MICHAEL J. SEAY

mikejseay.com

Philadelphia, PA
m: 504.319.5224
mikejseay@gmail.com
LinkedIn

PROFESSIONAL SUMMARY

Computational neuroscience expert with record of success in research and academic sectors seeking a professional role

Reliable, results-oriented researcher with 12+ years of experience. A self-starter with a history of success in independent and collaborative environments, possessing multifaceted credentials and a commitment to continuous learning. Creative problem-solver with ability to guide project lifecycles, integrate best practices, and mitigate risks. Exceptional training and academic qualifications, including a recently obtained Ph.D. in Psychology/Computational Neuroscience from the University of California Los Angeles.

CORE COMPETENCIES

- Computational modeling
- Complex problem-solving
- Database management
- Public speaking
- Report/article production
- Research planning/support
- Experiment design
- Technical documentation
- Colleague instruction

TECHNICAL PROFICIENCIES

Computer Programming: Python (`numpy`, `matplotlib`, `seaborn`, `pandas`, `scipy`, `sklearn`, `statsmodels`, `networkx`, `lightgbm`, `tensorflow`, `torch`)
R (`tidyverse`, `caret`, linear modeling), SQL (Postgres), Unix-like OSs, Git

Analytical Techniques: Dimensionality reduction, graph theory, network modeling, time-series analysis, spectral decomposition, psychophysics

Software: Tableau, JetBrains IDEs, RStudio, MobaXterm, EndNote, Adobe Illustrator, Microsoft Office Suite, SPSS / JASP

PROFESSIONAL EXPERIENCE

BUONOMANO LAB AT UCLA, LOS ANGELES, CA, AUGUST 2017 TO AUGUST 2022

GRADUATE STUDENT RESEARCHER

- Directed the design and implementation of multiple computational models explaining neural functions.
- Partnered with fellow researchers to develop and execute experiments and tests of model predictions.
- Coordinated the publication of 2 first-author scientific articles; co-authored 3 forthcoming articles.
- Maintained oversight of large datasets; conducted complex statistics and machine learning.
- Delivered mentorship for 4 undergraduate research volunteers.
- Supported the teaching of 6 courses; administered and graded assessments and laboratories.

HENRI BEGLEITER NEURODYNAMICS LABORATORY, BROOKLYN, NY, JUNE 2015 TO JULY 2017

RESEARCH SCIENTIST

- Collaborated in the creation of a database system for storing, updating, and accessing 200k+ records containing complex and diverse scientific research information using Python and MongoDB.
- Created module for analysis, visualization, and statistics of electroencephalogram (EEG) data in Python.
- Oversaw the design and implementation of comprehensive processing pipeline for EEG data in MATLAB.
- Conceptualized and developed a novel algorithm for calculating Family History Density of an illness from tabular pedigree data; provided a better predictor of alcoholism risk than previous comparable measures.
- Facilitated the achievement of lab goals through publications and presentations with analyses, visualizations, and written results; reviewed findings and conclusions to verify before publication.

TULANE COGNITIVE NEUROSCIENCE LABORATORY, NEW ORLEANS, LA, DECEMBER 2010 TO MAY 2015
STUDENT and RESEARCH ASSISTANT

- Participated in the design and implementation of a novel processing pipeline for EEG data.
- Contributed novel EEG analyses, visualizations, and content to a scientific article; clearly and concisely communicated the findings in an easy-to-understand manner.
- Supervised the design and execution of an original experiment; published the results in an honors thesis.
- Provided assistance for professors in teaching 2 courses and mentorship to undergraduates; offered individualized support for struggling students.

EDUCATION AND CREDENTIALS

DOCTOR OF PHILOSOPHY (PH.D.) IN PSYCHOLOGY, FOCUS ON COMPUTATIONAL NEUROSCIENCE, 2022

University of California – Los Angeles, CA
Relevant coursework: Data Analysis Methods, Advanced Psychological Statistics, Statistical Methods for Time-Series, Spatial Statistics

MASTER OF SCIENCE (M.S.) IN NEUROSCIENCE, 2013

BACHELOR OF SCIENCE (B.S.) IN NEUROSCIENCE, MINOR IN MATHEMATICS, COORDINATE MAJOR IN COGNITIVE STUDIES [MAGNA CUM LAUDE], 2012

Tulane University – New Orleans, LA
Relevant coursework: Music & Digital Signal Processing, Linear Algebra, Combinatorics, Scientific Computing, Psychological Statistics, Cognitive Neuroscience

PUBLICATIONS AND PRESENTATIONS

Published

- **Seay MJ**, Natan RG, Geffen MN, Buonomano DV (2020). Differential Short-Term Plasticity of PV and SST Neurons Accounts for Adaptation and Facilitation of Cortical Neurons to Auditory Tones. *Journal of Neuroscience.*
- Motanis H*, **Seay MJ***, Buonomano DV (2018). Short-Term Synaptic Plasticity as a Mechanism for Sensory Timing. *Trends in Neurosciences.* *Contributed equally
- Mock JR, **Seay MJ**, Charney DR, Holmes JL, Golob EJ (2015). Rapid cortical dynamics associated with auditory spatial attention gradients. *Frontiers in Neuroscience.*

Unpublished and Theses

- Zhou S*, **Seay MJ***, Taxidis J, Golshani P, Buonomano DV (under review). Multiplexing working memory and timing: encoding retrospective and prospective information in neural trajectories. *Neuron.*
- Soldado-Magraner S, **Seay MJ**, Laje R, Buonomano DV (accepted). Orchestrated Excitatory and Inhibitory Learning Rules Lead to the Unsupervised Emergence of Up-states and Balanced Network Dynamics. *Proceedings of the National Academy of Sciences*.
- Liu B, **Seay MJ**, Buonomano DV (accepted). Creation of neuronal ensembles and cell-specific homeostatic plasticity through chronic sparse optogenetic stimulation. *Journal of Neuroscience*.
- **Seay MJ** (2022). Neurocomputational mechanisms of timing, temporal context, and working memory. *Ph.D thesis*.
- **Seay MJ** (2012). The effect of encoded stimulus strength on auditory cortical responses during short-term memory retrieval of pitch. *Honor's Thesis*.

Presentations

- **Seay MJ**, Natan RG, Geffen MN, Buonomano DV (2019). A cortical spiking model with differential short-term plasticity onto parvalbumin and somatostatin interneurons reproduces in vivo results of sensory adaptation in auditory cortex. *Society for Neuroscience*. Chicago, IL.
- **Seay MJ**, Yang RG (2019). Is Dale's Law computationally beneficial? *Computational and Cognitive Neuroscience Summer School*. Suzhou, China.
- **Seay MJ**, Mock JR, Golob EJ (2014). Cortical representations of absolute and relative sound locations during an auditory spatial attention task. *Society for Neuroscience*. Washington, D.C.

RELEVANT PROJECTS

SQL DATA ANALYSIS
DATABASE DETECTIVE: DISCOGS

In this article, I explain how I turned the largest online music database, Discogs, into a local SQL database on my machine. Using it, I perform some interesting analyses of recorded music, create dashboard views of results in Tableau, and conduct a network analysis of musical styles by pulling query results into Python. My analysis culminates by visualizing the network of musical styles in the browser using Javascript.

Skills demonstrated: SQL, Tableau, Python, JavaScript Article Github

MACHINE LEARNING RESEARCH
IS DALE'S LAW COMPUTATIONALLY BENEFICIAL?

In artificial neural networks, a single unit can excite some of its targets and inhibit others. But in biology, neurons are almost always exclusively excitatory or inhibitory (Dale's Law). Do networks of excitatory and inhibitory units provide a computational benefit? In this research project I use PyTorch to show that when given the opportunity, recurrent neural networks (RNNs) will train themselves to follow Dale's Law to accomplish certain simple tasks.

Skills demonstrated: Python, PyTorch, RNN Slides Github

SCIENTIFIC DATA MANAGEMENT
HBNL DATABASE

While working at a lab in Brooklyn, I co-wrote a Python module for building, updating, and accessing a lab database implemented in MongoDB. Still used today, it contains hundreds of thousands of records from disparate sources (EEG, behavioral experiment, survey, genetics, genealogy). Using this database, I conceptualized and developed a novel algorithm for calculating Family History Density of an illness from tabular pedigree data, which provided a better predictor of alcoholism risk than previous comparable measures.

Skills demonstrated: Database, Processing Architectures Article Github

DASHBOARD VISUALIZATION
AIRBNBS IN NEW ORLEANS: TABLEAU STUDY

Using a public database of AirBnB listings, I created this interactive visualization in Tableau. It shows AirBnB listings in my home town of New Orleans. Point size is based on the number of reviews, and point color is based on the price per bedroom. The user can filter listings shown based on the number of beds, bedrooms, and the room type. Hovering a listing shows key info in a tooltip.

Skills demonstrated: Database, Data Visualization Dashboard