Mike Dowman

PUBLICATIONS AND PRESENTATIONS

Submitted Modeling Language as a Product of Learning and Social Interaction. Submitted to special issue of Cognitive Systems.

2002 Modeling the Evolution of Basic Colour Terms. Talk given as part of the Language in Time Symposium, University of Western Australia, 25-28 June.

2002 Bayesian Learning of Linguistic Categories. Talk given at European Society for the Study of Cognitive Systems Special Workshop on Multidisciplinary Aspects of Learning Paris, 17-19 January 2002.

2001 A Bayesian Approach to Colour Term Semantics. Lingu@scene, Volume 1.

2001 A Bayesian Approach to Colour Term Semantics. Technical Report Number 528. Sydney: Basser Department of Computer Science, University of Sydney. (This is a more technical version of the lingu@scene paper.)

2000 Addressing the Learnability of Verb Subcategorizations with Bayesian Inference. In Gleitman, L. R. & Joshi, A. K. (Eds.) Proceedings of the Twenty-Second Annual Conference of the Cognitive Science Society. Mahwah, New Jersey, USA: Lawrence Erlbaum Associates.

2000 Unsupervised Learning of Probabilistic Automata for Language Modeling. Talk given as part of the, Symposium on Computational Intelligence at Intelligent Systems and Applications, University of Wollongong, Australia. Published in Proceedings of Intelligent Systems and Applications 2000. Wetaskiwin, Alberta, Canada: ICSC Academic Press.

2000 A Bayesian Model of Syntactic Acquisition. Talk given at Australian Linguistics Society Conference, Melbourne, July 7-9, 2000.

2000 Learning Verb Subcategorizations - A Case Study for the Acquisition of Syntax. Departmental Seminar, 3rd March, 2000, Department of Linguistics, University of Sydney.

with Jon Patrick (1999) A Minimum Encoding Inference Approach to Theoretical Syntax. Talk given at Australian Machine Learning Workshop, November 22-23, 1999, Australian National University, Canberra.

1999 Syntax: Accounting for Acquisition and Change. Talk given at Postgraduate Students' Conference, 23rd September, 1999, Department of Linguistics, University of Sydney.

1998 A Cross-linguistic Computational Investigation of the Learnability of Syntactic, Morpho-syntactic, and Phonological Structure. Research Report, Centre for Cognitive Science, University of Edinburgh. (This is a version my undergraduate dissertation.)

EDUCATION AND QUALIFICATIONS

Sydney University, March 1999-present
Ph.D. (Computer Science) : Modeling Language Acquisition and Evolution using Bayesian Inference and Multi-agent Simulations.
Awarded: Australian Research Council Scholarship, International Postgraduate Research Scholarship and International Postgraduate Award.

Edinburgh University, 1994-98
1st Class MA (Honours) in Psychology and Linguistics
Subsidiary subject Artificial Intelligence
Winner of Drever prize for the best student in the psychology honours class.

Heaton Manor School, Newcastle upon Tyne, UK, 1987-94
Gained advanced level certificates at grade A in Mathematics, Further Mathematics, Chemistry, Physics and General Studies.
Gained general level certificates (GCSE) at grade A in English Language, English Literature, French, Geography, Mathematics, Coordinated Science, Media Studies and Technology.

TEACHING AND RESEARCH WORK EXPERIENCE

March-June 1999
Teaching Assistant, Computer Applications in Linguistics, Department of Linguistics, University of Sydney.
Duties included lecturing, marking and student consultation.

January 2000- February 2001
Computational Linguist at Syrinx Speech Systems.
My primary work was to design and implement a program for automatically learning grammars from example data for use in commercial speech recognition systems.

March-June 2002
Tutor for Master of Information Technology Course, Object Oriented C++, School of Information Technologies, University of Sydney.

July-December 2002

Tutor for 2nd year linguistics course, Syntax, Department of Linguistics, University of Sydney.

RESEARCH INTERESTS

My research interests are mainly concerned with the application of machine learning theories, in particular Bayesian inference and Minimum Description Length, to understanding language acquisition. However, I also believe that language should be understood within a social context, and so whenever possible I have tried to place acquisitional models within a multi-agent mode, which has sometimes produced surprising new results. The aim of the research is primarily concerned with understanding human psychology, and how people learn, and investigating to what extent language is genetically determined and to what extent it is a product of learning. I believe that there is considerable evidence to suggest that people are Bayesian, and that by constructing Bayesian models of language acquisition we will be able to produce more evidence of whether this hypothesis is correct, by comparing the predictions of the models with empirical evidence.

The research also has the potential to be applied in the area of language technology and natural language processing. A better understanding of human languages should help us to construct better language technology systems which interact more reliably and in a more natural way with human users. Machine learning techniques can also be used to speed the development of such systems, because they avoid the need for people to create grammars and computational representations of language manually, and the potential of this approach has already been investigated by applying minimum description length learning to the development of language models for speech recognition.

Early stages of my research focussed on learning phonology (especially phonotactic constraints) and on learning syntax (especially phrase structure and syntactic categories). This work provided evidence to show that these systems are learnable when Minimum Description Length is used to learn them, and that learnability proofs would not be relevant to language acquisition if people's knowledge of language is statistical. More recent research has focussed on learning semantic representations for prototype categories, especially basic colour terms, and has suggested that prototype effects may be due to word meanings being learned by Bayesian inference, rather than the presence of prototypes. Further work shows that many other properties of Basic Colour terms can be explained only when the acquisitional model is used as part of an evolutionary simulation.