

CURRICULUM VITAE

Daniel A. Abrams

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Research Interests

Neural Bases of Social Communication and Language Impairments in Children with ASD Understanding the link between speech perception, social function, and auditory-based brain measures in children with autism spectrum disorders.

Neurobiology of Speech and Language in Children with Reading Impairments Understanding the relationship between speech perception impairments, brain function, and phonological and reading difficulties in children with reading disorders.

Other interests: Speech and language function in typically developing children and adults; 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

Acoustical Engineer and Consultant, Thorburn Associates, Castro Valley, CA
1996-1998. Provided architects with acoustical services including sound system design, mechanical noise measurement, and recommendations for room acoustics.

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

Publications

Abrams DA, Chen T, Odriozola P, Baker AE, Kochalka J, Phillips, J, Padmanabhan A, Menon V (2019). Impaired voice processing in reward and salience circuits predicts social communication abilities in children with autism spectrum disorder. *eLife*, 8.

Chen L*, Wassermann D*, **Abrams DA***, Kochalka J, Gallardo-Diez G, Menon V (2019). The visual word form area (VWFA) is part of both language and attention circuitry. *Nature Communications*, 10. *equal contributions

Gengoux G, **Abrams DA**, Schuck R, Millan ME, Libove R, Ardel CM, Phillips JM, Fox M, Frazier TW, Hardan AY (2019). A Pivotal Response Treatment package for children with autism spectrum disorder: An RTC. *Pediatrics*, 144 (3).

Chen L, **Abrams DA**, Rosenberg-Lee M, Iuculano T, Wakeman HN, Chen T, and Menon V (2019). Quantitative analysis of heterogeneity in academic achievement of children with high-functioning autism. *Clinical Psychological Science*, 7(2), 362-380.

Skeide MA, Evans TM, Mei EZ, **Abrams DA**, Menon V. (2018). Neural signatures of co-occurring reading and mathematical deficits. *Developmental Science*. PMID: 29920856

Abrams DA, Nicol T, White-Schwoch T, Hartmann M, Zecker S, Kraus N. (2017) Population responses in primary auditory cortex simultaneously represent the temporal envelope and periodicity features in natural speech. *Hearing Research*. 348, 31-43. PMID: 28216125

White-Schwoch T, Nicol T, Warrier CM, **Abrams DA**, Kraus N. (2017) Individual differences in human auditory processing: Insights from single-trial auditory midbrain activity in an animal model. *Cerebral Cortex*. 27(11), 5095–5115. PMID: 28334187

Abrams DA, Chen T, Odriozola P, Cheng KM, Baker AE, Padmanabhan A, Ryali S, Kochalka J, Feinstein C, Menon V (2016). Neural circuits underlying mother's voice perception predict social communication abilities in children. *Proceedings of the National Academy of Sciences of the United States of America*. 113, 6295-6300. PMID: 27185915

Uddin LQ, Supekar K, Lynch CJ, Cheng KM, Odriozola P, Barth ME, Phillips J, Feinstein C, **Abrams DA**, Menon V (2015). Brain state differentiation and behavioral inflexibility in autism. *Cerebral Cortex*, 25(12), 4740-7. PMID: 25073720

Abrams DA, Kraus N. (2014) Auditory pathway representation of speech sounds in humans. In: *Handbook of Clinical Audiology*, 7th edition. Katz J, Hood L, Burkard R, Medwetsky L (eds.).

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. (2013) Reply to Brock: Renewed focus on the voice and social reward in children with autism. *Proceedings of the National Academy of Sciences*, 110(42), E3974. PMID: 24278966

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**, Hoeft 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

Fellowships and Grants

Awarded

Title: Sex differences in voice processing systems in autism: A brain networks approach to uncover neuroprotective signatures of social function in girls (PI: Abrams)

Aim: To examine the integrity of voice-processing brain systems in female children with ASD

Agency: Brain and Behavior Research Foundation (NARSAD)

Dates: 01/15/2019 – 01/14/2021

Role: Principal Investigator

Title: Connectivity of voice processing brain networks in female children with autism and its link to social communication abilities (PI: Abrams)

Aim: To examine the integrity of voice-processing brain systems in female children with ASD

Agency: Stanford Women and Sex Differences in Medicine (WSDM) Seed Grant

Dates: 10/01/2017 – 09/30/2018

Role: Principal Investigator

Title: Longitudinal development of brain systems underlying voice processing in children with ASD (PI: Abrams)

Aim: To examine the development of voice processing in children and adolescents with ASD

Agency: Stanford Child Health Research Institute (CHRI) Pilot Early Career Award

Dates: 02/01/2017 – 01/31/2018
Role: Principal Investigator

Title: Decoding neural systems underlying affective prosody in children with autism (PI: Abrams)

Aim: To examine the structural and functional brain bases of emotional speech perception in children with autism.

Agency: NIH/National Institute of Mental Health

Grant Number: 1K01MH102428-01A1

Dates: 07/01/14 - 06/30/17

Role: Principal Investigator

Title: Decoding affective prosody and communication circuits in autism (PI: Menon)

Aim: To examine the structural and functional brain bases of emotional speech perception in children with autism.

Agency: Simons Foundation Autism Research Initiative

Grant Number:

Dates: 07/01/14 - 06/30/17

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

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

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: 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: 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: 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: 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

Presentations

Invited Lectures and Organized Symposia

Abrams DA. Inter-subject synchronization of brain responses during natural music listening. December 2019, Masterclass for Western Region of the American Music Therapy Association for Students (WRAMTAS).

Abrams DA. Voice processing brain systems: a window into communication deficits and social motivation in children and adolescents with autism. August 2019, University of Pittsburgh.

Abrams DA. Voice processing brain systems: a window into communication deficits and social motivation in children and adolescents with autism. April 2019, Stanford Autism Working Group, Stanford, CA.

Abrams DA. Brain systems for speech perception in children with autism spectrum disorders. June 2015, NCCR SYNAPSY 4th Symposium on Autism, Geneva, Switzerland.

Abrams DA. How brain science can help improve speech perception in children with an autism spectrum disorder. April 2015, Stanford Autism Update, Palo Alto, CA.

Abrams DA. Brain Systems for Speech and Language in Children with Autism Spectrum Disorders. April 2015, The MIND Institute, University of California – Davis, Davis, CA.

Abrams DA. Brain Systems for Speech and Language in Children with Autism Spectrum Disorders. March 2015, University of Michigan, Ann Arbor, MI.

Abrams DA. Brain Systems for Speech and Language in Children with Autism Spectrum Disorders. February 2015, University of Washington, Seattle, WA.

Abrams DA. Brain Systems for Speech and Language in Children with Autism Spectrum Disorders. January 2014, Columbia University, New York.

Abrams DA. Cognitive Deficits: Speech and Language in Autism. 6th Annual Autism Spectrum Disorder Update, Packard Children's Hospital, Stanford University, June 2013, Stanford, CA.

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. Brain Systems for Speech and Language. December 2012, University of Texas – Austin, Austin, TX.

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.

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

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

Poster and Podium Presentations

Intrinsic functional architecture of Wernicke's, Broca's, and Geschwind's areas of the human speech comprehension network, presented at the 6th International Conference on Auditory Cortex, Banff, September 2017.

Intrinsic functional architecture of Wernicke's, Broca's, and Geschwind's areas of the human speech comprehension network, presented at the Human Brain Mapping Annual Meeting, Vancouver, June 2017.

Brain systems for human voice perception in children with autism spectrum disorders, presented at Stanford's Center for Computer Research in Music and Acoustics, Palo Alto, CA, January 2017.

How brain science can help improve speech perception in children with an autism spectrum disorder. February 2016, Stanford Phonetics and Phonology Workshop, Palo Alto, CA.

'Unjittering' midbrain activity boosts the representation of speech formant structure, presented at 2016 ARO MidWinter Meeting, San Diego, CA, February 2016.

Intrinsic connectivity of human auditory cortex: Testing the Dual-Stream model of auditory processing, presented at the Human Brain Mapping Annual Meeting, Honolulu, HI, June 2015.

Rewarding speech sounds elicit reduced nucleus accumbens and amygdala activity and connectivity in children with autism, presented at the Human Brain Mapping Annual Meeting, Honolulu, HI, June 2015.

Pragmatic language ability is related to amygdala connectivity in children with autism, presented at the Human Brain Mapping Annual Meeting, Honolulu, HI, June 2015.

Familiar speech sounds elicit reduced brain activity in the reward circuit and amygdala in children with autism, presented at the International Meeting for Autism Research, Salt Lake City, UT, May 2015.

Hippocampal-parietal hyper-connectivity predicts visual-spatial abilities in children with autism, presented at International Meeting for Autism Research, Atlanta, GA, May 2014.

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

Abrams DA. Seminar on fMRI data analysis for auditory research. August 2019, Department of Communication Science and Disorders, University of Pittsburgh.

Abrams DA. Voice processing brain systems: a window into communication deficits and social motivation in children and adolescents with autism. April 2019, Postdoctoral Lecture Series, Stanford, CA.

Radio interview with Julie Motz on our autism research, Hot Tech - Cool Science, KWMR-FM, March 28, 2019.

Lecture on Autism Spectrum Disorder and Careers in Neuroscience to Cupertino High School Students, Stanford University, March 2019.

Lecture on Autism Spectrum Disorders, Human Biology 164, Stanford University, October 2018.

Lectures on Autism Spectrum Disorders and the Brain, Advanced Scientific Methods Course, Monta Vista High School, Cupertino, CA, November 2013, January 2015.

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.

Anonymous reviews from students averaged a score of 5.2 out of a possible 6.

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: *Current Biology*, *PNAS*, *Annals of Neurology*, *Journal of Neuroscience*, *Cerebral Cortex*, *Journal of Neurophysiology*, *Journal of the Association for Research in Otolaryngology, Ear and Hearing*, *Brain and Language*, *Hearing Research*, *Frontiers in Human Neuroscience*, *Human Brain Mapping*, *PLoS One*, *NeuroImage*, *Neuropsychologia*, *Neuroscience & Biobehavioral Reviews*, *Journal of Speech, Language, and Hearing Research*, *Molecular Autism*.