

## Timothy A. Miller

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### Education

Ph.D. Computer Science, University of Minnesota–Twin Cities, 2010  
Advisor: William Schuler  
Thesis title: Syntactic Processing Models for Fluent and Disfluent Speech

M.S. Computer Science, University of Minnesota–Twin Cities, 2007  
Thesis projects included a preliminary syntactic model for speech disfluencies and an online learning algorithm for a stock portfolio balancing system.

B.S. Computer Science, Marquette University, 2003, *Magna Cum Laude*

### Research/Work Experience

Research Scientist 2010–present  
Department of Health Sciences University of Wisconsin, Milwaukee  
Applying natural language processing and machine learning techniques to problems of interest to physicians and biosciences researchers.

Research Assistant 2004–2010  
William Schuler University of Minnesota  
Developing and implementing probabilistic models of natural language, with applications to speech interfaces for robotics and intelligent agents.

Visiting Researcher/Intern Summer 2008  
David Traum Institute for Creative Technologies, USC  
Incorporated a speech interface into a 3-D video game used for training simulations by the United States Army. Integrated a speech recognition engine, information extraction engine, message passing system, and 3-D video game engine.

Research Assistant 2003–2004  
John Soechting University of Minnesota  
Implemented models of smooth pursuit eye movements based on eye-tracking experiments in humans. Developed and performed experiments for testing smooth pursuit system in humans.

Research Assistant 2003  
Robert Scheidt Marquette University, Milwaukee, WI  
Developed software for use in experiments on motor control in humans. Designed and built prototype microcontroller devices for use in experiments.

Intern - Operations Research Group 2001–2002  
Paul Spicer Wisconsin Public Service, Green Bay, WI  
Modeled and simulated weather, energy usage, and energy markets, for use in designing energy market strategies.

### Research and Publications

Research Interests: Probabilistic models of spontaneous speech, including syntax and semantics, unsupervised learning of linguistic structure, speech interfaces for robotics and intelligent agents, psycholinguistic models of language production and understanding.

## Journal Articles

William Schuler, Samir AbdelRahman, **Tim Miller** & Lane Schwartz. Broad-Coverage Incremental Parsing using Human-Like Memory Constraints. *Computational Linguistics*, in press.

**Tim Miller** & William Schuler. A Syntactic Model for Recognizing Speech with Repairs. (Under revision).

## Conference Papers

**Tim Miller**. Word Buffering Models for Improved Speech Repair Parsing. *Proceedings of the 2009 Conference on Empirical Methods in Natural Language Processing*, Singapore, 2009. (20% acceptance rate for oral presentations)

**Tim Miller**, Luan Nguyen & William Schuler. Parsing Speech Repair without Specialized Grammar Symbols. *47th Annual Meeting of the Association for Computational Linguistics (ACL '09)*, Singapore, 2009. (25% acceptance rate)

**Tim Miller**. Improved Syntactic Models for Parsing Speech with Repairs. *Proceedings of the Annual Meeting of the North American Association for Computational Linguistics (NAACL)*, Boulder, CO, 2009. (28.8% acceptance rate)

**Tim Miller** & William Schuler. A Syntactic Time-Series Model for Parsing Fluent and Disfluent Speech. *Proceedings of COLING*, Manchester, UK, 2008. (26.8% acceptance rate)

William Schuler, Samir AbdelRahman, **Tim Miller** & Lane Schwartz. Toward a Psycholinguistically-Motivated Model of Language Processing. *Proceedings of COLING*, Manchester, UK, 2008. (26.8% acceptance rate)

**Tim Miller** & William Schuler. A Unified Model for Parsing Fluent and Disfluent Speech. *46th Annual Meeting of the Association for Computational Linguistics (ACL '08)*, Columbus, Ohio, USA, 2008. (25% acceptance rate)

**Tim Miller**, Lane Schwartz & William Schuler. Incremental Semantic Models for Continuous Context-Sensitive Speech Recognition. *SRSLO7 - Workshop on the Semantic Representation of Spoken Language*, Salamanca, Spain, 2007.

**Tim Miller**, William Schuler & Andy Exley. Elements of a Spoken Language Programming Interface for Robots. *Proceedings of HRI 2007*, Washington, D.C., 2007.

William Schuler, **Tim Miller**, Andy Exley & Steven Wu. Dynamic Evidence Models in a DBN Phone Recognizer. *Proceedings of the 9th International Conference on Spoken Language Processing (ICSLP/Interspeech'06)*, Pittsburgh, PA, 2006.

William Schuler & **Tim Miller**. Integrating Denotational Meaning into a DBN Language Model. *Proceedings of the 9th European Conference on Speech Communication and Technology (Eurospeech/Interspeech'05)*, Lisbon, Portugal, 2005.

Shana Watters, **Tim Miller**, Praveen Balachandran, William Schuler & Richard Voyles. Exploiting a Sensed Environment to Improve Human-Agent Communication. *Proceedings of the 4th International Joint Conference on Autonomous Agents and Multi-Agent Systems (AA/MAS'05)*, Utrecht, Netherlands, 2005.

## Presentations

*Syntactic Processing Models for Fluent and Disfluent Speech.* Computer Science Graduate Student Colloquium, University of Minnesota. 25 February 2009.

*Towards a Dynamically Extensible Language Model.* NSF-IGERT Computational Neuroscience Group, University of Minnesota. 15 January 2006.

## Service

Program Committee, Student Research Workshop, ACL 2010, Uppsala, Sweden.

Graduate Student Representative, Institute of Technology Consultative Committee, 2004–2005

This was a committee consisting of faculty from various departments in the Institute of Technology, one graduate student and one undergraduate, and I was the graduate student representative for one year. During this year, I attended four meetings in which the committee interviewed candidates being considered for Dean of the Institute of Technology, and formulated recommendations to the hiring committee.

## Awards and Honors

NSF-IGERT Fellowship in Computational Neuroscience, 2004-2005

The NSF-IGERT program was designed to get students from various technical and scientific backgrounds interested in neuroscience. As part of this fellowship I took four graduate-level courses in neuroscience, attended weekly lunch talks by other fellows, and spent two semesters working in a neuroscience laboratory.

Pi Mu Epsilon – Honorary Mathematics Society, 2001-2002

## Teaching Experience

### **Teaching Assistant, Structure of Computer Programming II, Fall 2009**

In this large introductory programming class, I was responsible for leading a weekly lab section with 25–30 students. These labs typically consisted of a question-answering period, a supervised walkthrough of some course concepts using an Integrated Development Environment (Eclipse) and the Java programming language. Occasionally these sessions also included “mini-lectures” reviewing lecture content at the instructor’s request.

In addition to leading the lab session, I was responsible for preparing some lab materials for my own session and three others, helping the instructor prepare homework materials, grading of homework and exams, and other course logistics (web site, web forum, automated grading scripts). Finally, I gave the lecture in this course when the instructor was unable to attend class (approximately 100 students).

### **Teaching Assistant, Natural Language Processing, Fall 2007**

This was a graduate level course with a relatively small enrollment. I worked closely with my advisor in this course, helping plan the course schedule, consulting on lecture topics, and planning homework and the course project. My duties also involved helping students with questions about course material during office hours, especially helping the students with programming, since this course was the first to require use of a c++ random variable template library developed in the NLP research lab for programming assignments. My specific responsibilities on this front included creating demonstration programs, posting tutorials on the course website, and answering student questions in an online forum and via e-mail. Finally, I gave a lecture on my research topic of speech repair to the class towards the end of the semester.

### **Teaching Assistant, Computational Techniques for Genomics, Fall 2007**

This was a graduate level course with a relatively large enrollment. My duties in this course involved grading homework and exams, helping students with questions about coursework and lectures via e-mail, office hours, and an online forum.

**Teaching Assistant, Algorithms and Data Structures, Spring 2007**

In this senior-level course I led the weekly discussion section. This discussion usually involved spending half the time on a short presentation reviewing important topics from the lecture, with an effort towards looking at these topics from slightly different angles than in lecture, and highlighting important uses of the algorithm in “real life.” The latter half of discussion was devoted to answering questions about the lecture and coursework. I also was involved with planning homework and exams, writing questions for homework and exams, and grading homework and exams. Homework assignments included short answer questions, short proofs, hand demonstration of algorithms on small input, and programming assignments. Finally, I was responsible for maintaining the course website and monitoring an online forum where students could ask questions about the course material and homework.

**Preparing Future Faculty, Fall 2006**

This was a course in which Ph.D. students seeking academic careers learned about teaching in higher education. Topics covered included student-centered learning, Bloom’s taxonomy, active learning strategies, and course design.