

NEAL SNIDER, PhD.
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Linguistic researcher and engineer and statistical analyst with 8 years experience modeling natural language and other diverse data sets. Expertise in constructing, implementing, and testing automatic language processing systems, and integrating human language processing models into these systems. Expert at statistical analysis to determine the underlying structure in data, including latest techniques for modeling human behavior. Accomplished mentor and project leader skilled at integrating resources and bridging diverse groups of collaborators.

TECHNICAL INTERESTS

Computational Linguistics, Natural Language Processing, Machine Learning, Statistical Analysis, Modeling Human Language Production and Comprehension, Machine Learning, Crowdsourcing, Eye Tracking, Discourse Tagging, Information Extraction, Data Mining, Linguistic Resource Development, Linguistic Variation

EDUCATION

PhD in Linguistics, 2008, Stanford University

Dissertation: *An exemplar model of syntactic priming*

Committee: Tom Wasow (co-advisor), Joan Bresnan (co-advisor), Dan Jurafsky, Arto Anttila

Master of Arts in Linguistics, 2006, Stanford University

Project Title: *A corpus study of left dislocation and topicalization*

Advisors: Annie Zaenen, Tom Wasow, Joan Bresnan

Master of Arts in Linguistics, 2003, University of North Carolina at Chapel Hill

Thesis Title: *Tongan raising: A minimalist analysis*

Master of Science in Physics, 2000, University of North Carolina at Chapel Hill

Bachelor of Science in Physics, 1997, Case Western Reserve University

Visting Student, 1995-6, Physics Department, Imperial College, London

PROFESSIONAL SKILLS

Statistical Analysis

- Expert at using statistical models to determine primary factors that drive the structure in data
- Experience with diverse data sets (natural language corpora, human behavioral data and annotations, eye movements in a display, tongue curvature during articulation, etc.)

Application Development

- Integration of symbolic and statistical approaches for development of natural language systems
- Extensive experience in linguistic feature extraction, evaluation, and engineering
- Effective implementation of machine learning and statistical modeling techniques
- Integrating human processing models to improve automatic language processing systems

Resource Development

- Experience in the collection and annotation of text and speech corpora
- Evaluating the consistency and efficacy of corpus annotators
- Implementation of experimental design techniques to elicit data from human subjects
- Experience using crowdsourcing (Mechanical Turk) for data collection and annotation

Project management and teamwork

- Contributing to cross-disciplinary resource development projects with national and international scope
- Facilitator of collaboration and exchange of ideas between groups
- Success in coordinating team members with diverse skills and interests

POSITIONS HELD

2010-Present: Senior NLP Research Engineer, Nuance Communications Inc., Burlington, MA

- Using Natural Language Processing and Understanding in order to assist medical documentation and improve patient outcomes
- Implementing NLP and NLU models to extract facts from unstructured medical transcripts
- Developed an annotation scheme for medical fact extraction
- Applying IBM Deep Question Answering technology (Watson) to the healthcare domain

2008-2010: Postdoctoral Fellow, Center for Language Sciences, University of Rochester

- Developed a method of PCFG rule re-weighting based on context for natural language parsers using a model of human implicit learning
- Developed and tested scalable annotation schemes with Amazon Mechanical Turk using human experimentation techniques to minimize external and task-related bias
- Modeled human linguistic and visual cue integration using eye-tracking methodologies, including cutting-edge analysis accounting for the psychophysics of eye movements
- Mentored young researchers in experimental design and analysis

2003-2008: Researcher, Department of Linguistics, Stanford University

- Trained statistical models of word order choice and syntactic paraphrase that integrate lexical and contextual information
- Developed an unsupervised statistical model of verb similarity for Arabic using syntactic and lexical semantic cues, which can be used to boot-strap a larger resource of verb classes and is applicable to any language (ACL paper)
- Trained a statistical model of durational cues in speech prosody using lexical, syntactic, semantic, and discourse-pragmatic features
- Developed a parser for a dependency grammar of Russian
- Collaborated internationally in the testing of an annotation scheme for the investigation of spoken discourse, resulting in the NXT-format Switchboard Corpus (released by the LDC)
- Trained young researchers in statistical language modeling techniques

2001-2003: Researcher, Department of Linguistics, UNC-Chapel Hill

- Developed neural network and n-gram language models of relative clauses in English, and compared their predictions with human behavior

1998-2001: Researcher, Department of Physics, UNC-Chapel Hill

- Helped develop and test a 3-D visual and haptic interface for nanoscale microscopy (now the NanoManipulatorTM), collaborating with computer scientists and physicists

TECHNICAL SKILLS

Operating Systems: Unix/Linux, OS X, Windows

Programming: Perl, R, Python, C, Java, Tgrep2, bash, awk, html

Software: NLP/Machine learning (NLTK, Tillburg Memory-Based Learner, Light Efficient Neural Network Simulator), Speech analysis and manipulation (Praat), statistical analysis (R, SPSS)

Speech Transcription: IPA, ARPAbet, ToBI

NATURAL LANGUAGES

English (native), Spanish (conversational), German, Arabic (basic)

REFERENCES

Available on request.

AWARDS AND HONORS:

- Jerrold J. Katz Young Scholar Award for "Implicit learning and syntactic persistence: Surprisal and cumulativity", presented at the 20th Annual CUNY Conference on Human Sentence Processing, La Jolla CA, March 2007.
- Dolores Zohrab Liebmann Foundation Fellowship 2002-2005
- National Science Foundation Graduate Research Fellowship – Honorable Mention 2002
- Eagle Scout, 1992

JOURNAL PUBLICATIONS

- Snider, Neal and T. F. Jaeger. Under review. Syntax in flux: structural priming maintains probabilistic representations. *Cognition*.
- Snider, Neal and J. Runner. Under review. Semantic and phonological neighbors are reactivated in verb phrase ellipsis: evidence from eye tracking. *Journal of Memory and Language*.
- Arnon, I. and Neal Snider. 2010. More than words: Frequency effects for multi-word phrases. *Journal of Memory and Language*. 62(1): 67-82.
- Hofmeister, P., I. Arnon, T.F. Jaeger, I. Sag, and N. Snider. Under revision. The source ambiguity problem: distinguishing effects of grammar and processing on acceptability judgments. *Language and Cognitive Processes*.
- Tily, H., S. Gahl, I. Arnon, N. Snider, A. Kothari, and J. Bresnan. 2009. Syntactic probabilities affect pronunciation variation in spontaneous speech. *Language and Cognition*. 1:2. Mouton de Gruyter.
- Paulson, S., M. R. Falvo, N. Snider, et al. 1999. In situ resistance measurements of strained carbon nanotubes. *Applied Physics Letters* 75(19): 2936-2938.

REFEREED CONFERENCE PROCEEDINGS

- Snider, Neal. 2009. Similarity and Structural Priming. In N.A. Taatgen & H. van Rijn (Eds.), *Proceedings of the 31th Annual Conference of the Cognitive Science Society* (pp. 816-822). Austin, TX: Cognitive Science Society.
- Jaeger, T.F. and Neal Snider. 2008. Implicit learning and syntactic persistence: Surprisal and cumulativity. In B. C. Love, K. McRae, & V. M. Sloutsky (Eds.), *Proceedings of the 30th Annual Conference of the Cognitive Science Society* (pp. 1061-1067). Austin, TX: Cognitive Science Society.
- Fausey, C., Neal Snider, and L. Boroditsky. 2008. Causal priming: How a language production mechanism guides representation In B. C. Love, K. McRae, & V. M. Sloutsky (Eds.), *Proceedings of the 30th Annual Conference of the Cognitive Science Society* (pp. 1130-1136). Austin, TX: Cognitive Science Society.
- Snider, Neal. 2007. Exemplars in Syntax: Evidence from Priming in Corpora. *Proceedings of the Workshop on Exemplar-Based Models of Language Acquisition and Use*. 19th ESSLLI. Trinity College, Dublin.
- Snider, Neal and Mona Diab. 2006. Unsupervised Induction of Modern Standard Arabic Verb Classes Using Syntactic Frames and LSA. In *Proceedings of COLING/ACL 2006*. Sydney, Australia.
- Snider, Neal. and Mona Diab. 2006. Unsupervised Induction of Modern Standard Arabic Verb Classes. In *Proceedings of NAACL 2006*. Brooklyn, New York.
- Arnon, Inbal, Neal Snider, Philip Hofmeister, T. Florian Jaeger, Ivan A. Sag. 2006. Cross-linguistic variation in a processing account: The case of multiple *wh*-questions. In *Proceedings of Berkeley Linguistics Society Conference 2006*.

BOOK CHAPTERS

- Snider, Neal and I. Arnon. Accepted. A unified lexicon and grammar?: Compositional and non-compositional phrases in the lexicon. In *Topics in Linguistics vol. 3*, ed. by Stefan Gries

and Dagmar Divjak. Mouton de Gruyter

- Snider, Neal. Accepted. Investigating syntactic persistence in corpora. In *Title to be announced*.
- Strunk, J. and Neal Snider. In press. Extraposition without subadjacency?. *Rightward Movement from a Cross-linguistic Perspective*, ed. by Heike Walker, Gert Webelhuth, and Manfred Sailer. John Benjamins.
- Jaeger, T.F. and Neal Snider. 2007. Implicit learning and syntactic persistence: Surprisal and cumulativity. *Rochester Working Papers in the Language Sciences*, 3(1). Rochester, NY.
- Hofmeister, P., T. F. Jaeger, I. A. Sag, I. Arnon, and Neal Snider. 2007. Locality and Accessibility in Wh-Questions. In *Roots: Linguistics in Search of its Evidential Base*, ed. by Sam Featherston and Wolfgang Sternefeld. Berlin: de Gruyter.
- Snider, Neal and A. Zaenen. 2006. Animacy and syntactic structure: Fronted NPs in English. *A Festschrift for Ronald M. Kaplan*. CSLI Publications.

PAPERS IN PREPARATION

- Snider, Neal and T. F. Jaeger. Modeling Implicit Learning of Syntactic Distributions.
- Lehnert-LeHouillier, H., Neal Snider, and J. McDonough. Is longer also stronger? The relationship between temporal and spatial expansion in domain-initial prosodic strengthening of vowels.

INVITED PRESENTATIONS

- Snider, Neal. 2010. Modeling Implicit Learning Using Structural Priming. Department of Languages and Linguistics. June 3. McMaster University.
- Snider, Neal. 2010. Modeling Implicit Learning Using Structural Priming. Computational Cognitive Science Laboratory. April 19. University of California, Berkeley.
- Snider, Neal. 2008. A unified model of lexical and syntactic processing?. Department of Linguistics Colloquium. Oct. 30. Ohio State University.
- Snider, Neal. 2008. An exemplar model of syntactic priming. Center for Language Sciences Colloquium. April 30. University of Rochester.
- Snider, Neal. 2008. An exemplar model of syntactic production. 1st Annual Workshop on Complex Systems and Language. April 25-26. University of Arizona.
- Snider, Neal. 2008. Exemplars and constructions in syntactic production. Linguistics Department Colloquium. Jan 15. University at Buffalo.
- Snider, Neal and T. Florian Jaeger. 2006. Surprisal and cumulativity in syntactic priming: Evidence for implicit learning. Center for Research in Language Talk. March 29-31. UCSD, La Jolla, CA.

REFEREED CONFERENCE PRESENTATIONS

- Snider, Neal and J. Runner. 2010. Structural parallelism aids ellipsis and anaphora resolution: evidence from eye movements to semantic and phonological neighbors. 16th Annual Conference on Architectures and Mechanisms for Language Processing. September 7-9, York, UK.
- Lehnert-LeHouillier, H., Neal Snider, and J. McDonough. 2010. Is longer also stronger? The relationship between temporal and spatial expansion in domain-initial prosodic strengthening of vowels. 12th Conference on Laboratory Phonology, University of New Mexico
- Snider, Neal and J. Runner. 2010. The role of structural parallelism on anaphoric antecedent resolution. 23rd CUNY Sentence Processing Conference. March 26-28, New York University.
- Snider, Neal and T. F. Jaeger. 2009. Syntax in flux: structural priming maintains probabilistic representations. 15th Annual Conference on Architectures and Mechanisms for Language

- Processing. September 7-9, Barcelona, Spain.
- Arnon, I. and Neal Snider. 2009. More than words - speakers are sensitive to the frequency of four-word phrases. 22nd CUNY Sentence Processing Conference. March 26-28, University of California at Davis.
 - Snider, Neal. 2009. Accessibility and passive choice. Presentation at LSA Annual Meeting. Jan 8-11. San Francisco, CA.
 - Arnon, I. & Neal Snider. 2009. More than words: Speakers are sensitive to the frequency of multi-word sequences. Presentation at LSA Annual Meeting. Jan 8-11. San Francisco, CA.
 - Tily, H., Hemforth, B., Arnon, I., Shuval, N., Snider, N. & Wasow, T. 2008. Eye movements reflect comprehenders' knowledge of syntactic structure probability. 14th Annual Conference on Architectures and Mechanisms for Language Processing. September 4-6, Cambridge, UK.
 - Snider, Neal. 2008. Evidence for a Unified Theory of Structural and Lexical Priming. 21st CUNY Sentence Processing Conference. Mar 13-15. UNC Chapel Hill.
 - Strunk, J. and Neal Snider. 2008. Extraposition Without Subjacency. 30th Annual Convention of the German Society of Linguistics (DGfS 2008). Feb 27-29. Bamberg, Germany.
 - Tily, H., Snider, N., Kothari, A., Arnon, I., & Bresnan, J. 2007. Phonetic production reflects syntactic probability: Evidence from duration and disfluency. 13th Annual Conference on Architectures and Mechanisms for Language Processing. August 24-27, Turku, Finland
 - Philip Hofmeister, Ivan Sag & Neal Snider. 2007. Empirical investigations in syntactic islands. 43rd Annual Meeting of the Chicago Linguistic Society. May 3-5. University of Chicago, Chicago, IL.
 - Neal Snider and T. Florian Jaeger. 2007. Surprisal and cumulativity in syntactic priming: Evidence for implicit learning. CUNY Conference on Human Sentence Processing. March 29-31. UCSD, La Jolla, CA.
 - Harry Tily, Inbal Arnon, Joan Bresnan, Anubha Kothari and Neal Snider. 2007. What makes a construction predictable? Using semantic and contextual cues to better model phonetic reduction. CUNY Conference on Human Sentence Processing. March 29-31. UCSD, La Jolla, CA.
 - Neal Snider. 2007. Evidence from priming for hierarchical representation in syntactic structure. LSA Annual Meeting. Jan 4-7. Anaheim, CA.
 - Jaeger, Florian, Neal Snider, Laura Staum, and Daniel Jurafsky. 2006. (In)dependence of lexical and syntactic production: that-reduction and omission in spontaneous speech. Poster presented at CUNY Conference on Human Sentence Processing. March 23-25. CUNY Graduate Center, New York, NY.
 - Snider, Neal and Mona Diab. 2006. Using the Arabic Treebank for Lexical Semantics. Arabic Linguistic Society Symposium. 2006. March 3-5. Western Michigan University, Kalamazoo, MI.
 - Snider, Neal, Inbal Arnon, Philip Hofmeister, T. Florian Jaeger, Ivan A. Sag. 2006. Processing accounts for gradience in acceptability: The case of multiple wh-questions. BLS. 2006. Feb. 10-12. University of California - Berkeley.
 - Hofmeister, Philip, T. Florian Jaeger, Inbal Arnon, Ivan Sag, and Neal Snider. 2006. Locality and accessibility in 'wh'-questions. International Conference on Linguistic Evidence. 2006. Feb. 1-4. University of Tübingen, Germany.
 - Arnon, Inbal, Bruno Estigarribia, Philip Hofmeister, T. Florian Jaeger, Jeanette Pettibone, Ivan A. Sag, and Neal Snider, 2005. Rethinking superiority effects - a processing model. poster presented at CUNY Sentence Processing Conference, Mar. 30 - Apr. 2, University of Arizona.
 - Cueni, Anna, Neal Snider, & Annie Zaenen, 2005. Boundaries to the influence of animates.

paper presented at LSA Annual Meeting Jan 6-9, Oakland, CA.