

CURRICULUM VITAE

Daniel A. Abrams

Postdoctoral Research Fellow
Stanford Cognitive and Systems Neuroscience Laboratory
1070 Arastradero Rd. Suite 220, Palo Alto, CA 94304
Cell: (312) 593-1566, daa@stanford.edu

Research Interests

Neurobiological Foundations of Speech and Language Impairments:

Understanding the link between speech perception, cognitive function, and auditory-based brain measures in children with autism spectrum disorders and dyslexia.

Neurobiology of Speech and Language in Typically Developing Children:

Decoding auditory and speech-based signals in the brain; brain networks that support acoustical and semantic processing of speech; functional interactions in the auditory system during speech and language processing.

Other interests: Central auditory processing of music; single and multi-unit neurophysiology in the ascending auditory system.

Education

Ph.D. in Communication Sciences and Disorders, Northwestern University.

Graduated 2008. Advisor: Nina Kraus. Dissertation title: "Temporal Features of Speech in the Auditory System."

Bachelor of Fine Arts, The University of Arizona, Tucson, AZ.

Graduated 1994. Coursework and experience in applied acoustics, music production, and technical theater.

Professional Experience

Special Education Assistant, San Francisco State University

1998. Helped a physically disabled and developmentally delayed student with a severe congenital hearing disorder take part in a movement class in an effort to encourage exercise and socialization with non-special education students.

Acoustical Engineer and Consultant, Thorburn Associates, Castro Valley, CA

1996-1998. Provided architects with a variety of acoustical services including sound system design, mechanical noise measurement, and recommendations for room acoustics.

Acoustical Engineer and Marketing Staff, Renkus-Heinz Inc., Irvine, CA
1994-1996. Measured acoustical properties of concert and commercial loudspeakers; provided technical support for the Windows-based acoustical modeling software, E.A.S.E.

Member of International Alliance for Theatrical Stage Employees, Local 415
1994-1998

House Sound System Engineer, Southwestern Center for Music, Tucson, AZ
1994-1995

Acoustical Engineer, Acoustical Products and Services, Tucson, AZ
1992-1994. Assistant engineer: assisted in the design and installation of sound systems and acoustical products for theaters and commercial spaces throughout southern Arizona

Publications

Abrams DA, Lynch CJ, Cheng KM, Phillips J, Supekar S, Ryali S, Uddin LQ, Menon V. (2013) Underconnectivity between voice-selective cortex and reward circuitry in children with autism. *Proceedings of the National Academy of Sciences*, 110(29), 12060-12065. PMID: 23776244

Abrams DA, Uddin LQ, Menon V. (in press) Reply to Brock: Renewed focus on the voice and social reward in children with autism. *Proceedings of the National Academy of Sciences*.

Abrams DA, Ryali S, Chen T, Chordia P, Levitin DJ, Menon V. (2013) Inter-subject synchronization of brain responses during natural music listening. *European Journal of Neuroscience*, 37(9), 1458-1469. PMID: 23578016

Abrams DA, Ryali S, Chen T, Menon V. (2013) Multivariate activation and connectivity patterns discriminate speech intelligibility in Wernicke's, Broca's, and Geschwind's Areas. *Cerebral Cortex*, 23(7), 1703-1714. PMID: 22693339

Ashkenazi S, Black JM, Abrams DA, Hoefft F, Menon V. (2013) Neurobiological underpinnings of math and reading learning disabilities. *Journal of Learning Disabilities*. PMID: 23572008

Abrams DA, Bhatara AK, Ryali S, Balaban E, Levitin DJ, Menon V. (2011) Decoding temporal structure in music and speech relies on shared brain resources but elicits different fine-scale spatial patterns. *Cerebral Cortex*, 21(7), 1507-1518. PMID: 21071617

Warrier CM, Abrams DA, Nicol TG, Kraus N. (2011) Midbrain contributions to phase encoding of stop consonants in an animal model. *Hearing Research*, 282(1-2), 108-118. PMID: 21945200

Abrams DA, Nicol T, Zecker S, Kraus N. (2011) A role for the paralemniscal auditory pathway in the coding of slow temporal information. *Hearing Research*, 272(1-2), 125-134. PMID: 21094680

Ryali S, Supekar K, Abrams DA, Menon V. (2010) Sparse logistic regression for whole brain classification of fMRI data. *NeuroImage*, 51(2), 752-64. PMID: 20188193

Abrams DA, Nicol T, Zecker S, Kraus N. (2010) Rapid acoustic processing in the auditory brainstem is not related to cortical asymmetry for the syllable rate of speech. *Clinical Neurophysiology*, 121(8), 1343–1350. PMID: 20378402

Abrams DA, Nicol T, Zecker S, Kraus N. (2009) Abnormal cortical processing of the syllable rate of speech in poor readers. *Journal of Neuroscience*, 29(24), 7686-7693. PMID: 19535580

Warrier C, Wong P, Penhune V, Zatorre R, Parrish T, Abrams D, Kraus N. (2009) Relating structure to function: Heschl's gyrus and acoustic processing. *Journal of Neuroscience*, 29(1), 61-69. PMID: 19129385

Abrams D, Kraus N. (2009) Auditory pathway representation of speech sounds in humans. In: *Handbook of Clinical Audiology*, 6th edition. Katz J, Hood L, Burkard R, Medwetsky L (eds.). pp 611-626.

Abrams DA, Nicol T, Zecker S, Kraus N. (2008) Right-hemisphere auditory cortex is dominant for coding syllable patterns in speech. *Journal of Neuroscience*, 28(15), 3958-3965. PMID: 18400895

Banai K, Abrams D, Kraus N. (2007) Speech evoked brainstem responses and sensory-based accounts of learning disability. *International Journal of Audiology*, 46(9), 524 – 532. PMID: 17828668

Abrams DA, Nicol T, Zecker S, Kraus N. (2006) Auditory brainstem timing predicts cerebral dominance for speech sounds. *Journal of Neuroscience*, 26(43), 11131-11137. PMID: 17065453

Publications in preparation

Abrams DA, Kaneshiro B, Berger J, Menon V. (in preparation) Musical expectation elicits predictive codes in the human auditory brainstem.

Abrams D, Kraus N. (in preparation) Auditory pathway representation of speech sounds in humans. In: *Handbook of Clinical Audiology*, 7th edition. Katz J, Hood L, Burkard R, Medwetsky L (eds.).

Fellowships and Grants Awarded

Title: University Fellowship

Aim: To perform research on typically-developing children and children with language disorders in preparation for Predoctoral Qualifying Examination

Agency: Northwestern University

Dates: 09/01/00 - 08/31/01

Role: Research Fellow

Title: Research Training in Neuroscience (PI: Peterson)

Aim: To examine the relationship between brainstem and cortical processing of rapid acoustic information in speech in typically-developing children and children with reading impairments

Agency: NIH/National Institute on Deafness and Other Communication Disorders

Grant Number: 5T32DC000015-20

Dates: 06/01/02 - 05/31/03

Role: Research Fellow

Title: Neural Timing to Speech Sounds: Envelope Cues (PI: Kraus)

Aim: To develop a neurophysiologic measure of speech-envelope phase-locking in the human auditory system and use this tool to examine typically-developing children and children with reading impairments

Agency: National Organization for Hearing Research Foundation

Grant Number: 340-B208

Dates: 01/01/06 - 12/31/06

Role: Project Coordinator; Co-wrote this proposal with Dr. Kraus to fund my dissertation work

Title: Epilepsy Training Program (PI: Huguenard)

Aim: To examine the interrelationship between the medial and lateral temporal lobe structures using electrocorticography (ECoG) in patients with epilepsy

Agency: NIH/National Institute of Neurological Disorders and Stroke

Grant Number: 5T32NS007280-25

Dates: 06/16/09 - 05/18/10

Role: Research Fellow

Title: Decoding temporal features of speech in the auditory system using fMRI (PI: Abrams)

Aim: To examine brainstem and cortical decoding of two perceptually-relevant ranges of temporal modulations in speech

Agency: NIH/National Institute on Deafness and Other Communication Disorders

Grant Number: 1F32DC010322-01A2
Dates: 07/01/10 - 06/30/12
Role: Principal Investigator

Title: Decoding 'what' and 'who' in the auditory system of children with autism spectrum disorders (PI: Menon)

Aim: To examine the neural basis of auditory information processing deficits in children with autism

Agency: NIH/National Institute on Deafness and Other Communication Disorders

Grant Number: 1R21DC011095-01A1

Dates: 02/04/11 – 01/31/13

Role: Research Fellow; Co-wrote this proposal with Dr. Menon

Presentations

Invited Lectures and Organized Symposia

Abrams DA and Chandrasekaran B. Short and long-term neural plasticity in the auditory brainstem. Symposium organized for Association for Research in Otolaryngology Mid-Winter Meeting, February 2013, Baltimore, MD.

Abrams DA, Kaneshiro B, Berger J, Menon V. Predictive coding the human auditory brainstem: implications for neural plasticity. Association for Research in Otolaryngology Mid-Winter Meeting, February 2013, Baltimore, MD.

Abrams DA, Ryali S, Balaban E, Levitin DK, Menon V. New evidence for a fronto-parietal network in processing intelligible speech. I-Poster presentation, Human Brain Mapping Conference, June 2011, Quebec City.

Abrams DA, Kraus N. Cognitive-sensory interaction in the neural encoding of music and speech. Stanford Music and the Brain Symposium 2009. Stanford, CA.

Invited Conferences

Longevity, Music, and Memory Conference, Stanford University, September 2010. Stanford, CA.

Poster and Podium Presentations

Under-connectivity between voice-selective cortex and reward circuitry in children with autism, presented at Bay Area Autism Consortium Annual Meeting, Palo Alto, CA, April 2013.

New evidence for a fronto-parietal network in processing intelligible speech, presented at Human Brain Mapping Annual Meeting, Quebec City, June 2011.

Music and speech structure engage shared brain resources but elicit different activity patterns, presented at the 3rd International Conference on Auditory Cortex, Madgeburg, Germany, August 2009.

Neural synchrony across listeners during natural listening conditions, presented at the 3rd International Conference on Auditory Cortex, Madgeburg, Germany, August 2009.

Decoding the distributed neural substrates of temporal structure in music and speech: Beyond the shared syntactic integration resource hypothesis, presented at Human Brain Mapping Annual Meeting, San Francisco, CA, June 2009.

Low-frequency phase coherence in near- and far-field midbrain responses reveals high-frequency formant structure in consonant-vowel syllables, presented at the Mid-Winter meeting of the Association for Research in Otolaryngology, Baltimore, MD, February 2009.

Primary and non-primary cortical encoding of the speech envelope: Implications for neural representation and perception in humans, presented at the Mid-Winter meeting of the Association for Research in Otolaryngology, Denver, CO, February 2007.

A role for the non-primary auditory pathway in the encoding of slow temporal information: implications for speech envelope encoding, presented at the Mid-Winter meeting of the Association for Research in Otolaryngology, New Orleans, LA, February 2005.

Cortical responses to the temporal envelope of speech and speech-like stimuli in humans, presented at the International Conference on Auditory Cortex, Madgeburg, Germany, August 2003.

Effects of training on lateral representation of speech sounds in learning-impaired children, presented at the Mid-Winter meeting of the Association for Research in Otolaryngology, Daytona Beach, FL, February 2003.

Training of language impaired children: cognitive, perceptual and physiologic change, presented at American Speech and Hearing Association Technical Session, Chicago, IL, November 2003.

Patterns of hemispheric asymmetry in response to speech sounds in normal and learning-impaired subjects, presented at the Mid-Winter meeting of the Association for Research in Otolaryngology, St. Petersburg Beach, FL, February 2002.

Teaching Experience

Lecture on Cognitive-sensory interaction in the neural encoding of music and speech, Psychophysics and Music Cognition course, Stanford University, March 2011.

Lecture on EEG methods, Topics in Cognition and Learning: Educational Neuroscience, Stanford University, September 2010.

Lecture on evolution of the mammalian auditory system, Biology, Psychology, and Evolution of Music in Humans course, Stanford University, January 2009.

Lecture on EEG methods, Neuroscience of Music course, Stanford University, January 2009.

Lecture on anatomy and physiology of the peripheral and central auditory systems, Neuroscience of Music course, Stanford University, January 2009.

Teacher's Assistant for Biological Foundations for Speech and Music class, Northwestern University, Nina Kraus, course instructor (Winter Quarter 2003-2005). Responsibilities included scheduling course lecturers, assembling readings, grading weekly quizzes and midterm/final exams, and answering students' questions on course material.

Lecture on plasticity of somatosensory cortex, Northwestern University, June 2002, June 2003, March 2004, March 2005, March 2006, March 2007, Feb 2008.

Lecture on hemispheric dominance, Central Auditory Physiology class, Northwestern University, May 2002.

Lab Instructor for Central Auditory Physiology class, Northwestern University, Nina Kraus, course instructor. Spring Quarter 2001, 2002. Responsibilities included preparing and giving biweekly lectures, designing lab assignments for measurement and analysis of evoked potential in humans, and test writing and grading.

Mentoring Experience and Award

Mentored a high-school senior on a brain imaging project, entitled "Deconstructing the Neural Correlates of Amplitude, Tonal, and Rhythmic Structure in Beethoven's 5th Symphony." This student was named a finalist in the 2012-13 Siemens Competition in Math, Science and Technology for this work and the Siemens Foundation recognized me for my efforts.

I have extensive experience mentoring students at all levels of education, from grade school through graduate school.

Service

Ad hoc manuscript reviewer for: *Journal of Neuroscience*, *Cerebral Cortex*, *Journal of Neurophysiology*, *Journal of the Association for Research in Otolaryngology, Ear and Hearing*, *Brain and Language*, *Hearing Research*, *Human Brain Mapping*, *PLoS One*.