

Eric Elmoznino

Artificial Intelligence
Cognitive Neuroscience

Contact

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Websites



Education

PhD | Computer Science
Mila (Université de Montréal)
2022-Now GPA: 4.3/4.3

MA | Cognitive Science
Johns Hopkins University
2019-2020 GPA: A+

BASc | Computer Engineering
University of Toronto
2014-2019 GPA: 3.95/4.0

DCS | Health Sciences
Dawson College
2012-2014 GPA: 96/100

Skills

Languages/Frameworks

Python, PyTorch, JAX, TensorFlow,
sklearn, Matlab, C++, C, C#, Swift

Subjects/Techniques

AI, Deep learning, Computational
neuroscience, Linguistics, Algorithmic
information theory

Spoken Languages

English, French (Fluent in both)

Interests

Mind, Brain, and AI

Consciousness, Compositionality,
Open-endedness, In-context learning,
Algorithmic information theory,
Causality, Knowledge acquisition, OoD
generalization, Lifelong learning

Public Speaking

Technical presentations, Teaching

Other Disciplines

Data Science, Genetics, Astrophysics,
Philosophy of mind, Epistemology

Hobbies

Reading, Piano, Meditation,
Snowboarding, Tennis, Basketball

Research Positions & Work Experience

- 2022-Now **AI Researcher (PhD)** Mila (Université de Montréal), Montreal, QC
Inductive biases from conscious higher-level cognition ◦ Compression based perspectives on intelligence, compositionality, and open-endedness ◦ Supervised by Guillaume Lajoie and Yoshua Bengio
- 2024-Now **AI Student Researcher** Google – Paradigms of Intelligence, Remote
Open-ended exploration leveraging predictive sequence models and learning in-context ◦ Supervised by João Sacramento
- 2025, 2026 **Visiting Researcher** Institute for Basic Science, South Korea
Supervised by Hakwan Lau at the Center for Neuroscience Imaging Research ◦ Brain-computer interface using fMRI and LLMs ◦ Theories and models of consciousness, blindsight, and introspection
- 2020-2025 **Data Science Instructor** Lighthouse Labs, Remote
Teach lectures on machine learning topics at a full-time data science bootcamp to students with no prior coding experience
- 2019-22 **Cognitive Science Researcher (MA)** Johns Hopkins University, Baltimore, MD
Research on information representation and algorithms in the visual system of the human brain ◦ Supervised by Michael Bonner
- 2021 **Computational Neuroscience TA** Neuromatch Academy, Remote
Lead groups of students through tutorial exercises ◦ Review lecture material and answer student questions
- 2017-19 **Machine Learning Researcher** ModiFace, Toronto, ON
Computer vision models for the beauty industry
- 2018 **Computer Vision Contractor** Precious, Remote
Computer vision models for automatic baby photo album generation
- 2016 **Software Developer Intern** Orbis Investments, Vancouver, BC
Full-stack web development for internal workflow applications
- 2012-14 **Corporal, Infantry Division** Canadian Armed Forces (Reserves), Valcartier, QC
Participation in combat and reconnaissance exercises

Highlighted work

- 2023-Now **Compositionality, structure, and complexity**
Deriving a formal quantitative definitions of compositionality using ideas from algorithmic information theory
- 2024-Now **Open-ended knowledge growth**
Training a policy with an intrinsic reward derived from algorithmic information theory to explore and seek new knowledge efficiently
- 2023-Now **Compositional attractor models of human thought**
Learning discrete and compositional models of conscious human thought using neural network attractor dynamics
- 2024-2025 **In-context learning and Occam's Razor**
A normative theory of in-context learning as a meta-learning algorithm for fitting the simplest model that explains the training data
- 2022-23 **Sampling compositions of modular neural networks**
Jointly learning a set of neural network modules and how to sample context-conditioned compositions of them using GFlowNets
- 2021-22 **Dimensionality and Manifold Geometry of Visual Representations**
Quantifying the relationship between the geometry of neural network representations and their similarities to visual cortex

Publications

- 2026 **Can In-Context Learning Support Intrinsic Curiosity?** [Eric Elmoznino](#), Sangnie Bhardwaj, Johannes von Oswald, Rajai Nasser, JoÃo Sacramento, Rif A Saurous, Guillaume Lajoie *Preprint*
- 2026 **Simplifying the Modeling of Arbitrary Conditionals in Natural Language.** Yinhan Lu, [Eric Elmoznino](#), LÃo Gagnon, Sarthak Mittal, Tejas Kasetty, Guillaume Lajoie *Preprint*
- 2026 **A Compression Perspective on Simplicity Bias.** Tom Marty, [Eric Elmoznino](#), Dhanya Sridhar *Preprint*
- 2025 **A Complexity-Based Theory of Compositionality.** [Eric Elmoznino](#), Thomas Jiralerspong, Yoshua Bengio, Guillaume Lajoie *ICML poster*
- 2025 **In-context learning and Occam's razor.** [Eric Elmoznino](#), Tom Marty, Tejas Kasetty, LÃo Gagnon, Sarthak Mittal, Mahan Fathi, Dhanya Sridhar, Guillaume Lajoie *ICML poster*
- 2025 **Does learning the right latent variables necessarily improve in-context learning?** [Eric Elmoznino](#), Sarthak Mittal, LÃo Gagnon, Sangnie Bhardwaj, Tom Marty, Dhanya Sridhar, Guillaume Lajoie *ICML poster*
- 2025 **Illusions of AI consciousness.** Yoshua Bengio & [Eric Elmoznino](#) *Science*
- 2025 **Multi-agent cooperation through learning-aware policy gradients.** Alexander Meulemans, Seijin Kobayashi, Johannes von Oswald, Nino Scherrer, [Eric Elmoznino](#), Blake Richards, Guillaume Lajoie, Blaise Aguera y Arcas, JoÃo Sacramento *ICLR poster*
- 2025 **Convolutional architectures are cortex-aligned de novo** Atlas Kazemian, [Eric Elmoznino](#), Michael F. Bonner *Nature Machine Intelligence*
- 2024 **Amortizing intractable inference in large language models.** Edward J. Hu, Moksh Jain, [Eric Elmoznino](#), Younesse Kaddar, Guillaume Lajoie, Yoshua Bengio, Nikolay Malkin *ICLR talk – best paper honorable mention*
- 2024 **Sources of Richness and Ineffability for Phenomenally Conscious States.** [Eric Elmoznino](#), Xu Ji, George Deane, Axel Constant, Guillaume Dumas, Guillaume Lajoie, Jonathan Simon, Yoshua Bengio *Neuroscience of Consciousness*
- 2024 **High-performing neural network models of visual cortex benefit from high latent dimensionality.** [Eric Elmoznino](#) & Michael F. Bonner *PLOS Computational Biology*
- 2023 **Discrete, compositional, and symbolic representations through attractor dynamics.** Andrew Nam, [Eric Elmoznino](#), Nikolay Malkin, Chen Sun, Yoshua Bengio, Guillaume Lajoie *NeurIPS Workshop talk*
- 2023 **Consciousness in Artificial Intelligence: Insights from the Science of Consciousness.** Patrick Butlin, Robert Long, [Eric Elmoznino](#), Yoshua Bengio, Jonathan Birch, Axel Constant, George Deane, Stephen M. Fleming, Chris Frith, Xu Ji, Ryota Kanai, Colin Klein, Grace Lindsay, Matthias Michel, Liad Mudrik, Megan A. K. Peters, Eric Schwitzgebel, Jonathan Simon, Rufin VanRullen *Preprint, condensed 2025 version published in Trends in Cognitive Sciences*
- 2023 **Scene context is predictive of unconstrained object similarity judgments.** Caterina Magri, [Eric Elmoznino](#), Michael F. Bonner *Cognition*
- 2023 **Learning Macro Variables with Auto-encoders.** Maitreyi Swaroop, [Eric Elmoznino](#), Dhanya Sridhar *Neurips Workshop poster*
- 2020 **Visual representations derived from multiplicative interactions.** [Eric Elmoznino](#) & Michael F. Bonner *NeurIPS Workshop poster*
- 2019 **A new procedure, free from human assessment that automatically grades some facial skin structural signs.** Jiang R., Kezele I., Levinstein A., Flament F., Zhang J., [Elmoznino E.](#), Ma J., Ma J., Coquide J., Arcin V., Omoyuri E., Aarabi P. *International Journal of Cosmetic Science*

Invited Talks

- 2026 [Compression & intelligence](#) — *Center for Neuroscience Imaging Research, South Korea*
- 2026 Compositional languages — *Cognition theory journal club, NYU*
- 2025 Compositional languages — *Analogy group*
- 2025 Compositional languages — *Jennifer Hu Lab, Johns Hopkins University*
- 2025 Good visual representations are high-dimensional — *Martin Hebart Lab, Max Planck Institute*
- 2024 [Why can't we describe our conscious experiences? An information theoretic attractor dynamics perspective of ineffability](#) — *Models of Consciousness conference*
- 2024 Consciousness, ineffability, and AI safety — *AI Safety Reading Group, Mila*
- 2023 Sampling discrete objects through continuous attractor dynamics — *GFlowNet Reading Group, Mila*
- 2023 [Why can't we describe our conscious experiences? An information theoretic attractor dynamics perspective of ineffability](#) — *Computational Phenomenology Group*
- 2023 [Why can't we describe our conscious experiences? An attractor dynamics perspective of the ineffability of qualia](#) — *University of Toronto guest lecture*
- 2020 How does the brain work? Cognitive science research — *SABES*
- 2020 Introduction to Programming with Python — *UofTHacks*

Podcasts

- 2025 [Could AIs be Conscious?](#) — *New Horizons podcast*
- 2023 [Why can't we describe our conscious experiences? An information theoretic attractor dynamics perspective of ineffability](#) — *Active Inference Institute podcast*

Supervision

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|---------|--|---|
| 2025-26 | Yinhan Lu
Undergraduate (Computer Science) | Mila, Montreal, QC |
| 2023 | Maitreyi Swaroop
Masters (Mathematics and Computing) | Mila, Montreal, QC |
| 2021-22 | Atlas Kazemian
Masters (Cognitive Science) | Johns Hopkins University, Baltimore, MD |
| 2020-21 | Adyant Balaji
Undergraduate (Computer Engineering & Cognitive Science) | Johns Hopkins University, Baltimore, MD |
| 2019-20 | Maro Maged Doce
Undergraduate (Neuroscience) | Johns Hopkins University, Baltimore, MD |

Patents

- 2022 **System and method for image processing using deep neural networks.** Levinshtein A., Chang C., Phung E., Kezele I., Guo W., Elmoznino E., Jiang R., Aarabi P. *U.S. Patent No. 11216988*. Washington, DC: U.S. Patent and Trademark Office
- 2021 **Image-to-image translation using unpaired data for supervised learning.** Elmoznino E., Kezele I., Aarabi P. *U.S. Patent Application No. 17096774*. Washington, DC: U.S. Patent and Trademark Office
- 2020 **System and method for augmented reality using conditional cycle-consistent generative image-to-image translation models.** Elmoznino E., Ma H., Kezele I., Phung E., Levinshtein A., Aarabi P. *U.S. Patent Application No. 16683398*. Washington, DC: U.S. Patent and Trademark Office
- 2020 **Machine image colour extraction and machine image construction using an extracted colour.** Elmoznino E., Aarabi P., Zhang Y. *U.S. Patent Application No. 16854975*. Washington, DC: U.S. Patent and Trademark Office
- 2020 **Automatic image-based skin diagnostics using deep learning.** Jiang R., Ma J., Ma H., Elmoznino E., Kezele I., Levinshtein A., Charbit J., Despois J., Perrot M., Antoinin F., Flament R.S., Parham A. *U.S. Patent Application No. 16702895*. Washington, DC: U.S. Patent and Trademark Office

Scholarships & Awards

2024	UNIQUE Conference Travel Award (\$1,000 value)
2023	Vanier Canadian Graduate Scholarship (\$150,000 value)
2023	Natural Sciences and Engineering Research Council of Canada (NSERC) PhD Grant (\$105,000 value)
2022	UNIQUE Neuro-AI Excellence Scholarship (\$15,000 value)
2016	Class of 4T3 Engineering James Ham Award (\$10,000 value)
2015	Class of 5T6 Award of Merit (\$15,000 value)
2013	First Choice Science Award
2012	McGill Science Award and Scholarship
2012	A.J. Grant Shield and Scholarship
2012	Quebec English Public Speaking (Provincial Finals) — Bronze Medal
2012	Governor General of Canada Academic Medal
2012	Royal Bank of Canada Shield
2012	Davies Family Shield
2012	Eakeley Shield
2011	Quebec French Public Speaking (Provincial Finals) — Silver Medal

Other Activities

2026	Mila Tea Talk Organizer	Mila, Montreal, QC
	Invite and host speakers at Mila “tea talks” — the research institute’s seminar series	
2018	Instructor for ECE1780	University of Toronto, Toronto, ON
	Taught lectures for a graduate course on DNNs deployed to mobile devices under Prof. Parham Aarabi	
2015-16	Finance Chair	Electrical and Computer Engineering Club, Toronto, ON
	Elected by peers at the University of Toronto to manage the club budget and plan social activities	
2014-15	Class Representative	Electrical and Computer Engineering Club, Toronto, ON
	Elected by peers at the University of Toronto to represent student interest at faculty meetings	