Eric L. Denovellis

CONTACT INFORMATION	675 Nelson Rising Ln. UCSF San Francisco, CA 94158 USA	*Email:* eric.denovellis@ucsf.edu *Github:* github.com/edeno

RESEARCH INTERESTS

Statistical methods for large datasets, state space time series models, point process modeling, interactive data visualization, prefrontal cortex, hippocampus, cognitive flexibility, task switching, machine learning, computational neuroscience

EDUCATION

Boston University, Boston, Massachusetts USA
Graduate Program for Neuroscience

Ph.D. in Computational Neuroscience, September 2016

Thesis: Task Switching in the Prefrontal Cortex

Advisor: Daniel H. Bullock

University of California, Santa Barbara, Santa Barbara, California USA

B.S., Mathematics and B.A., Philosophy with High Honors, June 2007

ACADEMIC EXPERIENCE

University of California, San Francisco, San Francisco, California USA

Research Scientist   **September, 2019 - Present**
Researcher in the Department of Physiology. Developing clusterless point process state space models for the interpreting and categorizing hippocampal replay and other neural representations. Building and maintaining lab data processing pipelines. Collaborating with and mentoring trainees on statistical analyses.

Boston University, Boston, Massachusetts USA

Postdoctoral Researcher   **September, 2016 - August, 2019**
Researcher in the Mathematics and Statistics Department. Research focuses on communication between the hippocampus and other brain areas during the reactivation of memory. Involves work in state space modeling, point processes, and signal processing.

Graduate Student   **September, 2009 - September, 2016**
Includes doctoral and masters level coursework in mathematics, statistics, computational modeling, and neuroscience as well as research into the neural and computational correlates of task switching.

Teaching Fellow   **January, 2014 - May, 2014**
CAS NE 340 - Introduction to Computational Models of Skilled Decision and Action. Gave lecture on Matlab. Assisted in computer lab.

Teaching Fellow   **January, 2011 - May, 2011**
CAS CN 570 - Neural and Computational Models of Conditioning, Reinforcement, Motivation and Rhythm. Gave lecture on task switching. Led MATLAB tutorial and designed the course final project.

University of California, Santa Barbara, Santa Barbara, California USA

Campus Learning Assistance Services - Mathematics Tutor   **September, 2005 - June, 2007**
Assisted students with mathematics homework for lower level courses.

PUBLICATIONS Gillespie, A.K., Astudillo Maya, D.A., **Denovellis, E.L.**, Desse, S., and Frank, L.M. (2022). Neurofeedback training can modulate task-relevant memory replay in rats. bioRxiv, 2022.10.13.512183. 10.1101/2022.10.13.512183.

Joshi A., **Denovellis, E.L.**, Mankili A., Meneksedag Y., Davidson T., Gillespie A.K., Guidera, J.A., Roumis, D., and Frank, L.M. (2022). Dynamic Synchronization between Hippocampal Spatial Representations and the Stepping Rhythm. bioRxiv preprint:30.

Gillespie, A.K., Astudillo Maya, D.A., **Denovellis, E.L.**, Liu, D.F., Kastner, D.B., Coulter, M.E., Roumis, D.K., Eden, U.T., and Frank, L.M. (2021). Hippocampal replay reflects specific past experiences rather than a plan for subsequent choice. Neuron S0896627321005730.

Denovellis, E.L., Gillespie, A.K., Coulter, M.E., Sosa, M., Chung, J.E., Eden, U.T., and Frank, L.M. (2021). Hippocampal replay of experience at real-world speeds. ELife 10, e64505.

Denovellis, E.L., Frank, L.M., and Eden, U.T. (2019). Characterizing hippocampal replay using hybrid point process state space models. In 2019 53rd Asilomar Conference on Signals, Systems, and Computers, (Pacific Grove, CA, USA: IEEE), pp. 245–249.

Buschman, T.J*., **Denovellis, E.L.***, Diogo, C.*, Bullock, D., and Miller, E.K. (2012). Synchronous Oscillatory Neural Ensembles for Rules in the Prefrontal Cortex. Neuron *76*, 838–846.

* Co-first authors

SOFTWARE PACKAGES **Denovellis, E.L.**. (2022). Eden-Kramer-Lab/replay_trajectory_classification: 1.3.5 (v v1.3.5). Zenodo. doi:10.5281/zenodo.7126995. **30 stars. 8 forks. 165,240 downloads.**

A state space modeling package for decoding hippocampal replay trajectories and determining their type using sorted or clusterless data

Denovellis, E.L., Myroshnychenko, M., Sarmashghi, M. and Stephen, E.P. (2022). Eden-Kramer-Lab/spectral_connectivity: 1.0.3 (v1.0.3). Zenodo. doi:10.5281/zenodo.7080364. **79 stars. 36 forks. 29,404 downloads**.

Toolbox for multitaper spectral estimation and frequency domain functional and directed connectivity analysis for electrophysiological data

Denovellis, E.L. and Stephen, E.P. (2018). NeurophysVis/SpectraVis: v1.1.0 (1.1.1). Zenodo. doi:10.5281/zenodo.1218014. **38 stars. 11 forks.**

An interactive web-based neuroscience app for analyzing task-related functional networks over time and frequency

Denovellis, E.L.. (2018). NeurophysVis/RasterVis: v0.0.1 (0.0.1). Zenodo. doi:10.5281/zenodo.1218012. **8 stars. 3 forks.**

An interactive web-based neuroscience app for analyzing electrophysiological spiking along many different dimensions for many different neurons. Example: https://neurophysvis.github.io/RasterVis/public/

TALKS Characterizing hippocampal replay using hybrid point process filters. IEEE Asilomar Conference on Signals, Systems, and Computers. Pacific Grove, CA November 2019

Using state space models to identify latent temporal dynamics of population spiking activity. The 33rd New England Statistics Symposium. Hartford, CT May 2019.

Better Science Code. MIT Center for Brains, Minds, and Machines. Cambridge, MA May 2017

Data visualization tools: from classroom to science. Inter Science of Learning Centers Conference Workshop. San Diego, CA June 2015

Synchronous Neural Ensembles for Rules in the Prefrontal Cortex. The 5th Annual Dana and Betty Fisher Retreat of the Picower Institute. Red Jacket Resort. South Yarmouth, MA June 2012.

Neural Dynamics of Cognitive Flexibility. Fall 2011 Picower Plastic Lunch Series. Massachusetts Institute of Technology. Cambridge, MA October 2011.

CONFERENCE PROCEEDINGS

Denovellis, E.L., Joshi, A., Eden, U.T., Frank, L.M. Hippocampal replay outside of sharp wave ripples. Program No. 742.04. 2022 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2022. Online.

Lee K., **Denovellis, E.L.**, Ly, R., Magland, J., Soules, J., Comrie, A., Guidera, J.A., Nevers, R., Gramling, D., Adenekan, P., Bak, J., Monroe, E., Tritt, A., Ruebel, O., Nguyen, T.T., Yatsenko, D., Chu, J., Kemere, C., Garcia, S., Buccino, A.P., Aery Jones, E., Giocomo L.M., Frank, L.M. Spyglass: a data analysis framework for reproducible and shareable neuroscience research. Program No. 742.16. 2022 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2022. Online.

Chu, J., Coulter M.E., Liu, D.F., **Denovellis, E.L.**, Frank, L.M., Kemere, C. Real-time decoding with state space models of neural activity. Program No. 742.08. 2022 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2022. Online.

Gillespie, A.K., Astudillo Maya, D.A., , **Denovellis, E.L.**, Desse, S., Eden, U.T., Frank, L.M. Real-time feedback can promote task-relevant memory replay. Program No. 742.05. 2022 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2022. Online. Online.

Denovellis, E.L., L.M. Frank. Confidently decoding multiple spatial environments in hippocampal replay, Program No. 66. Santorini, Greece: AREADNE Research in Encoding and Decoding of Neural Ensembles, 2022. Online.

Denovellis, E.L., A.K. Gillespie, M.E. Coulter, M. Sosa, U.T. Eden, L.M. Frank. Hippocampal replay of experience at real-world speeds. Program No. 842.02. 2021 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2021. Online.

A.K. Gillespie, D.A. Astudillo Maya, **Denovellis, E.L.** D.F. Liu, D.B. Kastner, M.E. Coulter, D.K. Roumis, U.T. Eden, L.M. Frank. Hippocampal replay reflects specific past experiences rather than a plan for subsequent choice. Program No. 842.01. 2021 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2021. Online.

Denovellis, E.L., A.K. Gillespie, M.E. Coulter, L.M. Frank, U.T. Eden. A state space model for characterizing replay dynamics. Program No. 162.04. 2019 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2019. Online.

A.K. Gillespie, D.A. Astudillo Maya, D.F. Liu, M.E. Coulter, **Denovellis, E.L.** S. Desse, D.K. Roumis, U.T. Eden, L.M. Frank. Operant conditioning of hippocampal sharp wave ripples Program No. 162.02. 2019 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2019.

Online.

Denovellis, E.L., A.K. Gillespie, M.E. Coulter, L.M. Frank, U.T. Eden. A state space model for characterizing trajectory dynamics of non-local spatial firing in hippocampus. Ninth International Workshop Statistical Analysis of Neuronal Data, 2019.

Denovellis, E.L., Stephen, E.P., Eden, U., and Kramer, M.A. Interactive data visualization for electrophysiological data. Program No. 703.20. 2018 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2018. Online.

Denovellis, E.L., Buschman, T.J., Diogo, C., Bullock, D., and Miller, E.K. Point process models of anterior cingulate and dorsolateral prefrontal cortical neurons during cognitive control. Program No. 599.12. 2012 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2012. Online.

Buschman, T.J., **Denovellis, E.L.**, Diogo, C., Bullock, D., and Miller, E.K. Dynamic, synchronous, sub-networks in prefrontal cortex encode stimulus-response rules. Program No. 599.12. 2012 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2012. Online.

Buschman, T.J., **Denovellis, E.L.** , Diogo, C., Bullock, D., and Miller, E. (2012). Dynamic networks in frontal cortex support the cognitive flexibility to switch between rules. Poster presented at the Computational and systems neuroscience (Cosyne) meeting, Salt Lake City, UT.

Denovellis, E.L., Buschman, T.J., Diogo, C., Bullock, D., and Miller, E.K. Rule-based task switching in the anterior cingulate and prefrontal cortex. Program No. 405.18. 2011 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2011. Online.

SERVICE

CELEST Student Organization Co-President   **May, 2011 - June, 2016**
In charge of organizing CELEST student events (CELEST is an NSF-funded Science of Learning Center), scheduling the speaker series, Matlab tutorials for CELEST summer program for college students.

Computational Neuroscience Student Organization Treasurer   **May, 2010 - March, 2011**
In charge of budgeting funds and reimbursing students.

Originating team for the Simons SURF program for underrepresented students in STEM **June 2020**

PROFESSIONAL EXPERIENCE

Mercer Advisors, Santa Barbara, California USA

Pension Consultant I   **October, 2007 - July, 2009**
In charge of designing and advising clients on pension plans for three national offices. Carried out statistical analysis of pension plans. Attended conferences to keep abreast of IRS rule changes. Designed a computer program to enhance the efficiency of pension plan design and analysis.

PROFESSIONAL MEMBERSHIPS

Society for Neuroscience   **May, 2011 - Present**

HONORS AND AWARDS

Phi Beta Kappa Scholar, Lambda Chapter
AREADNE 2022 Travel Award

Skills

- Statistical Packages: Matlab, R
- Languages: Python, Javascript

- Signal processing