Jeffrey S. Seely

jsseely.com

Work Experience

Facebook Research, New York, NY — 2019 — present
Research Scientist

CTRL-Labs, New York, NY — 2017 — 2019
Lead Scientist

Education

Columbia University, New York, NY — 2011 — 2017
PhD, March 2017
Theoretical Neuroscience
Advisors: Mark M. Churchland, Larry F. Abbott

Colgate University, Hamilton, NY — 2004 — 2008
Bachelor of Arts, May 2008
Physics and Mathematics (double concentration)
Magna Cum Laude
Honors in Physics
Honors in Mathematics

University of Texas at Arlington, Arlington, TX — 2003 — 2004
Physics and mathematics coursework

Honors

NSF Graduate Research Fellowship — 2012 — 2016
Brains for Brains Young Researchers' Computational Neuroscience Award — September 2012
Bernstein Association for Computational Neuroscience, Munich, DE
Osborne Mathematics Prize, Colgate University — April 2008
Sisson Mathematics Prize, Colgate University — April 2005
Dean's Award for Academic Excellence, Colgate University
Phi Eta Sigma National Honors Society, Colgate University
Sigma Pi Sigma Physics Honors Society, Colgate University

Activities

Reviewer for *COSYNE* — 2016
Reviewer for *Neural Information Processing Systems* — 2013, 2014
Reviewer for *The Journal of Computational Neuroscience* — 2011

Fellowships

Postbaccalaureate Intramural Research Training Award — 2010 — 2011
Laboratory of Biological Modeling
National Institutes of Health, Bethesda, MD
Advisor: Carson C. Chow

Talks

Topological analysis of motor cortex May 2016
New York Applied Topology Seminar, Columbia University

Neural computation: visual cortex versus motor cortex March 2016
Applied Topology Seminar, University of Pennsylvania

Denoising neural signals with tensor decompositions June 2014
Noise Workshop, NYU

Tensor decompositions on neural data June 2014
Shenoy group, Neural Prosthetic Systems Lab, Stanford University

State-space models for cortical-muscle transformations February 2014
COSYNE, Salt Lake City

Neural dynamics of perceptual bistability March 2011
Gatsby Computational Neuroscience Unit, UCL, London, UK

Information rate optimization of the squid giant axon April 2008
Rochester Symposium for Undergraduate Physics Students, Rochester, NY

Presentations

P Kaifosh, A Barachant, C Barbre, N Danielson, A Du, N Guo, C Hernández, N Hussami, P Li, M Mandel, A Moschella, T Reardon, J Reid, R Rubin, **J Seely**, Z Wang, A Yembarwar
Wearable non-invasive human neural interface with action potential resolution
COSYNE, Lisbon, Portugal, March 2019

JS Seely, R Memmesheimer, LF Abbott
Propagating targets through noninvertible layers of deep networks
Cognitive Computational Neuroscience, September 2017

A Miri, C Warriner, **JS Seely**, GF Elsayed, LF Abbott, JP Cunningham, MM Churchland, TM Jessell
Motor cortex engages output circuits in a behaviorally-selective manner
COSYNE, Salt Lake City, February 2017

AA Russo, SR Bittner, **JS Seely**, SM Perkins, BM London, AH Lara, A Miri, LF Abbott, TM Jessell, JP Cunningham, MM Churchland
Changes in motor cortex population structure between movement types
SFN, San Diego, November 2016

JS Seely, MT Kaufman, CJ Cueva, L Paninski, KV Shenoy, MM Churchland
State-space models for cortical-muscle transformations
CSHL Symposium: Cognition, Cold Spring Harbor Laboratory, May 2014

JS Seely, MT Kaufman, A Kohn, JA Movshon, NJ Priebe, SG Lisberger, SI Ryu, KV Shneoy, LF Abbott, JP Cunningham, MM Churchland
Input-driven activity and internal dynamics in visual and motor cortex
Temporal Dynamics in Learning: Networks and Neural Data, Janelia Farm Research Campus, May 2013

JS Seely, MT Kaufman, A Kohn, JA Movshon, NJ Priebe, SG Lisberger, SI Ryu, D Sussillo, KV Shenoy, LF Abbott, JP Cunningham, MM Churchland
Quantifying representational and dynamical structure in visual and motor cortex responses
Neural Control of Movement, Puerto Rico, April 2013

JS Seely, MT Kaufman, A Kohn, JA Movshon, NJ Priebe, SG Lisberger, SI Ryu, KV Shenoy, JP Cunningham, LF Abbott, MM Churchland
Quantifying representational and dynamical structure in large neural datasets
COSYNE, Salt Lake City, February 2013

JS Seely, JP Cunningham, MT Kaufman, D Sussillo, SI Ryu, KV Shenoy, MM Churchland
Dimensionality in motor cortex: differences between models and experiment
COSYNE, Salt Lake City, February 2012

JS Seely, CC Chow
Mutual inhibition as a mechanism for normalization
SFN, Washington DC, November 2011

JS Seely, CC Chow
Response normalization in theoretical firing rate models
COSYNE, Salt Lake City, February 2011

JS Seely, CC Chow
A general characterization of binocular rivalry models
SFN, San Diego, November 2010

P Crotty, **JS Seely**
Effects of the axonal leak conductance on energy and information
Computational Neuroscience Meeting, Portland, OR, July 2008

Publications

Y Shi, **J Seely**, PHS Torr, N Siddharth, A Hannun, N Usunier, G Synnaeve
Gradient Matching for Domain Generalization
arXiv preprint arXiv:2104.09937 (2021)

AA Russo, SR Bittner, SM Perkins, **JS Seely**, BM London, AH Lara, A Miri, NJ Marshall, A Kohn, TM Jessell, LF Abbott, JP Cunningham, MM Churchland
Motor Cortex Embeds Muscle-like Commands in an Untangled Population Response
Neuron, 97 (4), 953-966. e8 (2018)

A Miri, CL Warriner, **JS Seely**, GF Elsayed, JP Cunningham, MM Churchland, TM Jessell
Behaviorally Selective Engagement of Short-Latency Effector Pathways by Motor Cortex
Neuron, 95 (3), 683-696. e11 (2017)

JS Seely, MT Kaufman, SI Ryu, KV Shenoy, JP Cunningham, MM Churchland
Tensor analysis reveals distinct population structure that parallels the different computational roles of areas M1 and V1
PLoS Computational Biology, 12(11):e1005164 (2016)

MT Kaufman, **JS Seely**, D Sussillo, SI Ryu, KV Shenoy, MM Churchland
The largest response component in motor cortex reflects movement timing but not type
eneuro 3(4):ENEURO-0085 (2016)

JS Seely, CC Chow
The role of mutual inhibition in binocular rivalry
Journal of Neurophysiology 106(5):2136-50 (2011)

JS Seely, P Crotty
Optimization of the leak conductance in the squid giant axon
Physical Review E 82, 021906 (2010)

Programming

Python, PyTorch