Elizabeth (Liz) A. O'Gorman

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Summary

I am a computational neurobiologist with expertise in developing real-time machine and deep learning pipelines to analyze streaming high-dimensional behavioral and neural data, including conducting closed-loop experiments, signal processing, and adaptive feedback systems.

Technical Skills

Languages: Python (JAX, Jupyter, matplotlib, numpy, opencv, pandas, pytest, scikit-learn, scipy, statsmodels (in alphabetical order, equal fluency); R and RStudio; TensorFlow
Environments & Tools: bash/zsh; High-Performance Computing (Apptainer/Singularity, Docker); Jupyter; LabVIEW; LaTeX; Linux/UNIX; MATLAB (in alphabetical order, equal fluency)
Machine and Deep Learning: CNNs, LSTMs/RNNs, VAEs (theory and practice)
Data Analysis: dimensionality reduction; multi-channel and single-channel signal processing (audio, image, neural, video); spectral analysis; time-series and Markovian analysis; closed-loop real-time pipeline development for streaming time-series data

Education

Duke University 2018-2025
PhD in Neurobiology

Dissertation: "Flexible, Real-Time Shaping of Zebra Finch Vocal Learning"

Concurrent MS in Electrical & Computer Engineering (Data Analytics & Machine Learning)

Emory University 2014-2018
BS with Highest Honors in Neuroscience & Behavioral Biology — Ethics Minor

Honors Thesis: "Low-Dimensional Mapping of Corticostriatal Circuitry Dynamics Underlying Pair Bonding"

Honors and Awards: Alpha Epsilon Upsilon (General Academic) Honor Society; Nu Rho Sci (Neuroscience) Honor Society; Phi Sigma Tau (Philosophy) Honor Society; William Harrison Hightower, Jr. Scholarship; Dean's List Fall 2017; Merit List Fall 2014 - Spring 2016

Oxford College of Emory University 2014-2016
AA in Arts & Sciences

Publications

Hsu C-C, Madsen TE, **O'Gorman E**, Rainnie DG, and Gourley SL. Reward-related dynamical coupling between basolateral amygdala and nucleus accumbens. Brain Structure and Function. 2020 Jul;225(6):1873-1888. PMID: 32556583; PMCID: PMC7405940.

Awards and Honors

- Gordon Research Conference and Gordon Research Seminar on the Neural Mechanisms of Acoustic Communication (NMAC GRC and GRS) Travel Award, 2024
- Flatiron Institute's Center for Computational Neuroscience 2022 Workshop on Calcium & Voltage Imaging Analysis Travel Award from the Simons Foundation, 2022
- National Science Foundation Graduate Research Fellowship (NSF GRFP): NSF GRFP DGE 16-44868, 2018-2023
- Highest Honors (*summa cum laude*) in Neuroscience & Behavioral Biology at Emory University, 2018

Experience

Duke University 2022-2025

PhD Candidate advised by John Pearson, PhD

Flexible, real-time shaping of zebra finch vocal learning

- Developed and deployed flexible pipelines for adaptive, real-time analysis and reinforcement of streaming zebra finch vocalizations using custom LabVIEW and Python software integrating machine and deep learning (CNNs, VAEs), and spectral and time-series analysis
- Extracted high-dimensional features and quantified spectral changes of zebra finch song, using Python and deep learning, in response to real-time auditory feedback
- Designed and conducted experiments to deliver contingent auditory feedback (white noise, i.e., an aversive or auditory error signal) to negatively reinforce zebra finch vocalizations, demonstrating experience with closed-loop behavioral and neural systems

Selected Oral Presentations

O'Gorman EA, Schreiner DC, Mooney RD, Pearson JM. Hacking Neural Learning with Deep Learning: Real-Time Perturbation of High-Dimensional Song Features in the Zebra Finch. Gordon Research Conference on the Neural Mechanisms of Acoustic Communication (NMAC GRC and GRS); 2024 May 22; Newry, ME.

Selected Poster Presentations

O'Gorman EA, Schreiner DC, Mooney RD, Pearson JM. Hacking vocal learning with deep learning: flexible real-time perturbation of zebra finch song. Computational and Systems Neuroscience (CoSyNe); 2025 March 27-30; Montreal, Canada.

> **O'Gorman EA**, Schreiner DC, Mooney RD, Pearson, JM. Hacking vocal learning with deep learning: flexible real-time perturbation of zebra finch song. *Science Communications Worldwide*. doi:10.57736/f758-9516

O'Gorman EA, Schreiner DC, Mooney RD, Pearson JM. Hacking neural learning with deep learning: real-time perturbation of high-dimensional song features in the zebra finch. Gordon Research Conference and Gordon Research Seminar on the Neural Mechanisms of Acoustic Communication (NMAC GRC and GRS); 2024 May 18-24; Newry, ME.

Hsu C-C, **O'Gorman EA**, Madsen TE, Habib R, Rainnie DG. Neuronal oscillations in the nucleus accumbens and basolateral amygdala during social preference test and food conditioning. 47th Annual Society for Neuroscience Meeting; 2017 November 11-15; Washington, DC.