

## VIJAY SHANKER

### EDUCATION

University of Pennsylvania	Computer Science	Ph.D.	1987
Indian Institute of Science	Automation	M.E.	1983
Indian Institute of Science	Electronics	B.E.	1981
University of Madras	Physics	B.Sc.	1978

### PROFESSIONAL APPOINTMENTS

1993 - present	Associate Professor, Dept. of Computer and Information Science, University of Delaware
2002	Visiting Scientist, Anna University-KBC Research Center
1998	Visiting Research Scholar, Institute for Research in Cognitive Science, University of Pennsylvania
1993-1994	Visiting Research Scholar, German Center for Research in Artificial Intelligence (DFKI)
1987 - 1993	Assistant Professor, Dept. of Computer and Information Science, University of Delaware

### PROFESSIONAL ACTIVITIES

- Editorial Board: Grammars (2000-present)
- Editorial Board: Computational Linguistics (1992-1994)
- Program Committee Co-Chair: 38th Annual Meeting of the Association of Computational Linguistics, Hong Kong, October, 2000
- Program Committee Area Chair (Grammars and Parsing): 37th Annual Meeting of the Association of Computational Linguistics, College Park, USA, June 1999
- Conference Committee Co-Chair: 4th Workshop on Tree-Adjoining Grammars and Related Formalisms, TAG+, Philadelphia, August 1998
- Program Committee Member of:
  - 2007 International Conference of Natural Languages
  - 2007 International Workshop on Parsing Technologies.
  - 2007 Pacific Symposium on Biocomputing (NLP track)
  - 2006 International Workshop on Tree-Adjoining Grammars and Related Formalisms
  - 2005 International Conference of Natural Languages
  - 2005 Mathematics of Language
  - 2005 International Workshop on Parsing Technologies.
  - 2004 Logical Aspects of Computational Linguistics
  - 2004 International Conference of Natural Languages
  - 2004 International Workshop on Tree-Adjoining Grammars and Related Formalisms
  - 2003 Mathematics of Language
  - 2003 Language Engineering Conference
  - 2003 International Workshop on Parsing Technologies.
  - 2002 International Conference of Natural Languages
  - 2001 Annual Meeting of the Association of Computational Linguistics
  - 2001 International Workshop on Parsing Technologies.

- 2000 International Workshop on Tree-Adjoining Grammars and Related Formalisms
  - 2000 International Workshop on Parsing Technologies.
  - 1999 National Conference on Artificial Intelligence (AAAI)
  - 1999 Mathematics of Language
  - 1998 National Conference on Artificial Intelligence (AAAI)
  - 1998 Logical Aspects of Computational Linguistics
  - 1997 International Workshop on Parsing Technologies.
  - 1995 International Workshop on Parsing Technologies.
  - 1994 Annual Meeting of the Association of Computational Linguistics
  - 1994 International Workshop on Natural Language Generation
  - 1991 Annual Meeting of the Association of Computational Linguistics
- Reviewed for several journals, conferences and National Science Foundation panels

### REFEREED PUBLICATIONS

Z. Hu, Y. Xuan, M. Torii, M. Narayanaswamy, K. E. Ravikumar, K. Vijay-Shanker, and C. H. Wu, “An Online Literature Mining Tool for Phosphorylation Information”, *Bioinformatics*, (Application Notes), To Appear.

J. Chen, S. Bangalore and K. Vijay-Shanker, “Automated Extraction of Tree Adjoining Grammars”, *Natural Language Engineering*, in Press.

D. Shepherd, L. Pollock, and K. Vijay-Shanker, “Towards Supporting On-Demand Virtual modularization Using Program Graphs”, *Proc. International Conference on Aspect-Oriented Software development*, pages 3-14, 2006.

F. Xia, M. Palmer and K. Vijay-Shanker, “Automatically Generating Grammars from Abstract Specifications”, *Computational Intelligence*, 21(3):246-287, 2005.

M. Narayanaswamy, K. E. Ravikumar, and K. Vijay-Shanker, “Beyond The Clause: Extraction of Phosphorylation Information from Medline Abstracts”, *13th Annual Conference on Intelligent Systems for Molecular Biology 2005*, *Bioinformatics*, 21 Suppl 1:i319-i327, 2005.

Manabu Torii and K. Vijay-Shanker, “Resolution of Definite Anaphoric Noun Phrases in Medline Abstracts”, *Proceedings of PACLING*, pages 332-339, Tokyo, Japan, 2005.

Z. Z. Hu, M. Narayanaswamy, K. E. Ravikumar, K. Vijay-Shanker and C. H. Wu. “Literature mining and database annotation of protein phosphorylation using a rule-based system”, *Bioinformatics*, 21(11): 2759-2765, 2005.

K. E. Ravikumar, M. Narayanaswamy and K. Vijay-Shanker, “Towards Building a Database of Phosphorylation Interaction: Information Extraction from Text”, *Proceedings SCT’2004*, Orlando, USA, 2004.

M. Torii, S. Kamboj and K. Vijay-Shanker, “Using name-internal and contextual features to classify biological terms”, *Journal of Biomedical Informatics*, 2004, 37(6):498-511.

J. Chen and K. Vijay-Shanker, “Extraction of TAGs from Treebank”, in *New Developments in Parsing Technology (Text, Speech and Language Technology)*, editors H. Bunt, J. Carroll and G. Satta, pages 73-90, Springer 2004.

Raymond Kozlowski, Kathleen F. McCoy, and K. Vijay-Shanker, “Generation of single-sentence paraphrases from predicate/argument structure using lexico-grammatical resources”, *Proceedings of the Second Workshop on Paraphrasing*, 2003

- Torii, M., Kamboj, S., and Vijay-Shanker, K., “An Investigation of Various Information Sources for classifying Biological Names”, *Proceedings of ACL 2003 Workshop on NLP in Biomedicine*, pp. 113-120, Japan, 2003.
- S.Viswanathan, S.Ramesh Kumar, B.Kumara Shanmugam, S.Arulmozi and Vijay-Shanker, K., “A Tamil Morphological Analyser”, *International Conference on Natural Language Processing*, 2003.
- Baskaran Sankaran, Vijay-Shanker, K., *Influence of Morphology in Word Sense Disambiguation for Tamil*, International Conference on Natural Language Processing, Mysore, 2003.
- M. Narayanaswamy, K. E. Ravikumar and K. Vijay-Shanker, “A Biological Named Entity recognizer”, *Proceedings of Pacific Symposium on Biocomputing*, pages 427-438, 2003.
- R. Frank, P. Hagstrom, and K. Vijay-Shanker, “Roots, Constituents, and C-Command”, in Artemis Alexiadou, editor, *Theoretical Approaches to Universals*, pages 109-138, John Benjamins Publishing Company, 2002.
- Raymond Kozlowski, Kathleen F. McCoy, and K. Vijay-Shanker, “Selectional restrictions in natural language sentence generation”, *Proceedings of Sixth World Multi Conference on Systemics, Cybernetics, and Informatics*, pages 127-132, 2002.
- M. S. Carberry, K. Vijay-Shanker, A. Wilson, and K. Samuel, “Investigation of Randomized Rule Selection in Transformation-Based Learning”, *Natural Language Engineering*, 7(2):99-116, June 2001.
- O. C. Rambow, K. Vijay-Shanker, D. J. Weir, “D-Tree Substitution Grammar”, *Computational Linguistics*, 27(1):87-122, March 2001.
- R. Frank and K. Vijay-Shanker, “Primitive C-Command”, *Syntax*, 4(3), pages 164-204, 2001.
- A. K. Joshi and K. Vijay-Shanker. “Compositional Semantics for Lexicalized Tree-Adjoining Grammars”, in Harry Bunt, Reinhard Muskens, and Elias Thijsse (editors), *Computing Meaning*, Studies in Linguistics and Philosophy, Volume 77, pages 147-164. Kluwer Academic Press, Dordrecht, 2001.
- R. Frank and K. Vijay-Shanker, “Lowering Across Languages”, in *Cross-Linguistic Perspectives on Language Processing*, editors: Marica De Vincenzi and Vincenzo Lombardo, pp. 83-87, Kluwer Dordrecht, 2000.
- R. Frank, S. Kulick, and K. Vijay-Shanker, “Monotonic C-Command: A New Perspective on Tree Adjoining Grammars”, *Grammars*, 3(2):151-173, 2000.
- John Chen and K. Vijay-Shanker, “Towards a Reduced Commitment, D-theory Style TAG Parser”, in Harry Bunt and Anton Nijholt, editors, *Advances in Probabilistic and Other Parsing Technologies* pages 141-160, Kluwer Academic Publishers, Boston, Massachusetts, 2000.
- J. Chen and K. Vijay-Shanker, *Automated Extraction of TAGs from the Penn Treebank*, Proc. of the 6th International Workshop on Parsing Technologies, pages 65-76, Trento, Italy, 2000.
- F. Xia, M. Palmer, and K. Vijay-Shanker, “Towards Semi-Automating Grammar Development”, *Proc. of the 5th Natural Language Processing Pacific Rim Symposium*, Beijing, China, 1999.
- K. Samuel, S. Carberry, and K. Vijay-Shanker, “Automatically Selecting Useful Phrases for Dialogue Act Tagging”, *Proc. of the Fourth Conference of the Pacific Association for Computational Linguistics*, 1999.
- R. Frank, S. Kulick, and K. Vijay-Shanker, “C-Command and Extraction in Tree Adjoining Grammar”, *Proc. of 6th Mathematics of Language Conference*, pages 301-314, Orlando, USA, 1999.
- K. Vijay-Shanker and D. J. Weir, “Exploring the Underspecified World of Lexicalized Tree Adjoining Grammars”, *Proc. of 6th Mathematics of Language Conference*, pages 213-222, Orlando, USA, 1999.
- J. Chen, S. Bangalore, and K. Vijay-Shanker. “New Models for Improving Supertag Disambiguation”, *Proc. of the 9th Conference of the European Chapter of the Association for Computational Linguistics*, pages 188-195, Bergen, Norway, 1999.

- K. Samuel, S. Carberry and K. Vijay-Shanker. “Dialogue Act Tagging with Transformation-Based Learning”, *Proc. of the 36th Annual Meeting of the Association for Computational Linguistics*, pages 1150-1156, Montreal, 1998.
- K. Samuel, S. Carberry, and K. Vijay-Shanker, “An Investigation of Transformation-Based Learning in Discourse”, *Proc. of the International Conference on Machine Learning*, pages 497-505, Madison, 1998.
- T. Blear, M. Palmer and K. Vijay-Shanker, “Motion Verbs and Semantic Features in TAG”, *Proc. of 4th Workshop on Tree-Adjoining Grammars and Related Formalisms*, pages 1-4, Philadelphia, PA, August 1998.
- R. Frank and K. Vijay-Shanker, “TAG Derivation as Monotonic C-Command”, *Proc. of 4th Workshop on Tree-Adjoining Grammars and Related Formalisms*, pages 172-175, Philadelphia, PA, August 1998.
- O. Rambow and K. Vijay-Shanker. “Wh-Islands in TAG and Related Formalisms”, *Proc. of 4th Workshop on Tree-Adjoining Grammars and Related Formalisms*, pages 21-24, Philadelphia, PA, August 1998.
- F. Xia, M. Palmer, and K. Vijay-Shanker. “Consistent Grammar Development Using Partial-Tree Descriptions for Lexicalized Tree-Adjoining Grammars”, *Proc. of 4th Workshop on Tree-Adjoining Grammars and Related Formalisms*, pages 180-183, Philadelphia, PA, August 1998.
- J. Chen and K. Vijay-Shanker, “Towards a Minimal Commitment TAG Parser”, *Proceedings of the 6th International Workshop on Parsing Technologies*, pages 18-29, Cambridge, MA, September 1997.
- K. Samuel, S. Carberry, and K. Vijay-Shanker, “Computing Dialog Acts from Features using Transformation-Based learning”, *Proceedings of AAAI Spring Symposium on Applying Machine Learning to Discourse Processing*, pages 90-97, Stanford, CA. March 1997
- J. Rogers and K. Vijay-Shanker, “Towards a Formal Understanding of the Determinism Hypothesis in D-Theory Parsers”, *Current Issues in Parsing Technology*, ed. H. Bunt and M. Tomita, pages 191-206, Kluwer Academic Publishing, 1996.
- R. Kasper, B. Kiefer, K. Netter, and K. Vijay-Shanker, “Compiling HPSG into TAG”, *Proceedings of the 33rd Annual meeting of the Association for Computational Linguistics*, pages 92-99, Cambridge, MA, 1995.
- O. Rambow, K. Vijay-Shanker, and D. J. Weir, “D-Tree Grammars”, *Proceedings of the 33rd Annual Meeting of the Association for Computational Linguistics*, pages 151-158, Cambridge, MA, 1995.
- O. Rambow, K. Vijay-Shanker, and D. J. Weir, “Parsing D-Tree Grammars and Compact Representation of Parse Forest”, *Proceedings of the 5th International Workshop on Parsing Technologies*, pages 252-259, 1995.
- R. Backofen, J. Rogers, and K. Vijay-Shanker, “A First-order Axiomatization of the Theory of Finite Trees”, *Journal of Logic, Language, and Information*, 4:5-39, June 1995.
- K. Vijay-Shanker and D. J. Weir, “Equivalence of Four Grammar Formalisms”, *Mathematical Systems Theory*, Vol 27, pages 511-545, December 1994.
- J. Rogers and K. Vijay-Shanker, “Extracting Trees from their Descriptions: An Application to Tree Adjoining Grammars”, *Computational Intelligence*, 10(4), pages 401-421, November 1994.
- K. Vijay-Shanker and D. J. Weir, “Parsing Some Constrained Grammar Formalisms”, *Computational Linguistics*, 19(4):591-636, December 1993.
- K. Vijay-Shanker and D. J. Weir, “Shared Forests in TAG parsing”, *Proceedings of 6th Conference of the European Chapter of the Association for Computational Linguistics*, pages 384-393, Utrecht, The Netherlands, April 1993.
- K. Vijay-Shanker, “Using Description of Trees in Tree Adjoining Grammar framework”, *Computational Linguistics*, 18(4), pages 481-518, December 1992.

- K. Vijay-Shanker and Y. Schabes, "Structure Sharing in Lexicalized Tree Adjoining Grammars", *Proceedings of 14th International Conference of Computational Linguistics*, pages 205-211, Nantes, France, August 1992.
- K. McCoy, K. Vijay-Shanker and G. Yang, "A Functional Approach to Generation with TAG", *Proceedings of 30th Annual Meeting of the Association for Computational Linguistics*, pages 48-55, Newark, DE, June 1992.
- J. Rogers and K. Vijay-Shanker, "Reasoning with Descriptions of Trees", *Proceedings of 30th Annual Meeting of the Association for Computational Linguistics*, pages 72-80, Newark, DE, June 1992.
- G. Yang, K. McCoy, and K. Vijay-Shanker, "From Functional Specifications to Syntactic Structures: Tree Adjoining Grammars and Systemic Grammars", *Computational Intelligence*, December 1991, 7(4).
- A. Dawar and K. Vijay-Shanker, "An interpretation of negation in feature structure descriptions", *Computational Linguistics*, pages 11-21, March 1990.
- A. K. Joshi, K. Vijay-Shanker, and D. J. Weir "The convergence of mildly context-sensitive formalisms", in *Processing of Linguistic Structure* edited by T. Wasow and P. Sells, pages 31-82, MIT Press, 1990
- K. Vijay-Shanker and D. J. Weir, "Polynomial time parsing of Combinatory Categorical Grammars", *Proceedings of 28th Annual Meeting of Computational Linguistics*, pages 1-8, Pittsburgh, PA, June 1990.
- Y. Schabes and K. Vijay-Shanker, "Deterministic left to right parsing of Tree Adjoining Languages", *Proceedings of 28th Annual Meeting of Computational Linguistics*, pages 276-283, Pittsburgh, PA, June 1990.
- K. McCoy, K. Vijay-Shanker, and G. Yang, "Incorporating Tree Adjoining Grammars in the Systemic Framework", *Proceedings of 5th International Workshop on Natural Language Generation*, Dawson, PA, June 1990.
- A. Dawar and K. Vijay-Shanker, "Three valued interpretation of negation in Feature Structures", *Proceeding of 27th Annual Conference of Computational Linguistics*, pages 18-24, Vancouver, June 1989.
- A. K. Joshi and K. Vijay-Shanker, "Treatment of Long-Distance Dependencies in LFG and TAG", *Proceeding of 27th Annual Conference of Computational Linguistics*, pages 220-227, Vancouver, BC, June 1989.
- K. Vijay-Shanker and D. J. Weir, "Recognition algorithms for LIG and CCG", *Proceedings of 1st International Workshop on Parsing Technologies*, Pittsburgh, PA, August 1989.
- K. Vijay-Shanker, D. J. Weir, and A. K. Joshi, "On the Progression from Context Free Languages to Tree Adjoining Languages", in *Mathematics of Language*, edited by A. Manaster-Ramer and W. C. Rounds, pages 387-401, John Benjamins Publishing Company, 1989.
- K. Vijay-Shanker and A. K. Joshi, "Feature Structure based Tree Adjoining Grammars", *Proceedings of 1th International Conference of Computational Linguistics*, pages 714-719, Budapest, Hungary, August 1988.
- K. Vijay-Shanker, D. J. Weir, and A. K. Joshi, "The Structural Descriptions Provided by Grammatical Systems", *Proceedings of 25th Annual Meeting of Computational Linguistics*, pages 82-93, Stanford, CA, August 1987.
- K. Vijay-Shanker, D. J. Weir, and A. K. Joshi, "Tree Adjoining and Head Wrapping", *Proceedings of 11th International Conference of Computational Linguistics*, pages 202-207, Bonn, West Germany, August 1986.
- D. J. Weir, K. Vijay-Shanker, and A. K. Joshi, "The Relationship between Tree Adjoining Grammars and Head Grammars", *Proceedings of 24th Annual Meeting of Computational Linguistics*, pages 67-74, New York, NY, June 1986.
- K. Vijay-Shanker and A. K. Joshi, "Some Computational Properties of Tree Adjoining Grammars", *Proceedings of 23rd Annual Meeting of Computational Linguistics*, Chicago, IL, July 1985.

### Tutorials and Special Courses

*Exploiting Tree Descriptions in Strongly Lexicalized Grammar Formalisms and Parsers*, 1 week advanced course (co-taught with David Weir), European Summer School on Logic, Language and Computation, Saarbruecken, August 1998.

*Tree-Adjoining Grammars: Some Formal and Computational Properties*, tutorial at 4th International Workshop on Tree-Adjoining Grammars and Related Formalisms, Philadelphia, PA, August 1998.

*Tree-Adjoining Grammars: Some Formal and Computational Properties*, 1 week advanced course, European Summer School on Logic, Language and Computation, Prague, August 1996.

*Constrained Grammatical Formalisms*, Tutorial (with A. K. Joshi and D. J. Weir) at 27th Annual Meeting of Association of Computational Linguistics, Vancouver, BC, June 1989.

### INVITED TALKS (External)

*Information Extraction of Phosphorylation Information from Medline Abstracts*, Glaxo SmithKline, King of Prussia, PA, October 2005.

*Information Extraction from Biomedical Literature*, Computer Science Seminar Series, Villanova University, October 2004.

*Phosphorylation Information Extraction*, Computational Linguistics Seminar, Georgetown University, December 2003.

*Named Entity Classification in the Biology Domain*, Center for Speech and Language Processing Seminar Series, Johns Hopkins University, November 2003.

*From Classification to Information Extraction: Phosphorylation And Post-translational Modifications Extraction*, Bioinformatics Group, University of Pennsylvania, November 2003.

*Statistical Approaches for Indian Language Processing*, Department of Computer Science, Anna University, Chennai, India, January 2002.

*Delaying Attachments in TAG Parsing*, School of Cognitive Sciences, University of Sussex, Brighton, UK, 1997.

*The Use of Domination Statements in TAG and Related Formalisms*, XII Congress on Natural Languages and Formal Languages, La Seu D'Urgell, September 1996.

*Compiling HPSG into TAG*, Invited talk, 3rd International Workshop on Tree-Adjoining Grammars, Paris, France, September 1994.

*Compiling HPSG into TAG*, University of Utrecht, Utrecht, The Netherlands, 1994.

*An Axiomatization of Trees*, CWI, University of Amsterdam, Amsterdam, The Netherlands, 1994.

*A New Formulation of Tree-Adjoining Grammars*, School of Cognitive Sciences, University of Sussex, Brighton, UK, 1994.

*On the Logic of Trees*, Joint Colloquium Series of Department of Computational Intelligence, University of Saarbruecken, and DFKI (German Center for Research in Artificial Intelligence), February 1994, Saarbruecken, Germany.

*Reasoning with Descriptions of Trees: An Application to Tree Adjoining Grammars* Joint Colloquium Series of Department of Computational Linguistics, University of Saarbruecken, and DFKI (German Center for Research in Artificial Intelligence), January 1992, Saarbruecken, Germany.

*Embedded Pushdown Automata and its relationship to TAG parsing*, First International Workshop on Tree Adjoining Grammars, Saarbruecken, West Germany, August 1990.

*Negation in Feature Structure Descriptions*, Department of Electrical Engineering and Computer Science, Northwestern University, Evanston, IL, December 1989.

*Some Properties of Combinatory Categorical Grammars*, 3rd Annual Conference on Advances in Categorical Grammars, Tucson, AZ, August 1989. (with D. J. Weir.)

*Tree Adjoining Grammars in Unificational Framework*, Workshop on *Mathematical Theories of Language*, August 1987, Stanford, CA.

### **External Support**

NSF Collaborative Research SBR-9710411: “Phrase Structure and C-Command”. July 1997-June 2000. \$70,686. The amount includes a *Research Experience for Undergraduates* supplement for \$4,875, June 1999-August 1999.

NSF Grant No. GER- 9354869: “Graduate Traineeship for Natural Language Human-Computer Interfaces”, September 1994 – January 2001. \$564,500. Co-Principal Investigators: Sandra Carberry Kathleen McCoy and K. Vijayashanker. Amount includes a supplement of \$6,500 for traineeship foreign travel for summer internship.

NSF Grant No. IRI-9016591: “Mathematical and Computational Investigations in Constrained Grammar Formalisms”. August 1991-January 1994, \$93,166.

### **PhD THESES SUPERVISED**

- John Miller, proposal expected Fall 2006.
- Michael Bloodgood, proposal expected Fall 2006.
- K. E. Ravikumar (Anna University), expected to graduate in Summer 2007.
- Meenakshi Narayanaswamy (Anna University), expected to graduate in Summer 2007.
- Manabu Torii, *Type Classification and Applications to Information Extraction in the Biology Domain*, December 2005. Postdoc, Department of Biostatistics, Biomathematics and Bioinformatics, Georgetown University, USA.
- Raymond Kozlowski (co-advised with Kathleen McCoy), *Uniform Multi-lingual Sentence Generation Using Flexible Lexico-Grammatical Resources*, December 2005. Lecturer, Tufts University, USA.
- John Chen, *Efficient Statistical Parsing Using Lexicalized Grammatical Information*, August 2001. Research Scientist, Janya Inc., USA.
- Ken Samuel (co-advised with Sandra Carberry), *Discourse Learning: An Investigation of Dialogue Act Tagging Using Transformation-Based learning*. Jan. 2001. Senior Artificial Intelligence Engineer, Mitre.
- James Rogers, *Studies in the Logic of Trees with Application to Grammar Formalisms*, December 1995. Associate Professor, Earlham College.
- Gijoo Yang (co-advised with Kathleen McCoy), *Prediction in Generation: Systemic Tree Adjoining Grammars*, December 1992. Associate Professor, Dongguk University, Korea.

### **MASTERS THESES SUPERVISED**

- Andrew Wilson, (co-advised with Sandra Carberry), *A Comparative Study of a Monte Carlo Version of Transformation-Based learning*, M.S., January, 2001.

- Paul Mora, *Graphical User Interface Generation from a Semantic Data Model*, 1991.
- Anuj Dawar, *Semantics of Negation in Feature Structure Descriptions*, M.S., 1989.  
Anuj Dawar is a Fellow and Director of Graduate Studies for Computer Science at Robinson College, University of Cambridge.

#### Selected University and Department Committees

- University Faculty Senate – September 2004–present
- Chair of Colburn Dissertation Award (Mathematics and Engineering) Committee – 2000
- Member of Ad hoc committee on ITA screening and testing
- Chair of CIS graduate program committee 1995-1997
- Member of CIS graduate and undergraduate program committees several years