Alexander Cates

PhD Student

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Personal Profile

Neurological function underlies all forms of human performance. Whether it is movement, sensory, or general cognition, everything starts with the brain. Despite its importance, much is still unknown about how these functions are accomplished or, more importantly, how we can improve them. I use a combination of neuroimaging and neuromodulation techniques to improve neurological function in healthy populations and to treat neurological conditions in clinical populations. My current research focuses on understanding the interaction between gaze behavior and gait during locomotor learning in healthy and clinical populations.

Education

Northwestern University

PhD. Student, Neuroscience, 2018 - Current

Working on gaze behavior during gait and motor learning

Hamilton College

B.A., Neuroscience (minor Mathematics), 2011 - 2015

Thesis: Beauty is in the mood of the beholder: Positive affect alters the neural responses to facial attractiveness

Research Experience

Senior Research Associate at Halo Neuroscience

2012 - 2013

Halo Neuroscience designs innovative and beautiful pieces of neural stimulation technology. By priming certain areas of the brain we are able to enhance brain function in a number of different areas. At Halo I: Designed and ran clinical trials with healthy (average and elite athletes) and clinical (stroke) populations, Organized and advised independent researchers on the use of neural stimulation, wrote 3 papers (published/in submission) and 2 grant applications, Designed and analyzed a data analytics system to glean customer information from support interactions

Undergraduate Researcher at Hamilton College

2013 - 2014

As an undergraduate researcher at Hamilton I: Designed and ran an original experiment centered on whether mood states affect how the brain perceives the world on a neurological level, Collaborated with students and professors on multiple projects such as: working with a prototype brain imaging device, Fitts law, Implicit associations

Teaching Experience

Introduction to Pandas at Northwestern University

2019 - 2019

Designed and taught a 3-hour workshop on how to use the python package Pandas to process and analyze different types of data.

CIRTL Associate at Northwestern University

2017 - 2017

Completed the mentored discussions in teaching program (winter 2019), the MOOC/MCLC on teaching stem to undergraduates (Summer 2019), and the Searle Teaching as Research program (spring 2020) to achieve CIRTL Associate status.

Basketball Coach at JCCSF and Wilmette Park District

2017 - 2018

Coach youth (4th through 6 grade boys and girls) basketball each winter, have done so in San Francisco with JCCSF (3 years) and more recently with the Wilmette Park District since starting at Northwestern.

TAing at Northwestern University

2018 - 2018

TAed 2 graduate level classes, including leading lectures on Matlab programming, Signal Processing, and Data Vizualization.

Publications

Repeated sessions of transcranial direct current stimulation (tDCS) with vertical jump training improves vertical jump performance in elite athletes

North American Neuromodulation Society (Poster), 2019

Cates A, Lin R, Mayberry A, Clark R, Chao D, Taylor T, Stray-Gundersen J, and Wingeier B

Transcranial direct current stimulation over the primary motor cortex accelerates synergistic motor learning in a complex piano chord task

Human Movement Science (in submission), 2018

Lin R, Cates A, Toker D, Sanchez S, Stromlund A, Clark R, Chao D, and Wingeier B

Effects of transcranial direct current stimulation over the motor cortex on isometric rate of force development

NANS Summer Series (Poster), 2018

Lin R, Cates A, Bar-Or T, and Wingeier B

Positional accuracy of scalp electrodes mounted on a ready-made band targeting motor cortex

Brain Stimulation, 2017

Review of methods for classifying continuous data streams using neural networks

Gaze behavior changes from step to step based on motor performance during walking

Dynamic Walking (Poster), 2020

Cates, A. and Gordon, K

tdcs and tinnitus: A meta analytic exploration into efficacy and optimization

MetaRxiv (Preprint), 2020

Cates, A and Davies, E

Awards

Gaze behavior during locomotor learning

NSF GRFP Honorable Mention, 2020