

## James Rogers

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### Education

Ph.D. Computer Science, University of Delaware, Newark, Delaware, Jan 1995.  
Dissertation: *Studies in the Logic of Trees with Applications to Grammar Formalisms*  
Adviser: K. Vijay-Shanker.  
Committee: John Case, Univ. of Delaware; Robert Frank, Univ. of Delaware;  
Aravind K. Joshi, Univ. of Pennsylvania.

M.S. Computer Science, University of Delaware, Newark, Delaware, Jan. 1993.

B.A. Liberal Arts, Goddard College, Plainfield, Vermont, June 1977.

### Academic Positions

2010–present Professor and Convener, Dept. of Computer Science, Earlham College, Richmond, IN.

2005–2006 Jeanne Rosselet Fellow, Radcliffe Institute for Advanced Study, Cambridge, MA.

2003–2009 Associate Professor and Convener, Dept. of Computer Science, Earlham College, Richmond, IN.

2002–2006 Visiting lecturer, International Ph.D. Programme in Formal Languages and Applications, Rovira i Virgili University, Tarragona, Spain. (Annual one week lectures.)

2000–2002 Assistant Professor, Dept. of Computer Science, Earlham College, Richmond, IN.

1996–2000 Assistant Professor, Dept. of Computer Science, University of Central Florida, Orlando, FL.

1994–1996 Post-Doctoral Fellow, Institute for Research in Cognitive Science (The NSF Science and Technology Center for Research in Cognitive Science), Univ. of Pennsylvania, Philadelphia, PA.

### Research Area

My principle research interests lie in the theoretical aspects of *Computational Linguistics* (and *Natural Language Processing*), *Cognitive Science*, *Mathematical Logic*, and, particularly, in the intersection of these.

My research focuses on the logical foundations of grammar formalisms and the mathematical properties of language (more accurately, the properties of the sets of structures that Linguists use to model languages). The majority of my research falls in the area known as *Model-Theoretic Syntax*.

For the last few years, working with various collaborators and my undergraduate research group, I have been focusing primarily on descriptive characterizations of classes of stringsets that are weaker than the Regular stringsets. These classes turn out to be useful in a number of areas:

- exploring the minimal capabilities of cognitive mechanisms that can recognize whether a sequence meets various types of constraints
- designing and interpreting experiments comparing the ability of human and non-human animals to distinguish aural and visual patterns
- designing and interpreting experiments to distinguish functional areas in the language and aural stimulus processing parts of the brain
- classifying the phonological patterns that occur in human languages
- as a foundation for stochastic models of human languages and human language learning.

I have done a great deal of work on descriptive characterizations of classes of sets of more complicated structures, including Context-Free (CF) sets of strings and trees and a variety of generalizations of CF sets including those mildly context-sensitive sets that are licensed by Tree-Adjoining Grammars (TAGs) and Wier's Control Grammars. These classes are useful, *inter alia*, in:

- reasoning about linguistic structure independently of assumptions about potential mechanisms for processing
- identifying the abstract principles embodied in linguistic theories that have been expressed in grammar- or automata-theoretic terms
- comparing linguistic theories expressed in terms of disparate formalisms
- specifying CFGs, TAGs, etc., directly in terms of the principles they are intended to capture, using logical formulae which can be compiled into grammars in the traditional form
- verifying that CFGs, TAGS, etc., enforce or are at least consistent with various linguistic principles
- determining the independence of sets of linguistic principles.

More generally, I am interested in *formal methods* in a broad sense—theories and mechanisms which are based on precise mathematical semantics. Additional interests include *Formal Language Theory*, *Theory of Computation*, *Artificial Intelligence (Automated Theorem Proving, Rewrite Systems)* and *formal semantics of languages* both natural and programming.

### Teaching Interests

I am interested in Computer Science education in itself and have been actively engaged in curriculum development with some success. I am particularly interested in exploring ways of better integrating theoretical foundations into the core curriculum without losing sight of the fact that its goals are largely practical.

I have a strong commitment to active learning which shows up in an extensive use of labs with expository content in my more systems oriented courses, and in the use of guided inquiry in my theoretical courses.

The courses I have taught most frequently, and for which I have the most fully developed pedagogy, are CS-2 (advanced programming and basic data structures), *Algorithms*, and *Theory of Computation*. In ToC, I have developed, over the last several years, course materials based on a variation of active/cooperative learning, which have been highly successful. I use similar materials in Algorithms, but not exclusively.

I also regularly teach a *Senior Seminar*, which involves guiding capstone projects (research/formal proposal and project planning/development/formal report and presentation at each stage) as well as leading a traditional seminar (reading/discussion/writing). The projects have covered a broad range of topics, both within CS proper and in the application of computational methodologies to a wide variety of other disciplines. (See appendix.) In the seminar we usually focus on social, ethical and legal issues in information technology including both current issues and historical context.

Other courses I have taught include *CS-1* (Introduction to Programming), *Programming Languages*, *Networks*, *Graphics*, *Symbolic Logic*, *Operating Systems*, *Computer Organization*, *AI* and *Database Systems*. I have professional experience in Hardware Design and Systems Programming which allows me to bring a personal perspective to *Computer Organization* and *Operating Systems*.

Courses I have not yet had an opportunity to teach, but which are close to my research include *Natural Language Processing*, other aspects of *Cognitive Science*, and *Compilers*.

I also have a strong interest in the *History of Computing* and *Social and Ethical Aspects of Computing*, and am interested in teaching such courses, if they are offered, or developing them if they are not.

I am particularly interested in the areas in which Computer Science interacts with other disciplines, my own research being one example. I have had the opportunity to supervise a good deal of interdisciplinary student research, but so far only in the context of the Senior Seminar and my own research group. I would very much like to expand this into a more formal framework. I'm particularly interested in collaborating with faculty from other disciplines in joint teaching and jointly mentoring research.

## Student Research

A particular focus of my teaching at Earlham has been the challenge of organizing sustained, meaningful, undergraduate student research. What has worked well for me, first of all, is to keep the research active throughout the year rather than relegating it to summer research. This allows a continuity to develop that extends across the tenures of the individual students, with the more senior students serving as mentors for the new students. This structure puts the senior students in a position in which they have to revisit and clarify their understanding of the foundations of what we are doing, it validates their accomplishments and it provides the new students with a successful model to aspire to. (I like to think of the group as a kind of standing wave in the stream of students.)

The second thing that seems most important is to provide the group with opportunities to do research that is genuinely new. The experience that really hooks a student on doing research is that moment when they realize that they have an understanding of something that no one has known before. Clearly, it is easier to find accessible topics in some areas than in others, but so far I have pretty successful in doing this. It is mostly a matter of saving the low hanging fruit that one encounters in one's own research for the group. Contributions that my students have made under my direction include:

- a data structure for tree-like structures in arbitrarily many dimensions
- a two-branching normal form (i.e., CNF-like) transformation for these structures
- an abstract characterization of the Strictly Piecewise Testable stringsets. (These turn out to be all and only the sets of strings that are closed under subsequence.)
- an algorithm for determining if an arbitrary DFA recognizes a Strictly Piecewise Testable stringset.

In addition, the group has developed a simplified polynomial time algorithm for testing whether a DFA recognizes a Strictly Local stringset, although this turns out to have been previously described in a 2001 paper.

Some of these students are truly outstanding, but for the most part they are simply strong students with a moderate degree of mathematical maturity and the nerve to take on, with guidance from their peers, something that seems initially of daunting complexity.

### Teaching Experience

Earlham College, 2000 to present. Very nearly the entire CS curriculum.

Visiting lecturer, International PhD. Programme in Formal Languages and Applications, Rovira i Virgili University, Tarragona, Spain. 2002-2006. *Tree-Adjoining Grammars*—Annual one week sessions.

Assistant Professor, University of Central Florida, 1996 to 2000. Graduate and undergraduate *Theory of Computation* and *Formal Language Theory*.

Instructor, University of Delaware, June–July 1993. *General Computer Science* (Pascal).

Teaching Assistant, University of Delaware, Sept 1989 to June 1991.

Duties included tutoring and grading for undergraduate and graduate level courses (*Compiler Design, Topics—Ada, Artificial Intelligence*); full responsibility for recitation periods for *General Computer Science* (Fall 1989); instruction, grading, and partial preparation of laboratory periods for *Introduction to Computer Science II* (C++) (Spring 1991).

Instructor, R.E.T.S. Electronics School, Broomall, PA. (Technical School) May–September 1979.  
*Electronic Engineering Technology*

### Thesis Supervision

Ivan Garibay. *English Language Semantics for Statecharts*. MS University of Central Florida, 2000.

### Thesis Committees

Feinstein, Daniel. *Computational Properties of Unification Grammars*. MS CS, University of Haifa. Supervisor: Shuly Wintner, 2004.

Whitehead, Daniel Lee. *Acquiring Historical Knowledge from Encyclopedic Texts: Human Relations Aspect*. MS CS, Univ. of Central Florida. Supervisor: Fernando Gomez. 1997

Herleman, Karl Eric. *Pronoun Resolution in Encyclopedic Texts*. MS CS, Univ. of Central Florida. Supervisor: Fernando Gomez. 1998.

### Undergraduate Research Supervision

Publications and presentations by undergraduates under my supervision.

Ian Kelly, Josh McCoy and Nate Sommer. *Load-balancing distributed XDM servers in a computer lab environment*. Butler Undergraduate Research Conference, Spring 2003.

- Josh Hursey. *Fingerprint Minutiae Recognition: An Artificial Neural Network Approach*. Butler Undergraduate Research Conference, Spring 2003.
- Josh McCoy. *High Dimensional Rendering in OpenGL*. Butler Undergraduate Research Conference, Spring 2004.
- Nathan Sommer. *Algorithmic Music Composition*. Butler Undergraduate Research Conference, Spring 2004.
- David Brown, Ian Kelly, Colin Kern, Alex Lemann and Greg Sandstrom. *Representing Multidimensional Trees*. Midstates Conference for Undergraduate Research in Computer Science and Mathematics (MCURSCM '04).
- David Brown, Ian Kelly, Colin Kern, Alex Lemann and Greg Sandstrom. *A CNF Transformation for Multidimensional Grammars*. Midstates Conference for Undergraduate Research in Computer Science and Mathematics (MCURSCM '04).
- David Brown, Colin Kern, Alex Lemann and Greg Sandstrom. *The Yield Operation for Multi-Dimensional Trees*. Butler Undergraduate Research Conference, Spring 2005.
- Greg Sandstrom. *A Parallel Extension of Earley's Parsing Algorithm*. Butler Undergraduate Research Conference, Spring 2005.
- Matt Edlefsen, Dylan Leeman, Nathan Myers, Nathaniel Smith, Molly Visscher and David Wellcome. *Deciding the Strictly Local (SL) Languages*, Midstates Conference for Undergraduate Research in Computer Science and Mathematics (MCURSCM'08).
- Gil Bailey, Matt Edlefsen, Molly Visscher, David Wellcome and Sean Wibel. *Deciding the Strictly Piecewise Testable Stringsets*, Midstates Conference for Undergraduate Research in Computer Science and Mathematics (MCURSCM'09).
- (James Rogers, Jeffrey Heinz), Matt Edlefsen, Molly Visscher, David Wellcome and Sean Wibel. *On Languages Piecewise Testable in the Strict Sense*, The Mathematics of Language, LNCS/LNAI 6149, 2010.

### **Independent Study Supervision**

- 1998, Spring: Christian Mackesy, Sandra Velez. (Plus several informal participants.) Initial development of FLT tutorial. Development of basic Java classes for interactive web-based version.
- 1998, Spring, Summer, Fall: Colby Cavin. A constraint-based grammar for the syntax of musical notation.
- 1999, Spring. Ivan Garibay. Elementary and Higher Order Logic (Informal).
- 1999, Summer. Ivan Garibay. Formalizing natural language system specifications.
- 1999, Fall. James Marley. Java classes for client submission of mathematical text.
- 2001, Spring. Andrew Dingman. A cryptographic file system for Linux.
- 2002, Spring. Ned Bingham. A Network Management Tool.

2002, Spring. James Rice. Electronic Gaming: A Peer-to-peer Approach.

2003, Spring. Micah Acinapura. Interactive Modeling in OpenGL.

2003, Spring. Nathan Sommer. Algorithmic Music Composition.

2008, Spring. Bryan Purcell. Modeling Expressive Rhythmic Performance.

## Publications

### *Journal Articles*

\*James Rogers. wMSO theories as grammar formalisms. *Theoretical Computer Science*, 293(2):291–320, 2003.

\*James Rogers. Syntactic structures as multi-dimensional trees. *Research on Language and Computation*, 1(3–4):265–305, 2003.

\*James Rogers. “Grammarless” Phrase Structure Grammar. *Linguistics and Philosophy*, 20:721–746, 1997.

\*Rolf Backofen, James Rogers, and K. Vijay-Shanker. A first-order axiomatization of the theory of finite trees. *Journal of Logic, Language, and Information*, 4:5–39, 1995. Also available as IRCS Technical Report 95-02.

\*James Rogers and K. Vijay-Shanker. Obtaining trees from their descriptions: An application to tree-adjointing grammars. *Computational Intelligence*, 10:401–421, 1994.

### *Journal Issues*

James Rogers and Richard T. Oehrle, editors. *Journal of Logic, Language and Information*, volume 13:4. Elsevier, 2004. Special Issue on 8<sup>th</sup> Meeting on Mathematics of Language.

James Rogers and Lawrence Moss, editors. *Grammars*, volume 3:2/3. Elsevier, 2000. Special Issue on 6<sup>th</sup> Meeting on Mathematics of Language.

### *Books*

James Rogers. *A Descriptive Approach to Language-Theoretic Complexity*. (Monograph.) Studies in Logic, Language, and Information. CSLI/FoLLI, 1998. Reviewed in *Computational Linguistics*, vol. 27, no. 13, June 2001, pp. 304–309.

*Book Chapters*

\*James Rogers, Jeffrey Heinz, Gil Bailey, Matt Edlefsen, Molly Visscher, David Wellcome, and Sean Wibel. On languages piecewise testable in the strict sense. In Christian Ebert, Gerhard Jäger, and Jens Michaelis, editors, *The Mathematics of Language: Revised Selected Papers from the 10th and 11th Biennial Conference on the Mathematics of Language*, volume 6149 of *LNCS/LNAI*, pages 255–265. FoLLI/Springer, 2010.

\*James Rogers and Marc D. Hauser. The use of formal language theory in studies of artificial language learning: a proposal for distinguishing the differences between human and nonhuman animal learners. In *Recursion in Human Languages*, volume 104 of *Studies in Generative Grammar*, chapter 12. de Gruyter, Berlin, 2009.

\*Stephan Kepser and James Rogers. The equivalence of tree adjoining grammars and monadic linear context-free tree grammars. In Christian Ebert, Gerhard Jäger, and Jens Michaelis, editors, *The Mathematics of Language: Revised Selected Papers from the 10th and 11th Biennial Conference on the Mathematics of Language*, volume 6149 of *LNCS/LNAI*, pages 129–144. FoLLI/Springer, 2010.

\*Thomas Cornell and James Rogers. Model theoretic syntax. In Lisa Lai-Shen Cheng and Rint Sybesma, editors, *The Glot International State of the Article Book 1*. Holland Academic Graphics, The Hague, 2000.

\*James Rogers. The descriptive complexity of generalized local sets. In Uwe Moennich and Hans-Peter Kolb, editors, *Mathematics of Syntactic Structure*, pages 21–40. Mouton/deGruyter, 1998.

\*James Rogers. Strict  $LT_2$  : Regular :: Local : Recognizable. In Christian Retore, editor, *Logical Aspects of Computational Linguistics : First International Conference, LACL '96 (Selected Papers)*, volume 1328 of *Lecture notes in computer science/Lecture notes in artificial intelligence*, pages 366–385. Springer, 1997.

\*James Rogers. On descriptive complexity, language complexity, and GB. In Patrick Blackburn and Maarten de Rijke, editors, *Specifying Syntactic Structures*, *Studies in Logic, Language, and Information*, pages 157–183. FoLLI/CSLI Publications, 1997. Also available as IRCS Technical Report 95-14. [cmp-ig/9505041](http://cmp-ig/9505041).

James Rogers and K. Vijay-Shanker. Towards a formal understanding of the determinism hypothesis in D-theory. In Masaru Tomita and Harry C. Bunt, editors, *Recent Advances in Parsing Technology*, pages 59–78. Kluwer, 1996.

*Conference Papers*

\*Jeffrey Heinz and James Rogers. Estimating strictly piecewise distributions. In *Proceedings of the 48th Annual Meeting of the Association for Computational Linguistics*, pages 886–896, Uppsala, Sweden, July 2010. Association for Computational Linguistics.

\*Geoffrey K. Pullum and James Rogers. Expressive power of the syntactic theory implicit in The Cambridge Grammar. In *Annual Meeting of the Linguistics Association of Great Britain*, University of Essex, Colchester (UK), September 2008.

- \*James Rogers and Geoffrey K. Pullum. Aural pattern recognition experiments and the subregular hierarchy. In *Tenth Meeting on Mathematics of Language*, UCLA, 2007.
- \*James Rogers and Marc D. Hauser. Potential distinguishing characteristics of human aural pattern recognition. In *Recursion in Human Languages*, Illinois State University, Normal, IL USA, 2007.
- \*James Rogers. Wrapping of trees. In *Proceedings of the 42nd Annual Meeting of the Association for Computational Linguistics (ACL'04)*, pages 558–565, Barcelona, ES, July 2004.
- \*James Rogers. On scrambling, another perspective. In *Proceedings of the Seventh International Workshop on Tree Adjoining Grammars and Related Frameworks*, Vancouver, BC, CA, May 2004.
- \*James Rogers. One more perspective on semantic relations in TAG. In *Proceedings of the Sixth International Workshop on Tree Adjoining Grammars and Related Frameworks*, Venice, IT, May 2002.
- \*James Rogers. Generalized tree-adjoining grammar. In *Sixth Meeting on Mathematics of Language*, pages 189–202, 1999.
- \*James Rogers. On defining TALs with logical constraints. In Anne Abeillé, Tilman Becker, Owen Rambow, Giorgio Satta, and K. Vijay-Shanker, editors, *Fourth International Workshop on Tree Adjoining Grammars and Related Frameworks (TAG+4)*, pages 151–154, 1998.
- \*James Rogers. A descriptive characterization of tree-adjoining languages. In *Proc. of the 17th International Conference on Computational Linguistics (COLING'98) and the 36th Annual Meeting of the Association for Computational Linguistics (ACL'98)*, pages 117–121, Montreal, 1998. ACL. Project Note.
- \*James Rogers. A unified notion of derived and derivation structures in TAG. In Tilman Becker and Hans-Ulrich Krieger, editors, *Proceedings of the Fifth Meeting on Mathematics of Language (MOL5)*, pages 146–152, Saarbrücken, 1997. DFKI.
- \*James Rogers. A model-theoretic framework for theories of syntax. In *Proceedings of the 34th Annual Meeting of the Association for Computational Linguistics*, pages 10–16, Santa Cruz, CA, 1996. Association for Computational Linguistics.
- \*James Rogers. Capturing CFLs with tree adjoining grammars. In *Proceedings of the 32nd Annual Meeting of the Association for Computational Linguistics*, pages 155–162, 1994. cmp-lg/9405020.
- James Rogers and K. Vijay-Shanker. Reasoning with descriptions of trees. In *Proceedings of the 30th Annual Meeting of the Association for Computational Linguistics*, pages 72–80, 1992.

#### *Technical Reports*

- \*James Rogers. A descriptive characterization of tree-adjoining languages (full version). Technical Report CS-TR-98-01, Univ. of Central Florida, 1998. Also available from the CMP-LG repository as paper number cmp-lg/9805008.
- \*James Rogers. What does a grammar formalism say about a language. Technical Report IRCS-96-10, Institute for Research in Cognitive Science, University of Pennsylvania, Philadelphia, PA, 1996.

James Rogers and K. Vijay-Shanker. A mechanism for obtaining trees from their descriptions. Technical Report 94-18, University of Delaware, Wilmington, DE, 1993.

James Rogers and K. Vijay-Shanker. On the determinism hypothesis and D-theory parsers. Technical Report 94-01, University Of Delaware, 1993.

(Publications with cmp-lg numbers are available on the computational linguistics preprint archive: [//http://arxiv.org/list/cs.CL](http://arxiv.org/list/cs.CL))

(Publications marked \* are available from my home page: <http://cs.earlham.edu/~jrogers>.)

## Presentations

*Cognitive Complexity of Linguistic Patterns*, Artificial Grammar Learning Workshop, Max Planck Institute for Psycholinguistics, Nijmegen, NL, Nov. 2010.

*Cognitive Complexity in the Sub-Regular Realm*, UCLA Linguistics Colloquium, Oct. 2010.

*On Formalizing Syntax*, UCLA Mathematical Linguistics Seminar, Oct. 2010.

*Estimating Strictly Piecewise Distributions*, 48th Meeting of the Association for Computational Linguistics, Uppsala, Sweden, July 2010.

*Formal Issues in the Design and Interpretation of Artificial Grammar Learning Experiments*, Characterizing Human Language by Structural Complexity (CHLaSC), Centre for General Linguistics (ZAS), Berlin, June 2009.

*On Languages Piecewise Testable in the Strict Sense*, Eleventh Meeting on Mathematics of Language (Bielefeld, Germany), Aug 2009.

*Model-Theoretic Syntax, Introduction*, Model-Theoretic Syntax at 10 (MTS@10), 19<sup>th</sup> European Summer School in Logic, Language and Information, Dublin, Ireland, Aug. 2007.

*Aural Pattern Recognition Experiments and the Subregular Hierarchy*, Tenth Meeting on Mathematics of Language (MoL10), July 2007.

*Potential Distinguishing Characteristics of Human Aural Pattern Recognition*, Recursion in Human Languages, April 2007.

*On Formalizing Syntax*, Eberhard Karls Universität (U. of Tübingen), Tübingen, Germany. April 2006.

*Model-Theoretic Syntax*, Institute for Research in Cognitive Science, University of Pennsylvania. Feb. 2006.

*Descriptions of Syntax*, Radcliffe Institute for Advanced Study. Jan. 2006.

*Some Notions of Higher-Order Grammars*, Fest Colloquium for Uwe Mönnich. Freudenstadt, Germany (University of Tübingen), Nov. 2004.

*wMSO Theories and the Control Language Hierarchy*. Logic and Computational Linguistics — LICS'03.

*Language-Theoretic Results in Model-Theoretic Syntax*, Workshop on Model-Theoretic Syntax. North American Summer School in Logic, Language and Information, Stanford, California, June 2002.

*One More Perspective on Semantic Relations in TAG*, Sixth International Workshop on Tree Adjoining Grammars and Related Frameworks. Venice, Italy, May 2002.

*A Hierarchy of Degrees of Constituency*, 6<sup>th</sup> Conference on Formal Grammars/7<sup>th</sup> Meeting on Mathematics of Language (FGMOL'01), Symposium on Model Theoretic Syntax. Helsinki, Finland, Aug. 2001, and Joint Sfs/IRCS Workshop, IRCS, Univ. of Pennsylvania, April 2002.

*wMSO Theories of Multi-dimensional Trees*, Automata and Finite Model Theory Workshop, 13<sup>th</sup> European Summer School in Logic, Language and Information (ESSLLI'01). Helsinki, Finland, Aug. 2001.

- In Multi-Dimensional Trees*, Joint SfS/IRCS Workshop, Univ. of Tübingen. Tübingen, Germany, Dec. 2000.
- Syntactic Structures as Multi-dimensional Trees*, Workshop on Trees in Logic, Computer Science and Linguistics, 12<sup>th</sup> European Summer School in Logic, Language and Information (ESSLLI'00). Birmingham, U.K., Aug. 2000.
- wMSO Theories as Grammar Formalisms*, 2<sup>nd</sup> AMAST Workshop on Algebraic Methods in Language Processing (AMILP 2000). Iowa City, Iowa, May, 2000.
- Generalized Tree-Adjoining Grammar*, Sixth Meeting on Mathematics of Language, Orlando, FL, July 1999.
- A Descriptive Characterization of Tree-Adjoining Languages*. 17th International Conference on Computational Linguistics (COLING'98) and the 36th Annual Meeting of the Association for Computational Linguistics (ACL'98), Montreal, Aug. 1998.
- On Defining TALs with Logical Constraints*. Fourth International Workshop on Tree Adjoining Grammars and Related Frameworks (TAG+4), IRCS, Univ. of Pennsylvania, Phila., Aug. 1998.
- A Unified Notion of Derived and Derivation Structures in TAG*. Fifth Meeting of the Mathematics of Language (MOL5). DFKI, Univ. Saarlandes, Saarbruecken, Germany, Aug. 1997.
- Strict  $LT_2$  : Regular :: Local : Recognizable*. Logical Aspects of Computational Linguistics (LACL'96). Nancy, FR, Sept. 1996.
- The Descriptive Complexity of the Generalized Local Sets*, The Mathematics of Syntactic Structure (workshop), Prague, Aug. 1996.
- Language-Theoretic Complexity and GB*, Universität Potsdam, Potsdam, Germany, Nov. 1995.
- What Does a Grammar Formalism Say About a Language*,  
Universität des Saarlands, Saarbrücken, Germany, Nov. 1995.
- CLiFF Group, Univ. of Penn., Oct. 1995.
- Werkvertrag (one week working visit including two formal talks), Universität Tübingen/SfS, Tübingen, Germany, Nov. 1995.
- “Grammarless” Phrase Structure Grammar*, Fourth Mathematics of Language Workshop (MOL4), University of Pennsylvania, Oct. 1995.
- Language Complexity and Theories of Syntax*, Defining Cognitive Science at IRCS (Workshop), April 1995.
- On Descriptive Complexity, Language Complexity, and GB*,  
Logic, Structures and Syntax (Workshop), Amsterdam, Sept. 1994.
- CLiFF Group, Univ. of Penn., Nov. 1994.
- A Logical Definition of Tree Adjunction*, Third International Workshop on Tree Adjoining Grammars, Paris, France, Sept. 1994.
- A Formalization of Partial Descriptions of Trees*, TAG+ Workshop, Institute for Research in Cognitive Science, University of Pennsylvania, June 1992.

### Other Teaching—Tutorials and Summer Schools

- Formal Description of Syntax*. Foundational Course, 19<sup>th</sup> European Summer School in Logic, Language and Information (ESSLLI'07), Trinity College, Dublin, Ireland. August 2007.
- Model-Theoretic Syntax*. 3<sup>rd</sup> North American Summer School in Logic, Language and Information, UCLA, Los Angeles, CA. June 2004.

- Model-Theoretic Syntax—Formal Aspects*. 15<sup>th</sup> European Summer School in Logic, Language and Information, Vienna, Austria. Aug. 2003.
- Formal Foundations of TAG*. (Tutorial) Fourth International Workshop on Tree Adjoining Grammars and Related Frameworks (TAG+4), IRCS, Univ. of Pennsylvania, Phila., Aug. 1998.
- Logical Approaches to Syntactic Theories*. (Tutorial) 35th Annual Meeting of the Association for Computational Linguistics (ACL'97). Madrid, Spain, July 1997.
- Topics in Model-Theoretic Syntax*, Advanced Course, Eighth European Summer School in Logic, Language, and Information, Prague, Czech Republic, Aug. 1996.

### Funding

- Research on Parsing Multi-dimensional Grammars* Ford-Knight Faculty/Student Research Program, Earlham College. \$7760, Summer 2004.
- University Graduate Enhancement Program, Office of the Vice President for Research and Graduate Studies, UCF. (with Mark Goudreau) \$25,000/year, 1997-98, 1998-99.
- An Interactive System for Formalizing Circuit Specifications*, (Competitive In-house Research Grant). Office of the Vice President for Research and Graduate Studies, UCF. \$7329.98, 1998-99.

### Reviewing

- National Science Foundation*  
*Theory of Computing Systems*  
*Journal of Logic, Language and Information*  
*Journal of the ACM*  
*Theoretical Computer Science*  
*Computational Linguistics*.  
*Linguistics and Philosophy*.  
*Journal of Language and Computation*.  
*Logic Journal of the Interest Group in Pure and Applied Logics*.  
*Grammars*.  
*Linguistic Analysis*.  
*Foundations of the Formal Sciences II*.
- I regularly review for a variety of conferences and workshops in Computational and Mathematical Linguistics.

### Committee Service

- President, Association for the Mathematics of Language. 2003–2005.
- Vice President/President-Elect, Association for the Mathematics of Language. 2001-2003.
- Editorial Board, *Grammars*.
- Editorial Board, *Lecture Notes in Logic, Language and Information (LNLLI)*
- Former member, editorial board, *Computational Linguistics*.
- Local Arrangements Chair, Sixth Meeting on Mathematics of Language. 1999.
- Session Chair, *Grammars* session, 37<sup>th</sup> Annual Meeting of the Association for Computational Linguistics. 1999.

Organizing Committee, 10th Conference on Formal Grammars and 9th Meeting on Mathematics of Language (FG-MoL'05), 2005.

Co-Chair, Model-Theoretic Syntax at 10 (MTS@10), 2007.

I regularly serve on the program committees of a variety of conferences and workshops in Computational and Mathematical Linguistics.

### **College Committees**

Ad hoc College working group on Curricular Visioning.

Budget Committee (convener).

Academic Advisory Committee

Ad hoc working group on implementation of the Analytic Reasoning section of the proposed General Education revisions.

Harassment Board. (Quasi-judicial complaint review board.)

Events Committee

### **Honors, Awards and Fellowships**

Jeanne Rosselet Fellow, Radcliffe Institute for Advanced Study, Cambridge, MA. 2005–06.

Post-Doctoral Fellowship, IRCS, University of Pennsylvania, 1994–95, 1995–96.

Frank Pherson Graduate Student Achievement Award (Outstanding Achievement in Computer Science), University of Delaware, 1994.

University Competitive Fellowship, University of Delaware, 1992–93, 1993–94.

Research Assistantship, University of Delaware, 1991–1992.

Teaching Assistantship, University of Delaware, 1989–1990, 1990–1991.

### **Professional Associations**

Association for Computational Linguistics.

Association for Mathematics of Language.

Association for Symbolic Logic.

European Federation for Logic, Language and Information.

European Association for Theoretical Computer Science.

Association for Computing Machinery.

ACM SIGACT (Algorithms and Computation Theory).

ACM SIGCSE (Computer Science Education).

IEEE Computer Society.

Computer Professionals for Social Responsibility.

Friends Association for Higher Education.

### **References**

Will follow.

**Appendix: Capstone Studies**

2000

- Ben Bartlett *Expert Systems: A Practical Application of Artificial Intelligence* †
- Drew Dingman *Design of a multi-user cryptographic file system* ‡
- Will Dyson *An Artificial Neural Network Architecture for Musical Instrument Recognition*
- Corinne Lofchie *Equity and School Vouchers: A Simulation*
- Nicholas Marouf *System Log Analyzer*
- Sam Mehl *Is the Internet Making us Dummer?: A comparison of reading comprehension between computer screens and paper*
- Afua Sanders *Automated Fingerprint Verification*
- Porter Schermerhorn *Artificial Neural Network Implementation of Beat Recognition*

2001

- Ned N. Bingham *A Network Management Tool: Exploring Requirements Analysis* ‡
- Abby Ge *An application: Competitive Analysis on the One-Way Trading Problem* §†  
(Now in Master of Finance program at Columbia.)
- Edward Kamonjoh *Autonomous Robots: A behavior based object oriented approach to problem decomposition*
- Levent Besik *Comparative Performance Analysis of Star and Hypercube Topologies for a Beowulf Cluster: A Simulation Approach*
- Aaron Cayard-Roberts *A Register-Oriented Driver for Serial Ports with an Application to a Low-Cost ADC*
- Trevor Moss *Evolutionary Music: a genetic algorithm approach to creating sound*
- Jim Rice *Electronic Gaming: A Peer to Peer Approach* ‡

2002

- Hasan Al-Aref *A look at Main Drive intersection with 40 West through simulation*
- Josh Hursey *Fingerprint Minutiae Recognition: An Artificial Neural Network Approach* ¶  
(Now in PhD. program at University of Indiana)
- Marwan Aburdeneh *Exploring diversity at Earlham College using Data Mining*
- Glen Upton *The Roommate Matching Problem: A Swarm Intelligence Approach*

2003

- Micah Acinapura *Identifying Binding Sites for Transcription Factors in Bacterial Genomes*
- Nathan Chu *Maze Traversal with Behavioral Control*
- Josh McCoy *Higher-Dimensional Rendering in Open-GL* ¶†  
(Now in PhD. program at UC Santa Cruz)
- Eliza Navias-Bell *Computer Assisted Mathematical Proof*

- Julie Pickett *Common Form: An Application of Software Engineering Methodology*
- Nathan Sommer *Experiments in Algorithmic Music Composition* ‡, ¶  
(Now in Masters Program at University of Cincinnati.)

Spring, 2004

- Jeremy Brown-Hayes *Simulation using a Theorem Prover*
- Seth Hopper *Get Me Out of this Place! A Parallel Approach to Solar System Escape* †  
(Now in PhD. program in Physics, Univ. of North Carolina.)
- Ian Kelly *Twisted Grammars and RNA Secondary Structure* †  
(MS CS, University of Delaware)
- Yousef Rabah *Automatic Speech Recognition: A Voice Enabled Phone Directory*
- Mikel Rodriguez *Simulation of Galaxy Evolution Using Tree-Codes*  
(Now in PhD. program at University of Central Florida)

Fall, 2004

- Stuart Taylor *Where Cash and Technology Meet: The Development of Electronic Commerce*
- Greg Sandstrom *A Parallel Extension of Earley's Parsing Algorithm* ¶
- Abe Davis *Computer Aided Psychological Experimentation*
- Nate Bell *Preferential Interaction in Iterated Prisoners' Dilemma*

Fall, 2006

- Colin Copeland *Economical Real-Time Monitoring of Power Consumption*
- Florian Loretan *Modeling Plant Growth with String Rewriting*
- Shawn Smith *Caching the Uncachable: Dynamic Websites*

Fall, 2007

- Dylan Leeman *Topic Modeling*
- Nathan Myers *Game Strategy using Genetic Algorithms*  
(Now in PhD. program at Indiana University.)

Fall 2008

- Matt Edlefsen *Partial Evaluation of a Flow-chart Language*
- ‡Bryan Purcell *Modeling Expressive Rhythmic Performance*

Fall 2010

- Sanele Mahlalela *Global Optimization using Gradient Descent and Simulated Annealing*
- David Wellcome *An Exploration of Learning Hexapawn*

Notes:

† Related to subsequent graduate studies.

‡ Followed up with Independent Study.

§ Related to subsequent employment.

¶ Presented at Butler Undergraduate Research Conference.