Mitchell Ostrow

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EDUCATION

Massachusetts Institute of Technology, Cambridge, MA   August 2022
Ph.D. Student in Computational Neuroscience and Machine Learning
Yale University, **New Haven, CT**
 B.S. in Neuroscience, B.S in Statistics and Data Science   August 2017 - December 2021
GPA: 3.95/4.00, *Magna Cum Laude, Distinction in both majors*
Statistics and Data Science Thesis: *Neural Mechanisms of Theory of Mind in Deep Reinforcement Learning*
Neuroscience Thesis: *Oscillations in Prefrontal Cortex Block Uncertain Evidence in Perceptual Decision-Making*

AWARDS

Mellon Fellowship ($500 awarded for senior thesis research)   2021
Yale Nominee for the Marshall and Mitchell Scholarships   2021
2nd Place Poster, *Yale Undergraduate Research Symposium*   2019
Kavli Neuroscience Fellowship ($5000 grant for summer undergraduate neuroscience research)   2019
Richter Fellowship ($1500 awarded for summer undergraduate research)   2019

PUBLICATIONS

Ostrow, M.B., Yang, G.R., Seo, H. (2022). *Representational Geometry of Social Inference and Generalization in a Competitive Game*. Robotics Science and Systems Conference, Workshop on Social Intelligence and Human Robotics. https://social-intelligence-human-ai.github.io/docs/camready_8.pdf

Ostrow, M.B. (2021). *Examining the Viability of Computational Psychiatry: Approaches into the Future.* Yale Undergraduate Research Journal, Spring 2021. https://elischolar.library.yale.edu/cgi/viewcontent.cgi?article=1079&context=yurj

POSTERS

Ostrow, M.B., Yang, G.R., Seo, H. (2022). *Neural Representations of Opponent Strategy Support the Adaptive Behavior of Recurrent Actor-Critics in a Competitive Game.* COSYNE 2022 Conference.

Ostrow, M.B., Yang, G.R., Seo, H. (2021). *A Deep Neural Network Model Adapts Flexibly to Different Opponent Strategies in a Competitive Game*. Society for Neuroscience Conference Proceedings.

Ostrow, M.B., Emmons, E., Pittenger, C. (2019). *Exploring Mouse Models for Tic Pathophysiology with Relevance to Tourette Syndrome.* Yale Undergraduate Research Symposium, September 2019.

PRESENTATIONS

How Neuroscience and AI Drive Each Other Forwards,
Instructor Spotlight, Inspirit AI Summer School, 2022

Representational Geometry of Social Inference and Generalization in a Competitive Game,
Spotlight Talk, Robotics Science and Systems Workshop on Social Intelligence and Human Robotics, June 2022
Yale Department of Neuroscience Research in Progress Talk, April 2022

Deep Meta-Learning in a Generalized Context Produces Semantic Neural Representations,
Yale Neuroscience Undergraduate Research Organization (YNEURO), February 2021

Low-D Sensory Processing Neural Activity Best Explains Mouse Behavior in a Visual Discrimination Task,
Neuromatch Academy Virtual Conference, July 2020

Spectral Backpropagation: Embedding Graphical Representations in Neural Networks,
Yale Department of Statistics and Data Science Virtual Conference, May 2020

RESEARCH EXPERIENCE

Yale Department of Neuroscience, New Haven, CT
Postgraduate Associate   Jan 2022-June 2022
Undergraduate Researcher   Aug 2019-Dec 2021
PI: **Dr. Hyojung Seo**, additionally advised by **Dr. Robert Yang** and **Dr. Daniel Ehrlich**.
-Developed deep reinforcement learning and deep learning algorithms as a model for macaque prefrontal cortex in two independent research projects (Python, Tensorflow).
-Implemented unsupervised dimensionality reduction methods on population recordings and simulated data.
-Identified latent dynamics and representations in the neural populations that support decision-making.

-Modeled macaque behavior on the competitive matching-pennies game in an independent research project utilizing model-free and model-based reinforcement learning models in Python.

Lockheed Martin, *Brain-Inspired AI Research Engineer Intern*, Shelton, CT   June 2021-December 2021
-Developed a novel hierarchical deep reinforcement learning algorithm that unified variational autoencoders, Transformer self-attention, and motor primitives via Modern Hopfield Networks, reducing error rate by half.
-Designed a generative algorithm that learns motor primitives to solve a navigational task within a continuous grid world in an explainable manner.

Yale Department of Psychiatry, *Undergraduate Research Fellow*, New Haven, CT   Jan 2019-Aug 2019
PI: **Dr. Chris Pittenger**
-Completed an independent research project analyzing the effects of striatal histamine depletion on rodent repetitive behavior stereotypy, resulting in a paper and presentation.
-Completed 8 survival craniotomies, implanting a metal cannula into the lateral cerebral ventricle.

COURSE RESEARCH PROJECTS

Neuromatch Academy Summer School, Global   July 2020
-Implemented supervised and unsupervised machine learning on neural spiking recorded from NeuroPixel probes (10,000 neurons) to understand how differential neural activity can predict changes in mice behavior.

Yale Department of Statistics and Data Science, New Haven, CT   Jan 2020-May 2020
-Proposed and completed an independent research project in a graduate deep learning class.
-Designed a learning algorithm with spectral graph theory to efficiently train a graph neural network.

TEACHING AND SCIENCE OUTREACH

Summer School Tutor, Inspirit AI   July-August 2022
-Taught introductory machine learning to 20 high school students and supervised two 6-student capstone research projects, one that won the Best Presentation award out of ten similar groups.

Volunteer, Neuromatch Academy   April-May 2022
-Peer-reviewed over 100 applications to NMA Computational Neuroscience and Deep Learning summer schools.

Co-Founder and Co-Organizer, Applied Philosophy in Neuroscience Journal Club   June 2021-Dec 2021
-With two graduate students, created and organized a weekly reading group to study philosophy of neuroscience.

Student Advisory Committee, Yale Department of Neuroscience   Sept 2021-Dec 2021
-Serves as a liaison between undergraduate neuroscience majors and the directors of undergraduate studies.

Linear Models Teaching Assistant, Yale Department of Statistics and Data Science   Aug 2020-Dec 2020
-Graded weekly problem sets and answered questions via Piazza.

Computer Science Tutor, The Coding School   April 2020-Nov 2020
-Individually tutored two middle school and high school students in introductory and intermediate Python.
-Wrote and edited lesson plans for the Machine Learning Curriculum.

Volunteer Teacher, Yale Brain Bee   March 2021
-Gave four tutorials on Learning and Memory to local high school students.

Mentorship and Research Chair, Yale Neuroscience Undergraduate Research Organization   Aug 2020-May 2021
-Organized neuroscience mentorship "families" within the major and coordinated social events.

Guest, The College Neuro Network Podcast   Aug 2020
- https://open.spotify.com/episode/2mMc01IKOwD76KBSszVPN1

Advisor, Precollege Association for Research in STEM   Aug 2020-Dec 2020
-Advised five high school mentors leading research projects, addressed questions as they arose.

NSF GRFP Peer Editor, Yale University Graduate Writing Lab   June 2020-July 2020
-Reviewed and edited NSF GRFP personal statements and research proposals.

LEADERSHIP

President and Co-Founder, Yale Scale and Bones Trombone Choir, New Haven, CT   Aug 2017-April 2020
Emergency Medical Technician, Seymour EMS, Seymour, CT   Sept 2019-Dec 2019

SKILLS AND INTERESTS

Programming: Python (5 years), R (4 years), MATLAB (2 years), Julia (1 year), Bash (1 year), SQL (1 year)
Tools: Adobe Illustrator, Git, LaTeX, Docker, Pandas, NumPy, PyTorch, TensorFlow, Scikit-Learn, Matplotlib
Interests: Philosophy of Neuroscience, Philosophy of Science, Music (Trombone and Guitar), Athletics (Powerlifting, basketball, running), Mindfulness