Daniel K. Bone

Signal Analysis and Interpretation Laboratory
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Professional Interests

Behavioral Data Science, Statistical Signal Processing, Machine Learning, Technologies for Health Applications

Education

Ph.D. in *Electrical Engineering* July 2016
University of Southern California, Los Angeles, CA *GPA*: 3.98/4.00
Thesis: Computational Modeling of Human Interaction Behavior Towards Clinical Translation in Autism
Advisor: Shrikanth S. Narayanan, Professor of EE, CS, Linguistics, Psychology, Pediatrics

M.S. in *Electrical Engineering* December 2011
University of Southern California, Los Angeles, CA *GPA*: 3.97/4.00
Coursework: Probability Theory; Random Processes; Statistics; Mathematical Pattern Recognition; Machine Learning; Advanced Natural Language Processing; Adaptive Signal Processing

B.S. *in Electrical Engineering and* **B.S.** *in Computer Engineering* May 2009
University of Missouri, Columbia, MO *GPA*: 3.98/4.00
Coursework: Digital Signal Processing I & II; Computational Neuroscience; Signals and Linear Systems; Math Statistics; Logic Design; Matrix Theory; Algorithm Design and Programming I & II

Relevant Professional Experience

Postdoctoral Scholar, with Shrikanth Narayanan May 2016 – present
Signal Analysis and Interpretation Laboratory, University of Southern California, Los Angeles, CA

- Lead research projects within the lab in various health domains including autism and depression
- Mentor PhD and undergraduate students
- Assist in grant writing to various external funding agencies

Research Assistant, under Shrikanth Narayanan August 2009 – May 2015
Signal Analysis and Interpretation Laboratory, University of Southern California, Los Angeles, CA

- Helped craft the field of Behavioral Signal Processing, mapping low-level signal information to higher-level diagnoses and outcomes; special focus on autism spectrum disorders
- Member of interdisciplinary research groups on paralinguistics, speech production, and affect
- Presented research at international conferences in USA, Japan, Italy, France, and Singapore

Awards and Honors

USC Alfred E. Mann Innovation in Engineering Fellow	2014–2016
Ming Hsieh Institute Scholar	2015–2016
Achievement Rewards for College Scientists Scholar	2012–2016
USC Body Engineering (BE-LA) NSF GK-12 Fellow	2012–2013
Winner of ISCA Interspeech Speech Nativeness Subchallenge	2015
Winner of ISCA Interspeech Speaker State Challenge - Intoxication Subchallenge	2011
International Speech Communication Association (ISCA) travel grant	2011
USC Annenberg Fellowship, Viterbi School of Engineering	2009–2011
Garmin Corporate Scholarship, University of Missouri Columbia	2007–2009

Professional Memberships & Activities

- Member: Eta Kappa Nu, IEEE-SPS, ISCA, INSAR, and ASA
- Reviewer: Journal of Child Psychology and Psychiatry; Journal of Autism and Developmental Disorders; IEEE Transactions on Audio, Speech, and Language Processing; IEEE Transactions on Affective Computing; ISCA Computer Speech and Language; PLOS One
- Speaker at Center for Autism and the Developing Brain, Weill Cornell Medical College, NY, 2015
- Speaker at NSF Expeditions in Computing Yearly Meeting, Atlanta, GA, 2015
- Speaker at NSF Expeditions in Computing Summer Institute, Center for Discovery, Monticello, NY, 2012
- Organizer and presenter for USC's "Engineering and Autism National Workshop," 2012

Research Grants

- Co-author of funded grant for *Simons Foundation Autism Research Initiative* entitled, "Developing Scalable Measures of Behavior Change for ASD Treatments", 2015–2018 (with Catherine Lord).
- Co-author of NSF grant on Speech Prosody Intervention in Autism (*In Preparation*).

Publications

Journals

1. Daniel Bone, Somer Bishop, Matthew P. Black, Catherine Lord, and Shrikanth Narayanan, "Use of Machine Learning to Improve Autism Screening and Diagnostic Instruments: Effectiveness, Efficiency, and Multi-Instrument Fusion', *Journal of Child Psychology and Psychiatry*, *57*(8), 927–937, 2016.
2. Daniel Bone, Matthew Goodwin, Matthew Black, Chi-Chun Lee, Kartik Audhkhasi, and Shrikanth Narayanan, "Applying Machine Learning to Facilitate Autism Diagnostics: Pitfalls and promises", *Journal of Autism and Developmental Disorders*, *45*(5), 1121–1136, 2015.
3. Daniel Bone, Chi-Chun Lee, Matthew P. Black, Marian E. Williams, Pat Levitt, Sungbok Lee, and Shrikanth Narayanan, "The Psychologist as an Interlocutor in Autism Spectrum Disorder Assessment: Insights from a study of spontaneous prosody", *Journal of Speech, Language, and Hearing Research*, *57*(4), 1162-1177, 2014.
4. Daniel Bone, Ming Li, Matthew P. Black, and Shrikanth Narayanan, "Intoxicated Speech Detection: A Fusion Framework with Speaker-Normalized Hierarchical Functionals and GMM Supervectors", *Computer Speech and Language*, *28*(2), 375-391, 2014.
5. Daniel Bone, Chi-Chun Lee, and Shrikanth Narayanan, "Robust Unsupervised Arousal Rating: A rule-based framework with knowledge-inspired vocal features", *IEEE Transactions on Affective Computing*, *5*(2), 201-213, 2014.

Refereed Conference Proceedings

1 Daniel Bone, James Gibson, Theodora Chaspari, Dogan Can, Shrikanth Narayanan, "Speech and Language Processing for Mental Health Research and Care", in *Proceedings of Asilomar Conference on Signals, Systems, and Computers*, 2016

2 Daniel Bone, Somer Bishop, Rahul Gupta, Sungbok Lee, Shrikanth Narayanan, "Acoustic-Prosodic and Turn-taking Features in Interactions with Children with Neurodevelopmental Disorders", in *Proceedings of InterSpeech*, San Francisco, 2016.

3 Manoj Kumar, Rahul Gupta, Daniel Bone, Nikolaos Malandrakis, Somer Bishop, Shrikanth Narayanan, "Objective Language Feature Analysis in Children with Neurodevelopmental Disorders During Autism Assessment", in *Proceedings of InterSpeech*, San Francisco, 2016.

4 Daniel Bone, Matthew P. Black, Anil Ramakrishna, Ruth Grossman, Shrikanth Narayanan, "Acoustic-Prosodic Correlates of 'Awkward' Prosody in Story Retellings from Adolescents with Autism", in *Proceedings of Interspeech*, Dresden, Germany, 2015.

5 Chi-Chun Lee, Daniel Bone, and Shrikanth Narayanan, "An Analysis of the Relationship between Signal-derived Vocal Arousal Score and Human Emotion Production and Perception", in *Proceedings of Interspeech*, Dresden, Germany, 2015.

6 Matthew Black, Daniel Bone, Zisis Skordilis, Rahul Gupta, Wei Xia, Pavlos Papadopoulos, Sandeep Nallan Chakravarthula, Bo Xiao, Maarten Van Segbroeck, Jangwon Kim, Panayiotis Georgiou, and Shrikanth Narayanan, "Automated Evaluation of Non-Native English Pronunciation Quality: Combining knowledge- and data-driven features at multiple time scales", in *Proceedings of Interspeech*, Dresden, Germany, 2015.

7 Jangwon Kim, Md Nasir, Rahul Gupta, Maarten Van Segbroeck, Daniel Bone, Matthew Black, Zisis Iason Skordilis, Zhaojun Yang, Panayiotis Georgiou and Shrikanth Narayanan, "Automatic Estimation of Parkinson's Disease Severity from Diverse Speech Tasks", in *Proceedings of Interspeech*, Dresden, Germany, 2015.

8 Daniel Bone, Chi-Chun Lee, Alexandros Potamianos, and Shrikanth Narayanan. "An Investigation of Vocal Arousal Dynamics in Child-Psychologist Interactions using Synchrony Measures and a Conversation-based Model", in *Proceedings of Interspeech*, Singapore, 2014.

9 Daniel Bone, Chi-Chun Lee, Theodora Chaspari, Matthew Black, Marian Williams, Sungbok Lee, Pat Levitt, and Shrikanth Narayanan, "Acoustic-Prosodic, Turn-taking, and Language Cues in Child-Psychologist Interactions for Varying Social Demand", in *Proceedings of Interspeech*, Lyon, France, 2013.

10 Daniel Bone, Theodora Chaspari, Kartik Audkhasi, James Gibson, Andreas Tsiartas, Maarten Van Segbroeck, Ming Li, Sungbok Lee, and Shrikanth Narayanan, "Classifying Language-Related Developmental Disorders from Speech Cues: The promise and the potential confounds", in *Proceedings of Interspeech*, Lyon, France, 2013.

11 Daniel Bone, Chi-Chun Lee, Vikram Ramanarayanan, Shrikanth Narayanan, Renske Hoedemaker, and Peter Gordon, "Analyzing Eye-Voice Coordination in Rapid Automatized Naming", in *Proceedings of Interspeech*, Lyon, France, 2013.

12 Theodora Chaspari, Daniel Bone, James Gibson, Chi-Chun Lee, and Shrikanth Narayanan, "Using Physiology and Language Cues for Modeling Verbal Response Latencies of Children with ASD", in *Proceedings of ICASSP*, Vancouver, Canada, 2013.

13 Daniel Bone, Matthew P. Black, Chi-Chun Lee, Marian E. Williams, Pat Levitt, Sungbok Lee, and Shrikanth Narayanan, "Spontaneous-Speech Acoustic-Prosodic Features of Children with Autism and the Interacting Psychologist", in *Proceedings of Interspeech*, Portland, OR, 2012

14 Daniel Bone, Chi-Chun Lee, and Shrikanth Narayanan, "A Robust Unsupervised Arousal Rating Framework using Prosody with Cross-Corpora Evaluation", in *Proceedings of Interspeech*, Portland, OR, 2012.

15 Rahul Gupta, Chi-Chun Lee, Daniel Bone, Agata Rozga, Sungbok Lee, and Shrikanth Narayanan, "Acoustical Analysis of Engagement Behavior in Children", in *Proceedings of WOCCI*, Portland, OR, 2012.

16 Ming Li, Angeliki Metallinou, Daniel Bone, Shrikanth Narayanan, "Speaker States Recognition using Latent Factor Analysis Based Eigenchannel Factor Vector Modeling", in *Proceedings of ICASSP*, Kyoto, Japan, 2012.

17 Daniel Bone, Matthew P. Black, Ming Li, Angeliki Metallinou, Sungbok Lee, and Shrikanth S. Narayanan, "Intoxicated Speech Detection by Fusion of Speaker-normalized Hierarchical Features and GMM Supervectors", in *Proceedings of Interspeech*, Florence, Italy, 2011.

18 Matthew P. Black, Daniel Bone, Marian E. Williams, Phillip Gorrindo, Pat Levitt, and Shrikanth S. Narayanan, "The USC CARE Corpus: Child-psychologist interactions of children with autism spectrum disorders," in *Proceedings of Interspeech*, Florence, Italy, 2011.

19 Daniel Bone, Samuel Kim, Sungbok Lee, and Shrikanth Narayanan, "A Study of Intra-Speaker and Inter-Speaker Affective Variability using Electroglottograph and Inverse Filtered Glottal Waveforms," in *Proceedings of Interspeech*, Makuhari, Japan, 2010.

20 Michael I. Proctor, Danny Bone, Nassos Katsamanis, and Shrikanth Narayanan, "Rapid Semi-automatic Segmentation of Real-time Magnetic Resonance Images for Parametric Vocal Tract Analysis," in *Proceedings of Interspeech*, Makuhari, Japan, 2010.

Book Chapters

1. Daniel Bone, Theodora Chaspari, and Shrikanth S. Narayanan, "Behavioral Signal Processing and Autism: Learning from multi-modal behavioral signals', *Autism Imaging and Devices*, (*In Press*).

Conference Abstracts

1. Daniel Bone, Somer Bishop, Sungbok Lee, and Shrikanth S. Narayanan, "Objective Acoustic-Prosodic and Turn-taking Measures in Interactions with Children with Neurodevelopmental Disorders", at *International Meeting for Autism Research*, San Francisco, CA, USA, May 2017.
2. Daniel Bone, Matthew Goodwin, Matthew P. Black, and Shrikanth S. Narayanan, "Machine Learning and Autism Diagnostics: Promises and Potential Pitfalls", at *International Meeting for Autism Research*, Salt Lake City, Utah, USA, May 2015.
3. Daniel Bone, Chi-Chun Lee, Matthew P. Black, Marian E. Williams, Sungbok Lee Pat Levitt, and Shrikanth S. Narayanan, "Computational Vocal Arousal: An objective instrument for studying affect and interaction in ASD", at *International Meeting for Autism Research*, Atlanta, GA, USA, May 2014.
4. Daniel Bone, Michael Proctor, Yoon Kim, and Shrikanth Narayanan, "Semi-Automatic Modeling of Tongue Surfaces using Volumetric Structural MRI", at *Meeting of the Acoustical Society of America*, San Diego, CA, November 2011.
5. Matthew P. Black, Daniel Bone, Theodora Chaspari, Andreas Tsiartas, Phillip Gorrindo, Marian E. Williams, Pat Levitt, and Shrikanth S. Narayanan, "Signal processing tools for the automatic analysis of child-psychologist interactions", at *International Meeting for Autism Research*, San Diego, CA, USA, May 2011.

Teaching and Mentoring

NSF GK-12 Fellow, with USC Body Engineering May 2012 – May 2013
Camino Nuevo Harvard Campus, Grade 8, Los Angeles, CA

- Developed and presented science, math, and engineering curriculum for under-served youth
- Co-hosted a "Chemistry Magic Show" for all K-8 students prior to the school's science fair

Teaching Assistant, for Dr. Shrikanth S. Narayanan Aug. 2011 – Dec. 2011
Speech Signal Processing for Multimedia (EE 519), University of Southern California, Los Angeles, CA

- Created homework problems and exams for 55-student student course
- Hosted weekly office hours regarding course concepts

Undergraduate Research Advisor Sept. 2011 – Present
Signal Analysis and Interpretation Laboratory, University of Southern California, Los Angeles, CA

- Taylor Seamans (Neuroscience)
- Yiyi Zhang (Linguistics)
- Liwei Xu (Electrical Engineering)
- Francisco Romero (Electrical Engineering)
- Naa Adei (Electrical Engineering)

Software

Matlab, Python, R, SPSS, Java, C, Keras
Learning: SQL, SAS, Tableau