James Rogers

Home Address:
2004 S. Race St.
Urbana, IL 61801
(217)365-9131

Campus Address:
Computer Science Department
Drawer #98
Earlham College
Richmond, IN 47374-4095
`jrogers@cs.earlham.edu`
`http://www.cs.earlham.edu/~jrogers`
(765)983-1671, Fax: (765)983-1497

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

2015–present Research Professor and Professor of Computer Science Emeritus, Earlham College, Richmond, IN.

2013–2015 Professor, Dept. of Computer Science, Earlham College, Richmond, IN.

2012–2013 Visiting Scholar, Dept. of Linguistics and Cognitive Science, University of Delaware, Newark, DE, USA.

2009–2012 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 PhD. Programme in Formal Languages and Applications, Rovira i Virgili University, Tarragona, Spain. (Annual one week lectures.)

2000–2003 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.

Publications

Journal Articles

James Rogers and Dakotah Lambert. Extracting subregular constraints from regular stringsets. *Journal of Language Modelling*, 7(2):143–176, Sep. 2019.

Gerhard Jäger and James Rogers. Formal language theory: refining the Chomsky hierarchy. *Philosophical Transactions of the Royal Socociety B*, 367(1598):1956–1970, July 2012.

James Rogers and Geoffrey Pullum. Aural pattern recognition experiments and the subregular hierarchy. *Journal of Logic, Language and Information*, 20:329–342, 2011.

*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(6):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(1):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-adjoining grammars. *Computational Intelligence*, 10(4):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^{th} Meeting on Mathematics of Language.

James Rogers and Lawrence Moss, editors. *Grammars*, volume 3:2/3. Elsevier, 2000. Special Issue on 6^{th} 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, Jeff Heinz, Margaret Fero, Jeremy Hurst, Dakotah Lambert, and Sean Wibel. Cognitive and sub-regular complexity. In Glyn Morrill and Mark-Jan Nederhof, editors, *Formal Grammar 2012*, volume 8036 of *Lecture Notes in Computer Science*, pages 90–108. Springer, 2012.

*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, pages 213–232. 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 First GLOT International State of the Article Book*, pages 171–198. 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-lg/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

Dakotah Lambert and James Rogers. Tier-based strictly local stringsets: Perspectives from model and automata theory. In *Proceedings of the Society for Computation in Linguistics: Vol. 3 , Article 2*, pages 330–337, 2020.

James Rogers and Dakotah Lambert. Some classes of sets of structures definable without quantifiers. In *Proceedings of the 16th Meeting on the Mathematics of Language*, pages 63–77, Toronto, Canada, July 2019. Association for Computational Linguistics.

Dakotah Lambert and James Rogers. A logical and computational methodology for exploring systems of phonotactic constraints. In *Proceedings of the Society for Computation in Linguistics: Vol. 2 , Article 26*, pages 247–256, 2019.

Jeffrey Heinz and James Rogers. Learning subregular classes of languages with factored deterministic automata. In *Proceedings of the 13th Meeting on the Mathematics of Language (MoL 13)*, pages 64–71, Sofia, Bulgaria, August 2013. Association for Computational Linguistics.

Margaret Fero, Jeremy Hurst, Dakotah Lambert, Sean Wibel, and James Rogers. Classifying relative complexity of factored stress patterns. In Jeffery Heinz, Harry van der Hulst, and Rob Goedemans, editors, *Univ. of Delaware Conference on Stress and Accent*, 2012.

⋆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`.)
(Publications marked ⋆ are available from my home page: `http://cs.earlham.edu/~jrogers`.)

Presentations

On the Cognitive Complexity of Phonotactic Constraints, Institute for Advanced Computational Science, Stony Brook University, March 2018.
Model-Theory of the Subregular with Applications to Phonology and Cognitive Science, Program in Pure and Applied Logic, Indiana University, Nov. 2017.
Classifying Stress Patterns by Cognitive Complexity, Dept. of Linguistics, Cornell University, March 2013.
Classifying Stress Patterns by Cognitive Complexity, Second UConn Workshop on Stress and Accent, University of Connecticut, Dec. 2011.
Cognitive Complexity of Phonological Patterns, Cognitive Science Colloquium, University of Delaware, Nov. 2010.
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), 19th 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, 6th Conference on Formal Grammars/7th 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, 13th 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, 12th European Summer School in Logic, Language and Information (ESSLLI'00). Birmingham, U.K., Aug. 2000.

wMSO Theories as Grammar Formalisms, 2nd 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

Topics in Model-Theoretic Phonology (with Jeff Heinz) Advanced Course, 26th European Summer School in Logic, Language, and Information, Tübingen, Germany. Aug. 2014.

Subregular Languages and Their Relevance to Phonology and Syntax (Tutorial) 51st Annual Meeting of the Association for Computational Linguistics (ACL'2013). Sofia, Bulgaria.

Formal Description of Syntax. Foundational Course, 19^{th} European Summer School in Logic, Language and Information (ESSLLI'07), Trinity College, Dublin, Ireland. August 2007.

Model-Theoretic Syntax. 3^{rd} North American Summer School in Logic, Language and Information, UCLA, Los Angeles, CA. June 2004.

Model-Theoretic Syntax—Formal Aspects. 15^{th} 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.

Honors, Awards and Fellowships

S.-Y. Kuroda Prize for Lasting Contributions to the Mathematics of Language, Association for the Mathematics of Language (SIGMoL). "...for work that has made a sustained and enduring impact on the mathematics of language." 2017.

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.