LUCY LAI

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EDUCATION

HARVARD UNIVERSITY, CAMBRIDGE, MA — 2018 –
Ph.D. in Neuroscience
Teaching Certificate, Derek Bok Center for Teaching and Learning

RICE UNIVERSITY, HOUSTON, TX — 2014 – 2018
B.A. in Cognitive Sciences with Honors
Minors in Neuroscience, Computational and Applied Mathematics
Distinction in Research and Creative Work, Thesis: *Multisensory context warps time perception*

RESEARCH

HARVARD UNIVERSITY, CAMBRIDGE, MA — JUN 2019 –
Department of Psychology and Center for Brain Science
Advisor: Samuel Gershman

- Developing and empirically testing resource-rational models of behavior with applications to decision-making, habitual and goal-directed learning, and computational psychiatry.

MARINE BIOLOGICAL LABORATORY, WOODS HOLE, MA — AUG 2019
Center for Brains, Minds, and Machines (CBMM) Summer School

- Investigated the emergence of representational specificity during continual learning in CNNs.

BAYLOR COLLEGE OF MEDICINE, HOUSTON, TX — JAN 2015 – JUN 2018
Department of Neuroscience
Advisor: Jeffrey Yau

- Developed Bayesian inference models and designed behavioral experiments to understand how context influences time perception across the senses.

JANELIA RESEARCH CAMPUS, ASHBURN, VA — SUMMER 2017
Janelia Undergraduate Scholars Program
Advisor: Joshua Dudman

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE, MA — SUMMER 2016
Center for Sensorimotor Neural Engineering NSF-REU, McGovern Institute for Brain Research
Advisor: Mehrdad Jazayeri

PUBLICATIONS

Lai, L.*, Huang, ZX*, Gershman, SJ. (in prep). Action chunking is a consequence of policy compression.

Gershman, SJ., **Lai, L**. (2021). The reward-complexity trade-off in schizophrenia. *Computational Psychiatry.*

Lai, L., Gershman, SJ. (2021). Policy compression: an information bottleneck in action selection. *Psychology of Learning and Motivation, Volume 74.*

Bhui, R., **Lai, L**., Gershman, SJ. (2021). Resource-rational decision making. *Current Opinion in Behavioral Sciences.*

Mikhael, JG, **Lai, L.,** Gershman, SJ. (2021). Rational inattention and tonic dopamine. *PLOS Computational Biology.*

Lai, L., Magnotti, JF., Yau, JM. (in prep). Conditioned inference explains multisensory time distortions.

Lai, L., Magnotti, JF., Yau, JM. (2017). Multisensory context warps time perception. *Conference on Cognitive Computational Neuroscience.*

INVITED TALKS

Otto Lab Meeting, McGill University, Providence, RI — NOV 2021
Action chunking is a consequence of policy compression. (Virtual)

Gold Lab Meeting, University of Maryland School of Medicine, Baltimore, MD — OCT 2021
Chunking as policy compression. (Virtual)

RL Super Lab (Akrami, Botvinick, Gershman, Hermundstad, Paton, Pehlevan, Pouget) — OCT 2021
Chunking as policy compression. (Virtual)

Shenhav Lab Meeting, Brown University, Providence, RI — OCT 2021
Chunking as policy compression. (Virtual)

From Neuroscience to Artificially Intelligent Systems (NAISys), CSHL, NY — NOV 2020
A computational division of labor for motor skill learning. (Virtual)

Computational Principles of Intelligence Lab, MPI Tübingen, Germany — SEP 2020
The reward-complexity tradeoff explains habit formation in free-operant conditioning. (Virtual)

CONFERENCE ABSTRACTS

Lai, L., Dudman, JT. Neural correlates of action kinematics in the dorsal striatum.
Janelia Undergraduate Scholars Symposium 2017, Ashburn, VA.

Lai, L., Magnotti, JF., Yau, JM. Contextual determinants of cue binding or separation in multisensory time perception. *International Multisensory Research Forum (IMRF) 2017, Nashville, TN.*

Lai, L., Yau, JM. Attractive and repulsive multisensory interactions in time perception.
Society for Neuroscience (SfN) 2016, San Diego, CA.

Lai, L., Jazayeri, M. Characterizing variability in memory recall of time intervals.
Center for Sensorimotor Neural Engineering (CSNE) REU Symposium 2016, Seattle, WA.

AWARDS &HONORS

Harvard Mind, Brain, Behavior (MBB) Graduate Student Award ($8560)	2021
Harvard University Certificate of Distinction in Teaching	2021
Center for Brains, Minds, and Machines (CBMM) Summer School	2019
National Science Foundation Graduate Research Fellowship	2018 – 2021
Phi Beta Kappa National Honor Society	2018
Rice University Student-Taught Course (STC) Teaching Award	2017
Cognitive Computational Neuroscience student travel award	2017
Janelia Undergraduate Scholars Program Fellowship	2017
Barry M. Goldwater Scholarship honorable mention	2017
Center for Sensorimotor Neural Engineering (CSNE) NSF-REU Fellowship	2016
Computational and Systems Neuroscience (Cosyne) undergraduate travel award	2016
Rice Undergraduate Scholars Program thesis grant ($3000)	2016 – 2018

TEACHING

Course Development & Lead Instructor

Courses that I have designed (curriculum, problem sets, etc.) and taught.

NB314QC / NB212: MATH TOOLS FOR NEUROSCIENCE — JAN 2020, F 2020
Department of Neurobiology, Harvard Medical School

- Designed and taught a new J-term course for the Neuroscience Ph.D. program curriculum. Topics include fundamentals of linear algebra, probability theory, statistical estimation and inference in neural circuits, and analysis of neural population data.
- Converted to a full-semester curriculum and added as the foundational course for the Certificate in Computational Neuroscience (F2020).

COLL158: HOW MUSIC PLAYS THE BRAIN — S 2017, F 2017, S 2018
Rice University

- Designed and taught a seminar course on the intersection of music and neuroscience. Topics include the neurobiology of music perception and cognition, music therapy, AI and music, etc. Recipient of the 2017 Rice Student-Taught Course Award!

TEACHING (CONT'D)

Teaching Assistantships

Designed / graded problem sets, taught discussion sections, proctored exams, and managed a teaching team.

TEACHING FELLOW, *Harvard University*

- GenEd1125: Artificial and Natural Intelligence (Head TF) — S 2021, S 2022
- NB212: Math Tools for Neuroscience — F 2020
- NB306QC: Quantitative Methods for Biologists — AUG 2020
- NB316QC: Probabilistic Modeling of Neural Data — S 2020

TEACHING ASSISTANT, *Computational and Systems Neuroscience Conference* — MAR 2019

TEACHING ASSISTANT, *Rice University*

- NEUR/PSYC 362: Cognitive Neuroscience — S 2016, S 2017, S 2018
- NEUR/CAAM 416: Neural Computation — S 2018
- NEUR/BIOC 385: Cellular and Molecular Neuroscience — F 2016
- STAT 310: Probability and Statistics — F 2016
- PSYC 203: Cognitive Psychology — F 2015

OUTREACH &SERVICE

STEM Outreach

Teaching / mentoring high school students from traditionally underserved and underrepresented backgrounds.

HPREP Teaching and Mentoring Team, Harvard Medical School — 2018 –
BrainSTEM, KIPP Sunnyside High School, Houston, TX — 2015 – 2017
Splash, Rice University — 2017

Academic Mentoring

Advising for graduate school and fellowship applications, internship opportunities, and curriculum planning.

Resident Tutor, Quincy House, Harvard University — 2021 –
Mind, Brain, Behavior (MBB) Graduate Student Mentor, Harvard University — 2019 –
Alumni Externship Advisor, Rice University — 2018 –
Head Academic Fellow, Lovett College, Rice University — 2016 – 2018

Research Mentoring

Advised the following students on independent research projects.

Ann Huang, Summer Intern, McGill University — 2021
Lily Zheng, Harvard Neuroscience Rotation Student — 2021
Varshini Subramanian, Thomas Jefferson High School Student — 2020 – 2021
Danielah Samson, HPREP, Boston Latin Academy High School Student — 2020 – 2021
Emma Rogge, Harvard Undergraduate — 2020

Peer Reviewing

NeurIPS Biological and Artificial Reinforcement Learning Workshop
Cognitive Science Society

LEADERSHIP &PROFESSIONAL

Co-Organizer, Cambridge Graduate Roundtable on Science and Religion — 2021 –
Founder and Co-Organizer, "Listening Lab" Forum, Harvard Dept. of Neurobiology — 2020 –
Committee on Diversity and Inclusion, Harvard Dept. of Neurobiology — 2020 –
Harvard Graduate Women in Science and Engineering (HGWISE), Harvard University — 2018 –
Conference Organizer, Exploring the Mind through Music Conference, Rice University — 2016

SKILLS &OTHER

Programming: Python, MATLAB, Javascript, HTML/CSS, PyTorch, Tensorflow
Interests: classical music, philosophy of science and religion, poetry, running, coffee