Michael J. Seay

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EDUCATION

University of California, Los Angeles – Los Angeles, CA

Ph.D in Psychology (work focused on Computational Neuroscience) *May 2022*

Relevant Coursework: Data Analysis Methods, Advanced Psychological Statistics, Statistical Methods for Time-Series, Spatial Statistics

Tulane University – New Orleans, LA

M.S. in Neuroscience *May 2013*

B.S. in Neuroscience, *magna cum laude* *May 2012*

Minor in Psychology, Minor in Mathematics, Coordinate Major in Cognitive Studies

Relevant Coursework: Music & Digital Signal Processing, Linear Algebra, Combinatorics, Scientific Computing, Psychological Statistics, Cognitive Neuroscience

EXPERIENCE

Buonomano Lab at UCLA – Graduate Student Researcher

August 2017 – August 2022 *Los Angeles, CA*

- Completed Ph.D focusing on Computational Neuroscience in May of 2022
- Designed and implemented multiple computational models explaining neural functions
- Published two first-author scientific articles, co-author on three forthcoming articles
- Handled large datasets, performed complex statistics and machine learning
- Mentored four undergraduate research volunteers, assisted teaching six courses

Henri Begleiter Neurodynamics Laboratory – Research Scientist

June 2015 – July 2017 *Brooklyn, NY*

- Co-created database system for storing, updating, and accessing 200k+ records containing complex and diverse scientific research information using Python and MongoDB
- Wrote module for analysis, visualization, and statistics of electroencephalogram (EEG) results in Python
- Designed and implemented comprehensive processing pipeline for EEG data using MATLAB
- Devised novel algorithm for calculating Family History Density of an illness from tabular pedigree data, which provided better predictor of alcoholism risk than previous comparable measures
- Supported lab goals, publications, and presentations with analyses, visualizations, and written results

Tulane Cognitive Neuroscience Laboratory – Student and Research Assistant

December 2010 – May 2015 *New Orleans, LA*

- Designed and implemented novel processing pipeline for EEG data
- Co-authored scientific article, contributing novel EEG analyses, visualizations, and writing
- Designed and executed original experiment, publishing results in honors thesis
- Assisted teaching of two courses, mentored undergraduates

SKILLS

Computer programming and literacy:

- Python (`numpy`, `scipy`, `scikit-learn`, `pandas`, `matplotlib`, `networkx`, `torch`)
- R (`tidyverse`, `caret`, linear modeling tools)
- SQL (Postgres)
- Unix-like OSs
- Git

Analytical techniques

- Psychophysics
- Time-series analysis
- Spectral analysis
- Dimensionality reduction
- Graph theory
- Network modeling

Software:

- Tableau
- RStudio
- Adobe Illustrator
- JetBrains IDEs
- Microsoft Office Suite
- SPSS / JASP

PUBLICATIONS & 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 (under review). 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 (under review). Creation of neuronal ensembles and cell-specific homeostatic plasticity through chronic sparse optogenetic stimulation. *Journal of Neuroscience*.

Seay MJ (2022). 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.

REFERENCES

Excellent references can be provided upon request by:

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