Jessica Slater, PhD
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SUMMARY

My research examines how the brain coordinates its activities in time to support cognition and sensorimotor integration. Building from my doctoral work on speech, music and rhythm, my current postdoctoral research investigates the neural dynamics of attention. My long-term goal is to understand how timing behavior and underlying neural dynamics are disrupted in attention disorders, such as ADHD, and to inform the development of effective rhythm-based therapies.

CURRENT POSITION

Postdoctoral Research Fellow (2016 – present)
Dept. of Neurological Surgery, Feinberg School of Medicine, Northwestern University, Chicago, IL
P.I. Dr. Matthew Tate, in collaboration with Dr. Marsel Mesulam
Investigating neural dynamics of spatial attention with a multi-methods approach, including ECoG during awake neurosurgery, structural and functional connectivity analyses and behavioral assessment.

EDUCATION

PhD, Communication Sciences and Disorders (2016) with specialization in Cognitive Science.
Northwestern University, Evanston, IL
Advisor: Dr. Nina Kraus, Auditory Neuroscience Laboratory.
Dissertation: The Integrated Auditory System: Communication and Cognition through the Lens of Musical Expertise
MA, Communication Sciences and Disorders (2014) Northwestern University, Evanston, IL
BA Hons, Philosophy and Psychology (1995) Oriel College, University of Oxford, Oxford, U.K. (2:1)

SELECTED ACADEMIC AWARDS & FELLOWSHIPS

Pre-doctoral Ruth L. Kirschstein National Research Service Award (NRSA) (2015-17)
National Institute on Deafness and Other Communication Disorders, National Institutes of Health
Rhythm and temporal processing in the perception of speech in noise

Graduate Writing Fellowship (2014-16) Northwestern University

Cognitive Science Fellowship in Interdisciplinary Research (2014-15) Northwestern University

Rearwin Scholarship (2014-15, declined) Northwestern University

RESEARCH PUBLICATIONS

Journal articles:

1. **Slater J,** Kraus N, Woodruff Carr K, Tierney A, Azem A, Ashley R (2017) Speech-in-noise perception is linked to rhythm production skills in adult percussionists and non-musicians. *Language, Cognition and Neuroscience*
2. **Slater J**, Ashley R, Tierney A, Kraus N (2017) Got rhythm? Better inhibitory control is linked with more consistent drumming and enhanced neural tracking of the musical beat in adult percussionists and non-percussionists. *Journal of Cognitive Neuroscience*
3. **Slater J**, Azem A, Nicol T, Swedenborg B, Kraus N (2017) Variations on the theme of musical expertise: cognitive and sensory processing in percussionists, vocalists and non-musicians. *European Journal of Neuroscience*.
4. **Slater J** and Kraus N. (2016). The role of rhythm in perceiving speech in noise: A comparison of percussionists, vocalists and non-musicians. *Cognitive Processing*
5. **Slater J**, Skoe E, Strait D, O'Connell S, Thompson E, Kraus N. (2015) Music training improves speech-in-noise perception: Longitudinal evidence from a community-based music program. *Behavioural Brain Research*
6. Strait DL, **Slater J**, O'Connell S, Kraus N. (2015) Music training relates to the development of neural mechanisms of selective auditory attention. *Developmental Cognitive Neuroscience*
7. Krizman J**, Slater J,** Marian V, Skoe E, Kraus N. (2015) Neural processing of speech in children is influenced by bilingual experience. *Neuroscience Letters*
8. **Slater J**, Strait DL, Skoe E, O'Connell S, Thompson EC & Kraus N. (2014) Longitudinal effects of group music instruction on literacy skills in low-income children. *PLoS One*
9. Kraus N, **Slater, J**, Thompson EC, Hornickel J, Strait DL, Nicol T, & White-Schwoch T. (2014) Music enrichment programs improve the neural encoding of speech in at-risk children. *The Journal of Neuroscience*
10. Kraus N, **Slater J**, Thompson EC, Hornickel J, Strait DL, Nicol T, & White-Schwoch T. (2014). Auditory learning through active engagement with sound: biological impact of community music lessons in at-risk children. *Auditory Cognitive Neuroscience*
11. Kraus N, Hornickel J, Strait DL, **Slater J**, Thompson EC. (2014) Engagement in community music classes sparks neuroplasticity and language development in children from disadvantaged backgrounds. *Frontiers in Psychology, Cognitive Science*
12. Strait DL, **Slater J,** Abecassis V, & Kraus N. (2014) Cortical response variability as a developmental index of selective auditory attention. *Developmental Science*
13. **Slater J,** Tierney A, & Kraus N. (2013) At-risk elementary school children with one year of classroom music instruction are better at keeping a beat. *PLoS One*

Invited book chapters and reviews:

14. **Slater J.** (in preparation) From Expertise to Disorder: Rhythm as a conceptual framework for temporal integration in the brain. *Frontiers in Computational Neuroscience: Special Issue on Temporal Structure of Neural Processes Coupling Sensory, Motor and Cognitive Functions of the Brain*
15. Kraus N and **Slater J**. (2016) Beyond Words: How humans communicate through sound. *Annual Review of Psychology, Vol 67*
16. Kraus N and **Slater J**. (2015) Music and language: relations and disconnections. *Handbook of Clinical Neurology: 3rd Series The human auditory system*

PRESENTATIONS & TALKS

Posters and presentations:

- **Slater J**, Mesulam M, Mugler E, Tate M (2017). Identifying neural mechanisms of covert spatial attention: An electrocorticography study in awake craniotomy patients. International Conference for Cognitive Neuroscience, 2017, Amsterdam, Netherlands.
- **Slater J**, Mesulam M, Tate M (2017) Neural mechanisms of spatial attention: Networks, connectivity and the neurosurgeon's dilemma. Cognitive Brain Mapping Group, Northwestern University, Chicago IL.
- **Slater J,** Tierney A, Woodruff Carr K, Kraus N. (2015) Rhythm without beat? Defining the role of rhythm in the perception of speech in noise. Society for Music Perception and Cognition, Nashville, TN.
- **Slater J**, Strait DL, Thompson E, Hornickel J, Kraus N. (2014) Longitudinal effects of group music instruction on speech and rhythm processing: Cognitive, perceptual and neural evidence. Neurosciences and Music-V, Dijon, France.
- **Slater J**, Swedenborg B, Kraus N. (2014) How musical expertise influences speech perception in noise: A comparison of drummers, vocalists and non-musicians. Association for Research in Otolaryngology Symposium, San Diego, CA.
- Strait DL, **Slater J,** Abecassis V, Kraus N. (2012) Cortical response variability as a marker of attention in children and adults and the impact of musical training. Association for Psychological Science Convention. Chicago, IL.
- **Slater J**, Strait DL, Kraus N. (2011) Neural correlates of enhanced auditory attention in children with musical training. The Neurosciences and Music IV, Edinburgh, Scotland.
- Strait, D, **Slater J** & Kraus N. (2011) Music lessons in early childhood promote speech perception in background noise. Music, Science and Medicine, New York Academy of Sciences, NY.

Invited talks:

- **Slater J**, Kraus N. (2015) Orchestrating Vision: Conducting music research with community partners. Panel Discussion. Society for Music Perception & Cognition biennial meeting. Nashville, TN.
- **Slater J** & Kraus N. (2015) Music as a Universal Language for Understanding. The Foundation for Human Potential 10th Symposium. Whitney Young Magnet High School, Chicago, IL with Adrian Anantawan
- **Slater J** & Kraus N. (2013) Biological Benefits of Musical Training in At-risk Children. Grammy Foundation Chicago Chapter, Chicago, IL.
- **Slater J** & Kraus N. (2013) Tuning Up the Brain: Biological Benefits of Music Education. Learning & the Brain "Educating for Creative Minds" Conference, San Francisco, CA.
- **Slater J** & Kraus N. (2012) From Notes to Neurons: The Biological Impact of Music. 3rd EISA (International Meeting of Health and Art), Escola de Artes, Sociedade Artistica Musical dos Pousos, Portugal (keynote)
- **Slater J** & Kraus N. (2012) Tuning up the Brain, Biological Benefits of Music Education. The Musical Offering, Faculty and parent orientation for fall events, Evanston, IL.

RESEARCH EXPERIENCE

Skills and expertise

- ECoG data collection during awake brain surgery using BlackRock Compumed, BCI2000; EEG data collection of brainstem and cortical auditory-evoked responses to complex stimuli using Neuroscan, IHS and BioMARK systems
- Structural and functional connectivity analysis with DTI and resting state fMRI data (beginner level)
- Proficient with data and statistical analysis tools MATLAB, R, SPSS.

- Behavioral test administration (TONI, TOSWRF, TOWRE, Woodcock Johnson Cognitive assessments, NIH ToolBox) and custom rhythm/drumming tasks. Pure tone audiometry.
- Extensive experience recruiting, scheduling and testing human research participants, including toddlers, adolescents and adults.
- Coordinated all lab-wide IRB approvals for human research in doctoral lab.
- Extensive experience writing grant proposals and progress reports for federal and foundation grants.

Research projects

Postdoctoral Fellow - Neurological Surgery, PI: Dr. Matthew Tate (2016-present)
Feinberg School of Medicine, Northwestern University, Chicago, IL.

- **Neural dynamics of spatial attention:** This project investigates spatial attention in patients with brain tumors. We use a multi-modal approach incorporating advanced neuroimaging (fMRI, diffusion tensor imaging), lesion analysis and intraoperative electrocorticography recording in patients undergoing awake brain surgery for tumor resection.

PhD student - Auditory Neuroscience Laboratory, PI: Dr. Nina Kraus (2010-16)
Department of Communication Sciences and Disorders, Northwestern University, Evanston, IL.

- **Rhythm and temporal processing in the perception of speech in noise**
  Dissertation research examined connections between music and language through the lens of musical expertise, focusing on neural and behavioral processing of sound in percussionists, vocalists and non-musicians. This research provided the first evidence for a link between rhythm skills and speech-in-noise perception, as well as links between rhythm and attention skills.
- **Biological impact of music training**
  Three-year longitudinal project assessing the biological impact of community-based music training, in partnership with Harmony Project in Los Angeles, CA. Gained invaluable experience as project lead for two years, managing a large longitudinal study and troubleshooting electrophysiological data collection in off-site testing locations. This work yielded groundbreaking evidence for the impact of music education on learning and language development, including the first longitudinal evidence for improved speech-in-noise perception with music training.
- **Attention and cortical response variability**
  Investigated the impact of music training on attention and cortical response variability across the lifespan, under mentorship of Dr. Dana Strait. This project significantly informed my thinking about neural synchrony as a substrate of selective attention.

Research Assistant - Neural Mechanisms of Language Processing Lab, PI: Dr. Albert Kim (2010)
Department of Psychology and Neuroscience, University of Colorado, Boulder, CO

- Electrophysiological data collection for ERP study examining semantic processing in language

Undergraduate Research Assistant - History and Philosophy of Science, Dr. Milan Jaros (1994)
University of Newcastle-upon-Tyne, Newcastle, U.K.

- Assisted in the development of content and teaching materials for a new undergraduate program in History and Philosophy of Science.

Undergraduate Research Assistant - Department of Psychology, PI: Dr. David McHenry (1994)
University of Oxford, Oxford, U.K.

- Statistical analyses of relationships between Myers-Briggs personality type and job description.

TEACHING & MENTORSHIP

CIRTL Associate level certification in STEM teaching (2017)
- Participated in mentored discussions of teaching and observations of the Fundamentals of Neurobiology undergraduate course at Northwestern, with Dr. Tracy Hodgson

Graduate Writing Fellow (2014-16) The Graduate Writing Place, Northwestern University
- Provided one-on-one consultations with graduate students across disciplines to assist with writing and communication
- Facilitated weekly writing group for STEM and social science students
- Developed and ran new quarterly workshops in scientific writing and communication to general audiences

Guest lecturer Northwestern University, Department of Communication Sciences and Disorders
Lectures taught:
- Biological Foundations of Speech and Music (2012-16)
    - Acoustics of Speech
    - Acoustics of Music
    - Neural Encoding of Speech and Music
    - Rhythm
    - Biological Impact of Noise
- Introduction to Audiology (2014)
    - Erroneous Hearing Loss
- Electrophysiology of the Human Auditory System (2012-4)
    - Cortical Plasticity
    - Amplification: Speech and Music
- Functional Neuroanatomy (2012)
    - Brainstem and Cranial Nerve Anatomy
- Introduction to Learning Disabilities (2011)
    - Reading and Auditory Processing

Teaching Assistant Northwestern University, Department of Communication Sciences and Disorders
- Biological Foundations of Speech and Music (2012-14)
- Introduction to Audiology (2014)
- Electrophysiology of the Human Auditory System (2012-14)
- Introduction to Learning Disabilities (2013)
- Clinical Neuroanatomy and Physiology (2012)
- Diagnostic & Remedial Approaches for Children with Learning Problems (2010)

Mentorship
- Undergraduate research assistant, Andrea Azem (2014-16)
- Clinical research coordinator Joan Hargraves (2014-16)
- AuD capstone student, Britta Swedenborg (2012-13)

SERVICE TO THE PROFESSION

- Webmaster (2010-2016) – Society for Music Perception and Cognition
- Blog Writer (2014-2016) – Science in Society, Northwestern University
- Guest reviewer:
    - Neuroscience Letters
    - PloSOne
    - Music Perception
    - Experimental Brain Research
    - International Journal of Audiology
    - Mind, Brain and Education

PROFESSIONAL EXPERIENCE

I have over ten years of professional experience in media, communications and technology. This has equipped me with communication and technical skills that contribute greatly to my productivity as a researcher, from project management and team leadership, to systems analysis and proposal writing.

My lifetime of music-making and writing in many forms has also fueled my curiosities about human communication and the dynamics of cognition.

Early Childhood Music Educator (2009-2010) – Music Together, Denver, CO
Freelance Online Copywriter (2009-2010) – National Endowment for Financial Education
Web Content Manager (2009) – Local Matters Inc, Denver, CO
Account Manager (2007 –2008) – Indigio/Bridgeline Software, Denver, CO
Technology Editor/ Web Development Manager (2005-2007) – Rocky Mountain News, Denver, CO
Technology Editor (2002 –2005) – Rocky Mountain News, Denver, CO
Systems Analyst (1999 –2002) – Rocky Mountain News, Denver, CO
Newsroom Editorial Staff/Tech Support (1997-1999) – International Herald Tribune, Paris, France

Languages: English, conversational French
Dual US/British citizenship