, pages 458–465, 1991.

An alternative conception of tree-adjoining derivation (with Yves Schabes). In *Proceedings of the 30th Annual Meeting of the Association for Computational Linguistics*, pages 167–176, 1992.

Algorithms for cartographic label placement (with Jon Christensen and Joe Marks). In *Proceedings of the 1993 ACSM/ASPRS Annual Convention*, volume 1, pages 75–89, 1993.

Semi-automatic region delineation for floor plans (with Kathy Ryall, Joe Marks, and Murray Mazer). In *Proceedings of the Third International Conference on Document Analysis and Recognition (ICDAR '95)*, volume 2, pages 964–969, 1995.

A viewer for PostScript documents (with Adam Ginsburg and Joe Marks). In *Proceedings of UIST '96*, 1996.

An interactive system for drawing graphs (with Kathy Ryall and Joe Marks). In *Proceedings of Graph Drawing '96*, 1996.

Empirical testing of algorithms for variable-sized label placement (with Jon Christensen, Stacy Friedman, and Joe Marks). In *Proceedings of the Thirteenth Annual ACM Symposium on Computational Geometry*, 1997.

Design Gallery Browsers Based on 2D and 3D Graph Drawing (with B. Andalman, K. Ryall, W. Ruml, and J. Marks). In *Proceedings of Graph Drawing '97*, 1997.

Design Galleries: A General Approach to Setting Parameters for Computer Graphics and Animation (with J. Marks, B. Andalman, P. Beardsley, B. Freeman, S. Gibson, J. Hodgins, T. Kang, B. Mirtich, H. Pfister, W. Ruml, and J. Seims). In *Proceedings of SIGGRAPH 97*, pages 389–400, 1997. Companion Video in Video Proceedings.

An Interactive Constraint-Based System for Drawing Graphs¡/strong¿ (with Kathy Ryall and Joe Marks). In *Proceedings of the 10th Annual Symposium on User Interface Software and Technology (UIST)*, 1997.

## TECHNICAL REPORTS

The computational complexity of cartographic label placement (with Joe Marks). Technical

Report TR-05-91, Center for Research in Computing Technology, Harvard University, 1991.

Infrastructure for research towards ubiquitous information systems (with Barbara Grosz, H.T. Kung, Margo Seltzer, and Michael Smith). Technical Report TR-04-93, Center for Research in Computing Technology, Harvard University, 1993.

Annotating floor plans using deformable polygons (with Kathy Ryall, Joe Marks, and Murray Mazer). Technical Report TR-24-93, Center for Research in Computing Technology, Harvard University, 1993.

Automatic structuring of high-performance hypermedia documents (with Rebecca Hwa and Joe Marks). Technical Report TR95-06, Mitsubishi Electric Research Laboratories, 1995.

## PATENTS

Method and apparatus for compression of images (with Peter B. Mark). U. S. patent number 5,303,313, April 1994. International patents pending.

Apparatus for determining the structure of a hypermedia document using graph partitioning (with Joe Marks and Rebecca Hwa). U. S. patent number 5,546,517, August 1996.

A system for delineating and annotating areal regions (with Murray Mazer, Kathy Ryall, and Joe Marks). U. S. patent number 5,553,214, September 1996.

System and method for exploring light spaces (with Ho Min Kang, Joseph Marks, and Joseph Seims). U. S. patent number 5,866,704, March, 1999.

Apparatus and method for automatic yellow pages pagination and layout (with Ramesh Johari, Joseph Marks, and Ali Partovi). U. S. patent number 5,911,146, June, 1999.

Command parsing and rewrite system (with John Armstrong, Rafael Baptista, Bryan Bentz, William Ganong III, and Donald Selesky). Pending, June, 1997.

Browser for documents with annotations (with Adam Ginsburg and Joe Marks). Pending, April 1998.

Interactive system for drawing graphs (with Kathleen Ryall and Joe Marks). Pending, April 1998.

## INVITED LECTURES

Generative capacity and computational complexity of linguistic theories. Panel at the 21st Annual Meeting of the Association for Computational Linguistics, Massachusetts Institute of Technology, 1983.

Separating linguistic analyses from linguistic theories. Workshop on Linguistic Theory and Computer Applications, University of Manchester Institute of Science and Technology, 1985.

———. Workshop on Word-Order and Parsing in Unification Grammars, Friedenweiler, West Germany, 1986.

Unification-based approaches to grammar. Tutorial at the 23rd Annual Meeting of the Association for Computational Linguistics, University of Chicago, 1985.

The quest for non-context-free natural languages. Santa Cruz Workshop on the Mathematics of Grammars and Languages, University of California at Santa Cruz, 1985.

Principle-based parsing. Discussant at the System Development Foundation Workshop on the Processing of Linguistic Structure, University of California at Santa Cruz, 1987.

An architecture for psycholinguistic modeling. First Annual Conference on Human Sentence Processing, City University of New York Graduate Center, 1988.

Parsing and type inference for natural and computer languages. Parsing Project Seminar Series, Massachusetts Institute of Technology, December, 1989.

Ellipsis and higher-order unification. Sloan Seminar Series, University of Pennsylvania, April, 1990.

Mildly context-sensitive grammar formalisms. Natural Information Processing Seminar. Harvard University, October, 1990.

Constraints and natural-language analysis. International Logic Programming Symposium, San Diego, California, October, 1991.

———. Workshop on Mathematical Aspects of Information Structures, Abingdon, England, April, 1992.

Reconciling abstract structure and concrete data in statistical language processing. IEEE Workshop on Automatic Speech Recognition, Arden House, Harriman, New York, December, 1991.

Variations on incremental interpretation. Fifth Annual Conference on Human Sentence Processing, City University of New York Graduate Center, March, 1992.

New varieties of tree-adjoining grammars. Computer Science Department Colloquium, Brandeis University, April, 1992.

Restricting the weak-generative capacity of synchronous tree-adjoining grammars. Second TAG Workshop, University of Pennsylvania, Philadelphia, Pennsylvania, June, 1992.

Leading issues in tree adjunction (with Yves Schabes). Tutorial at the 30th Annual Meeting of the Association for Computational Linguistics, Newark, Delaware, June, 1992.

The computer science of everyday language. Annual Meeting of the American Association for the Advancement of Science, Boston, Massachusetts, February, 1993.

———. Computer Science Department Colloquium, Wellesley College, Wellesley, Massachusetts, May, 1993.

Formal models of the structure of language. Computer Science Colloquium, Harvard University, Cambridge, Massachusetts, March, 1993.

———. Computer Science Department, Columbia University, New York, New York, December, 1993.

Some problems with defining tree-adjoining derivation. Department of Computer and Information Sciences Colloquium, University of Delaware, Newark, Delaware, May, 1993.

The Turing test. Mather Cognitive Science Colloquium. Harvard University, Cambridge, Massachusetts, April, 1994.

Between stochastic and deterministic optimization methods. Panel organizer, TIMS/ORSA '94 meeting, Boston, Massachusetts, April, 1994.

Informational graphic design as combinatorial optimization. SIGGRAPH '94, Orlando, Florida, July, 1994.

Interactions of scope and ellipsis. Workshop on declarative approaches to discourse. University of Nijmegen, Nijmegen, the Netherlands, January, 1995.

———. IBM Yorktown Heights, June, 1995.

The problem with tree-adjoining grammars. Keynote address. Seventh Conference of the European Chapter of the Association for Computational Linguistics. Dublin, Ireland, March, 1995.

——. Cognitive Sciences Programme. University of Edinburgh. Edinburgh, Scotland, March, 1995.

The graphically articulate computer. Fourteenth International Joint Conference on Artificial Intelligence. Montreal, Canada, August, 1995.

——. Distinguished Lecture Series. Center for Human-Computer Communication, Oregon Graduate Institute, Portland, Oregon, January, 1995.

——. Distinguished Colloquium Series. University of Pittsburgh, Pittsburgh, Pennsylvania, March, 1996.

——. University of Washington, Seattle, Washington, June, 1996.

——. AT&T Research Labs, Murray Hill, New Jersey, June, 1996.

Characterizing ambiguity. Computer Science Colloquium, Harvard University, Cambridge, Massachusetts, November, 1995.

Panel member, Meeting of the Association for Research Libraries ("Finding Common Ground"), Cambridge, Massachusetts, March, 1996.

## PROFESSIONAL RESPONSIBILITIES

National Academy of Sciences Committe on Intellectual Property and the Emerging Information Infrastructure, 1997–1999.

Association for Computational Linguistics, member of the executive committee, 1993–1996.

*Computational Linguistics*, member of the editorial board, 1990–1993.

*Journal of Artificial Intelligence Research*, member of the editorial board, 1993–1996.

*Journal of Heuristics*, advisory editor, 1995–present.

The Computation and Language E-Print Archive, founder and organizer, 1994–present.

North American Conference on Logic Programming, member of the program committee, 1990.

ARPA Workshop on Human Language Technology, invited participant, March, 1993.

IMS Conference on Syntax, Semantics, and Logic, invited participant, October, 1993.

AAAI/ARPA Meeting on Twenty-First Century Intelligent Systems, invited participant, April, 1994.

Workshop on Abstractions in Multimedia Layout, Presentation, and Interaction, member of the program committee, November, 1995.

ACM Workshop on Strategic Directions in Computer Science, Working Group on Human Computer Interaction, invited participant, June, 1996.

Reviewing: *Cognition*, *Communications of the Association for Computing Machinery*, *Computational Intelligence*, *IEEE Pattern Analysis and Machine Intelligence*, *Journal of Artificial Intelligence Research*, *Journal of the Association for Computing Machinery*, *Journal of Logic, Language, and Information*, *Journal of Logic Programming*, *Journal of Optimization Theory and Applications*, *Language and Cognitive Processes*, *Letters on Programming Languages and Systems*, *Linguistics*, *Linguistics and Philosophy*.

Annual Meeting of the Association for Computational Linguistics, Annual Meeting of the European Chapter of the Association for Computational Linguistics, IEEE/ACM International Symposium on Microarchitecture, International Conference on Computational Linguistics, International Logic Programming Symposium, International Workshop on Machine Learning, Joint International Conference and Symposium on Logic Programming, Meeting of the European Association for Computational Linguistics, Natural Language Understanding and Logic Programming Workshop, North American Conference on Logic Programming, USENIX Conference.

National Research Council of Canada, National Science Foundation.

[All information current as of March 27, 2000.]