# Thomas Jiralerspong


Université de Montréal
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## Education

**Université de Montréal**
PhD - Computer Science *In progress*
Supervisors: Yoshua Bengio & Doina Precup
FRQNT Master's Scholarship (40 000$) (Rank #1 among all applicants in category)
NSERC Canada Graduate Scholarship (17 500$)
Hydro-Québec Excellence Scholarship (10 000$)
Arbour Scholarship (7 500$)

**Massachusetts Institute of Technology**
Brains, Minds, and Machines Summer Course *2024*

**McGill University**
B.Sc., Honours Computer Science *2023*
Supervisors: Blake Richards & Doina Precup
GPA: 4.00/4.00
Exchange semester at the **National University of Singapore**
J.W. McConnell Major Entrance Scholarship (9 000$)

## Refereed Conferences

Ezekiel Williams*, Avery Ryoo*, **Thomas Jiralerspong***, Matt Perich, Guillaume Lajoie. "The Expressivity of Random Neural Networks with Learned Inputs." Accepted to *The Conference on Cognitive Computational Neuroscience (CCN)*. 2024.

Jean-Pierre Falet, Hae Beom Lee, Nikolay Malkin, Chen Sun, Dragos Secrieru, **Thomas Jiralerspong**, Dinghuai Zhang, Guillaume Lajoie, Yoshua Bengio. "Delta-AI: Local Objectives for Amortized Inference in Sparse Graphical Models" In *Twelfth International Conference on Learning Representations (ICLR)*. 2024.

Chen Sun, Wannan Yang, **Thomas Jiralerspong**, Dane Malenfant, Benjamin Alsbury-Nealy, Yoshua Bengio, Blake Richards. "Contrastive Retrospection: honing in on critical steps for rapid learning and generalization in RL." In *Thirty-seventh Annual Conference on Neural Information Processing Systems (NeurIPS)*. 2023.

Flemming Kondrup*, **Thomas Jiralerspong***, Elaine Lau, Nathan de Lara, Jacob Shkrob, My Duc Tran, Doina Precup, Sumana Basu. "Towards Safe Mechanical Ventilation Treatment Using Deep Offline Reinforcement Learning." In *Thirty-seventh AAAI Conference on Artificial Intelligence (AAAI)*. 2023.

* Equal Contribution

Marshall Wang, John Willes, **Thomas Jiralerspong**, Matin Moezzi. "A Comparison of Classical and Deep Reinforcement Learning Methods for HVAC Control." In *20th IEEE International Conference on Ubiquitous Intelligence and Computing (UIC)*. 2023.

## Refereed Workshops

**Thomas Jiralerspong***, Xiaoyin Chen*, Yash More, Vedant Shah, Yoshua Bengio. "Efficient Causal Graph Discovery Using Large Language Models." In *How Far Are We From AGI? Workshop at ICLR.* 2024.

**Thomas Jiralerspong***, Flemming Kondrup*, Doina Precup, Khimya Khetarpal. "Forecaster: Towards Temporally Abstract Tree-Search Planning from Pixels." In *Seventh Workshop on Generalization in Planning at NeurIPS.* 2023.

Flemming Kondrup*, **Thomas Jiralerspong***, Elaine Lau, Nathan de Lara, Jacob Shkrob, My Duc Tran, Doina Precup, Sumana Basu. "Deep Conservative Reinforcement Learning for Personalization of Mechanical Ventilation Treatment." In *The Multi-disciplinary Conference on Reinforcement Learning and Decision Making (RLDM)*. 2022.

## Under Review

Eric Elmoznino*, **Thomas Jiralerspong***, Yoshua Bengio, Guillaume Lajoie. "A Formal Theory of Compositionality" Under review at *The Thirteenth International Conference on Learning Representations (ICLR)*. 2025.

Jin Hwa Lee*, **Thomas Jiralerspong***, Lei Yu, Emily Cheng. "Geometric Signatures of Compositionality Across a Language Model's Lifetime" Under review at *The Thirteenth International Conference on Learning Representations (ICLR)*. 2025.

Ezekiel Williams, Avery Hee-Woon Ryoo*, **Thomas Jiralerspong***, Alexandre Payeur, Matthew G Perich, Luca Mazzucato, Guillaume Lajoie. "Expressivity of Neural Networks with Random Weights and Learned Biases." Under review at *The Thirteenth International Conference on Learning Representations (ICLR)*. 2025.

Marco Jiralerspong, Thomas Jiralerspong, Vedant Shah, Dhanya Sridhar, Gauthier Gidel. "General Causal Imputation via Synthetic Interventions." Under review at *The Causal Representation Learning Workshop at NeurIPS*. 2024.

## Research Experience

**Occam AI**
*LLM Research Intern* *Jun 2024 - Present*
**Project:** Automated SQL query generation for multi-agent LLMs

**Waabi**
*Deep Learning Research Intern* *Jun 2023 – Aug 2023*
*Mentored by Kelvin Wong and Chris Zhang*
**Project:** Realistic and controllable traffic simulation using a transformer based variational autoencoder

**Reasoning and Learning Lab, Mila/McGill University**
*Research Intern* *Jan 2022 – Aug 2023*
*Supervised by Prof. Doina Precup*
**Project:** Model-based reinforcement learning with affordance aware tree-search planning directly from pixels

**Learning in Neural Circuits Lab, Mila/McGill University**
*Research Intern* *Sep 2022 – Aug 2023*
*Supervised by Prof. Blake Richards*
**Project:** Contrastive learning to discover critical states for reinforcement learning in sparse reward environments

**Vector Institute for A.I.**
*Machine Learning Research Intern* *Sep 2022 – Dec 2022*
*Mentored by John Willes and Marshall Wang*
**Project:** Model-based reinforcement learning for HVAC control

**Project X, Machine Learning Research Competition**
*Co-leader of McGill's Team* *Jun 2021 – Feb 2022*
*Received the highest score out of 25 submitted papers*
**Project:** Deep offline conservative reinforcement learning for mechanical ventilation treatment

## Industry Experience

**Amazon Web Services (AWS) – S3 Team**
*Software Development Engineer Intern* *May 2022 – Jul 2022*
**Project:** JavaScript/Python tool to automate the Incremental Backup recovery system for AWS S3 (stores ∼14 trillion objects)

**Square Enix**
*Software Development Intern* *May 2021 – Aug 2021*
**Project:** Localization system to allow a MOBA game to be translated into over 10 languages

**Expedia**
*Software Development Intern* *May 2021 – Aug 2021*
**Project:** React/TypeScript tool to identify which elements of a webpage are broken and conveniently display them to developers

## Teaching

**Université de Montréal**
Teaching Assistant, Representation Learning 2023

**McGill A.I. Society**
Organizer/Teaching Assistant, Accelerated Intro to ML 2021 – 2023

**McGill University**
Teaching Assistant, Software Systems 2021 – 2022
Guest Lecturer, Theory of Machine Learning 2022

## Honors

FRQNT Master's Scholarship (40000$) (Rank #1 among all applicants in category) 2024
Arbour Scholarship (7500$) 2024
Hydro-Québec Excellence Scholarship (10000$) 2024
Chosen to attend the 10th Heidelberg Laureate Forum 2023

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| | NSERC Canada Graduate Scholarship (17500$) | 2023 |
| | University of Montreal Master's Scholarship (5000$) | 2023 |
| | McGill Mobility Bursary for Exchanges (6000$) | 2022 |
| | Winner of UofT AI's Project X competition (25000$) | 2022 |
| | J.W. McConnell Major Entrance Scholarship (9000$) | 2020 – 2022 |
| | CIBPA Foundation Bursary (1000$, 2500$, 1000$) | 2021, 2022, 2023 |
| | Marianopolis College Valedictorian | 2020 |
| | Governor General of Canada's Academic Medal | 2020 |

## Invited Talks

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| Canadian Undergraduate Conference on AI (CUCAI) | 2022 |
| University of Toronto AI Conference | 2022 |
| McGill AI Society Learnathon | 2022 |

## Professional Activities

**Mila**

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| Chairman of Lab Representatives | 2023 – Present |
| Chairman of Social Committee | 2023 – Present |
| Executive Member of Recruitment Committee | 2023 – Present |

**McGill AI Society**

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| Senior Advisor | 2023 – Present |
| Technical Project Manager | 2021 – 2023 |

**Montreal AI & Neuroscience Conference**

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| Organizer – Introduction to deep learning with PyTorch workshop | 2022 |

**McGill NeuroTech**

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| Machine Learning Developer | 2021 – 2022 |

**McGill Robotics**

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| Software Developer | 2020 – 2021 |

## Languages

**Native:** English, French
**Advanced:** Italian, Spanish
**Beginner:** Mandarin, Japanese

## Skills

**Programming Languages:** Python, Java, JavaScript, R, C, C++, C#, OCaml, SQL, HTML, CSS

**Machine Learning Libraries:** PyTorch, TensorFlow, Keras, Pandas, NumPy, Matplotlib

**Other:** LaTeX, Slurm, Jupyter Notebooks, Perforce, GitHub, Jira, Unity

## Press

**SciLogs**. Nina Beier. Jan 24, 2024. What Do Food and Research Have in Common? More Than You Might Think.

**The McGill Tribune**. Mikaela Shadick. March 15, 2022. Six McGill undergrads win UofT international artificial intelligence competition.

**McGill Reporter**. Richard Deschamps. March 1, 2022. Undergrad team uses machine learning to create a better hospital ventilator.

## Advanced Coursework

**Université de Montréal**
Representation Learning
Reinforcement Learning & Optimal Control
Scaling Laws
Causal Inference & Machine Learning
Probabilistic Graphical Models

**McGill University**
Reinforcement Learning
Brain Inspired Artificial Intelligence
Honours Math for Machine Learning
Probabilistic Programming
Network Science

**National University of Singapore**
Quantum Computing
Information Theory