curriculum vitæ of

Dongyan Lin

Computational Neuroscience · Brain-inspired AI · Neural Networks

dongyanlin.github.io dongyan.lin@mail.mcgill.ca

Education

Sep. 2019 – present **Ph.D.** in Computational Neuroscience — McGill University, Canada

I am a PhD candidate in computational neuroscience at the Integrated Program of Neuroscience at McGill University and Mila. My research focuses on the intersection of neuroscience and artificial intelligence, with the goal of unraveling the general principles of intelligence. Specifically, I am interested in understanding how the world is represented in brains and machines, as well as developing new tools to analyze neural data with machine learning methods.
cGPA: 4.00/4.00

Sep. 2015 – Jun. 2019 **Hon. B.Sc.** in Physiology (high distinction) — University of Toronto, Canada

Minored in Mathematics and Psychology.
cGPA: 3.87/4.00

Research Experience

Sep. 2019 – present Ph.D. Student — Mila; McGill University

Advisor: Dr. Blake Richards
Thesis: Beyond human-interpretable representations in brains and machines

Jun. 2022 – Oct. 2022 Neuro-AI Intern — Cold Spring Harbor Lab

Advisor: Dr. Tatiana Engel
Project: Generalization through flexible binding of sensory experience and latent structure in reinforcement learning agents

Sep. 2018 – Apr. 2019 Lab Manager / Research Assistant — Department of Psychology, University of Toronto

Advisor: Dr. Katherine Duncan
Project: Investigating the retrieval of semantic memory in human by measuring the familiarity to objects with the naming experiment

Jun. 2018 – Aug. 2018 Bioinformatics Intern — RIKEN, Japan

Advisor: Dr. Michiel de Hoon
Project: Elucidating the functional roles of anti-sense transcripts in human THP-1 leukemia cells with computational methods

May. 2017 – Aug. 2017 Research Student — Sickkids Hospital; University of Toronto

Advisor: Dr. Steven Prescott
Project: *In vitro* chloride regulation of mouse hippocampal gamma oscillations

Publications

Papers

1. R. Tong, R. da Silva*, **D. Lin***, A. Ghosh*, J. Wilsenach, E. Cianfarano, P. Bashivan, B. A. Richards, S. Trenholm. *The feature landscape of visual cortex.* bioRxiv (2023). [Link to paper] Under review.

2. **D. Lin**, A. Z. Huang‡, B. A. Richards. *Temporal encoding in deep reinforcement learning agents.* Under review.

3. **D. Lin**, D. Levenstein, J. H. Cornford, A. Ghosh, D. L. Barack, J. W. Krakauer, T. A. Engel,. J. C. R. Whittington. *Neurons, circuits, or manifolds: reconciling the Sherringtonian and Hopfieldian views on neural computations.* Accepted as Generative Adversarial Collaborations (GAC) Proposal for 2023 Cognitive Computational Neuroscience (CCN) conference, Oxford, UK. [Link to paper]

4. M. de Hoon, A. Bonetti, C. Plessy, Y. Ando, C-C. Hon, Y. Ishizu, M. Itoh, S. Kato, **D. Lin**, S. Maekawa, M. Murata, H. Nishiyori, J. W. Shin, J. Stolte, A. M. Suzuki, M. Tagami, H. Takahashi, S. Thongjuea, A. Forrest, Y. Hayashizaki, J. Kere, P. Carninci. *Deep sequencing of short capped RNAs reveals novel families of noncoding RNAs.* Genome Research (2022).

5. **D. Lin**, B. A. Richards. *Time cell encoding in deep reinforcement learning agents depends on mnemonic demands.* bioRxiv (2021). [Link to paper].

Posters & Presentations

1. **D. Lin**, R. da Silva, A. Ghosh, R. Tong, S. Trenholm, B. A. Richards. *Neuronal optimal stimuli synthesized with deep learning reveal functional segregations in the mouse visual cortex.* Society for Neuroscience (SfN), San Diego, CA, USA. November 2022. [Link to poster]

2. A. Z. Huang‡, **D. Lin**, B. A. Richards. *Time cell encoding is decoupled from time perception in deep reinforcement learning agents.* Cognitive Computational Neuroscience (CCN), San Francisco, CA, USA. August 2022. **Selected as a Contributed Talk (<5% of submissions)**. [Link to abstract] [Link to presentation]

3. **D. Lin**, A. Z. Huang‡, B. A. Richards. *Heterogeneous Representations of Variables in Task-Optimized DRL Agents Depend on Task-Relevance.* The Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM), Providence, Rhode Island, USA. June 2022. Link to paper

4. **D. Lin**, B. A. Richards. *Time cell encoding in deep reinforcement learning agents depends on mnemonic demands.* Computational and Systems Neuroscience (COSYNE), Lisbon, Portugal. March 2022. Link to poster

5. **D. Lin**, B. A. Richards. *Representations of space, time, and memory in deep reinforcement learning agents,* UNIQUE Student Symposium, virtual. May 2021. Link to presentation

6. **D. Lin**, FANTOM Consortium, M. de Hoon. *Elucidating the functional roles of anti-sense transcripts in human THP-1 leukemia cells with computational methods,* Summer Undergraduate Research Symposium, Department of Cell & System Biology, University of Toronto. September 2018. **Received the Best Poster Award.** Link to poster

7. **D. Lin**, S. Ratté, S. A. Prescott. *The chloride regulation of mouse hippocampal gamma oscillation in vitro,* University Research Opportunity Program Awardee Seminar, University of Toronto. July 2017. Link to presentation

*: Equal contribution ‡: mentee under my supervision

Honours

2022	**Society for Neuroscience** Trainee Professional Development Award	$1000
2022	**UNIQUE** Conference Travel Grant (for RLDM)	$1000
2022	**FRQNT** Doctoral Scholarship (declined to take CGSD)	$84,000 over 4 years
2022	Alexander Graham Bell **Canada Graduate Scholarship - Doctoral**	$105,000 over 3 years
2021	**Healthy Brains, Healthy Lives** PhD Fellowship	$15,000 over 1 year
2020	**IVADO** MSc Excellence Scholarship	$40,000 over 2 years
2019	**Integrated Program in Neuroscience** Recruitment Award	$5,000
2019, 2018, 2017, 2016	**University of Toronto** Dean's List	
2018	**Innis College** Exceptional Achievement Award	$735
2017	**Unversity of Toronto** Research Opportunity Program Award	$2,000
2017	**Innis College** Later Life Learning OSOTF Award	$1,336
2016	**Innis College** Later Life Learning OSOTF Award	$1,289
2016	**University of Toronto** Beatty Scholarship	$1,500
2015	**University of Toronto** Entrance Scholarship	$6,000
2015	**Canada Governor General's** Academic Bronze Medal	

Teaching Experience

Apr. 2023 – May 2023	Teaching Assistant: Machine Learning	IBRO-Simons Computational Neuroscience Imbizo
Sep. 2021 – Dec. 2021	Teaching Assistant: INF8953DE (Reinforcement Learning)	Polytechnique Montréal
May. 2021 – Jun. 2021	Teaching Assistant / Project Manager	AI4Good Lab, Montréal, Canada
Nov. 2019 – Mar. 2020	Volunteer Classroom Instructor	BrainReach, Montréal, Canada
Sep. 2018 – Apr. 2019	Teaching Assistant: MAT135 (Calculus I), MAT136 (Calculus II)	University of Toronto

Volunteer & Community Service

Nov. 2021 – Nov. 2022	Lab Representative	Mila
Sep. 2021 – Sep. 2022	Trainee Representative	HBHL Equity, Diversity, and Inclusion Committee
Feb. 2021 – present	Mental Health First Aider	Mila
Oct. 2020 - Nov. 2020	Organizer	Montréal AI & Neuroscience (MAIN) Conference, Montréal, Canada
Feb. 2020 - May. 2020	Organizer	UNIQUE Student Symposium, Montréal, Canada
May 11, 2019	Demo Day Volunteer	Science Rendezvous, University of Toronto
May 2018 – Apr. 2019	Peer Mentor	First-year Learning Community, University of Toronto
May 2018 – Apr. 2019	Event Leader	Centre for International Experience, University of Toronto
May 2017 – Apr. 2018	Mentor	Centre for International Experience, University of Toronto

Workshops & Summer Schools

Dec. 2023	CIFAR Neuroscience of Consciousness Winter School
Jul. 2021	CIFAR Deep Learning Reinforcement Learning Summer School
Feb. 2021	Computational and Systems Neuroscience (COSYNE) Workshop: Recurrent Neural Networks
Jul. 2020	Neuromatch Academy (Interactive Track): Computational Neuroscience
Jul. 2019 - Aug. 2019	L'École d'immersion française de Trois-Pistoles, Western University

Other

Paper Reviewing NeurIPS 2021, 2022 AI4Science Workshop, ICML 2022 AI4Science Workshop, ICLR 2023
Programming: Python, UNIX, MATLAB, LaTeX, HTML, PyTorch, Git
Experimental neuroscience: extracellular recording, surgery, slice preparation
Languages: Mandarin (native), English (fluent), French (basic)

Media Coverage

- HBHL Fellow Feature: Dongyan Lin: https://www.mcgill.ca/hbhl/article/fellow-features/fellow-feature-dongyan-lin
- Students of Mila: Dongyan Lin: https://www.youtube.com/watch?v=wVYD3oinEzc