

# MANDANA SAMIEI

PhD student at Mila & McGill University

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## RESEARCH FOCUS

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My research focuses on how language agents form abstractions, reason, and adapt continually. I aim to develop **agentic systems capable of scientific exploration**, robust to mode collapse and shallow chain-of-thought, with the goal of achieving **structured and systematic reasoning**.

## EDUCATION

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<b>Ph.D. – Mila Institute &amp; McGill University</b> <i>Advised by Prof. Blake A. Richards &amp; Prof. Doina Precup</i>	Montreal, Canada 2020 – Present
<b>M.Sc. – Concordia University</b> <i>Advised by Prof. Thomas Fevens</i>	Montreal, Canada 2017 – 2019
Thesis: Meta-Learning for Cancer Phenotype Prediction from Gene Expression Data <a href="#">[pdf]</a>	
<b>B.Sc. – Shahid Beheshti University</b> <i>Advised by Prof. Mona Ghassemin</i>	Tehran, Iran 2012 – 2016

## SELECTED RESEARCH PUBLICATIONS

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Presenters are shown in underline. Equal contribution is shown in \*.

1. **Language Agents Mirror Human Causal Reasoning Biases. How Can We Help Them Think Like Scientists?** Anthony GX Chen, Dongyan Lin\*, Mandana Samiei\*, Doina Precup, Blake A. Richards, Rob Fergus, Kenneth Marino.  
Second conference on Language Modeling (COLM), 2025. [\[pdf\]](#)
2. **The Role of Schemas in Reinforcement Learning: Implications for Generalization.** Mandana Samiei, Doina Precup, Blake A. Richards. Conference on Reinforcement Learning and Decision Making (RLDM), 2025. [\[pdf\]](#)
3. **The Schema Spectrum: Explicit, Implicit, and Emergent Structures in AI and the Brain.** Mandana Samiei, Doina Precup, Blake A. Richards. Under review at Neuron, 2025. [\[pdf\]](#)
4. **AIF-GEN: Open-Source Platform and Synthetic Dataset Suite for Reinforcement Learning on Large Language Models.** Jacob Chmura\*, Shahrad Mohammadzadeh\*, Ivan Anokhin, Jacob-Junqi Tian, Mandana Samiei, Taz Scott-Talib, Irina Rish, Doina Precup, Reihaneh Rabbany, Nishanth Anand.  
Championing Open-Source Development in ML Workshop @ ICML, 2025. [\[OpenReview\]](#)
5. **Learning Schemas in Reinforcement Learning: bottleneck structure discovery.** Mandana Samiei, Doina Precup, Blake A. Richards.  
Under submission at Nature Communications, 2025.
6. **A conceptual analysis of continual learning objectives.** Giulia Lanzillotta, Mandana Samiei, Claire Vernade, Razvan Pascanu.  
Manuscript under submission to TMLR, 2025.
7. **Testing Causal Hypotheses through Hierarchical Reinforcement Learning.** Anthony GX Chen\*, Dongyan Lin\*, Mandana Samiei\*.  
Intrinsically-Motivated and Open-Ended Learning (IMOL) Workshop @ NeurIPS, 2024. [\[OpenReview\]](#)
8. **Mimicking Mammalian Navigation in Watermaze using Brain-Inspired Representations** Mandana Samiei\*, Arna Ghosh\*, Blake A. Richards Biological and Artificial Reinforcement Learning (BARL) Workshop at NeurIPS 2020. [\[Poster\]](#)

9. Tristan Deleu, Tobias Würfl, **Mandana Samiei**, Joseph Paul Cohen, Yoshua Bengio. *Torchmeta: A Meta-Learning Library for PyTorch*. PyTorch Developer Conference (PTDC), 2019. [arXiv]

## SELECTED INVITED TALKS AND TUTORIALS

<b>The Role of Schemas in Reinforcement Learning</b> <i>Princeton Reinforcement Learning Lab</i>	Oct. 2025 <i>Remote</i>
– Invited research talk discussing schema representations in reinforcement learning and their implications for generalization.	
<b>Large Language Models – Tutorial</b> [GitHub] <i>Mediterranean Machine Learning Summer School (M2L)</i>	Sept. 2025 <i>Split, Croatia</i>
– Delivered a tutorial on the foundations and emerging research directions of large language models.	
<b>Towards Efficient Generalization in Continual RL using Episodic Memory</b> <i>Microsoft Research Summit 2021</i>	Oct. 2021 <i>Remote</i>
– Invited talk on memory-augmented RL agents and their generalization efficiency, based on a collaboration work with Microsoft Research.	
<b>RL for Games – Tutorial</b> [Notebook] <i>Neuromatch Academy 2021</i>	Jul. 2021 <i>Remote</i>
– Created an interactive tutorial on reinforcement learning for games, part of the Neuromatch Academy.	

## AWARDS AND RECOGNITION

Fonds de Recherche du Québec – Nature et Technologies (FRQNT) Doctoral Award	2022-2024
Women in AI Excellence Doctoral Scholarship, Mila	2021
UNIQUE (Unifying Neuroscience & AI) PhD Excellence Scholarship	2020
MITACS Accelerate Research Award	2019
National Merit Scholarship (top 0.2%)	2012

## SELECTED TEACHING & MENTORSHIP

<b>Tutor</b> — Large Language Models, Mediterranean ML Summer School (M2L)	2025
<b>Tutor</b> — Introduction to ML, Eastern European Summer School (EEML)	2024
<b>TA</b> — Reinforcement Learning (COMP 579), McGill University	2022
<b>TA</b> — Intro to Robotics & Intelligent Systems (COMP 417), McGill University	2020
<b>TA</b> — Fundamentals of Machine Learning (IFT 6390), University of Montreal	2020

## SERVICE & LEADERSHIP

<b>EDI Chair and Local Chair</b> — Conference on Lifelong Learning Agents (CoLLAs)	2025, 2024
<b>Board Member</b> — Women in Machine Learning (WiML)	2022–Present
<b>Reviewer</b> — ICLR, NeurIPS, TMLR, CoLLAs, RLC, COLM	2022–2025
<b>Organizer</b> — ML Reproducibility Challenge (MLRC 2023)	2023
<b>Organizer</b> — Mila Neuro-AI Reading Group	2020-2023

## SKILLS

**Programming Languages, Libraries, & APIs:** Python, Jax, Java, MATLAB, Javascript/CSS/HTML, Bash, Numpy, SciPy, Pandas, Jupyter, Git, SQL, Scikit-learn, TensorFlow, Slurm  
**Foundational Models, Fine-tuning and Inference:** HuggingFace, vLLM, verl, Olama, OpenAI API  
**Spoken & Written:** English (Fluent), Persian (native), French (Fluent), German (B1)

## REFERENCES

Prof. Doina Precup – McGill University, Mila, Google DeepMind	<a href="mailto:dprecup@cs.mcgill.ca">dprecup@cs.mcgill.ca</a>
Prof. Blake A. Richards – McGill University, Mila, Google Research	<a href="mailto:blake.richards@mila.quebec">blake.richards@mila.quebec</a>
Prof. Thomas Fevens – Concordia University	<a href="mailto:fevens@cs.concordia.ca">fevens@cs.concordia.ca</a>
Prof. Mona Ghassemian - King's College London, Huawei	<a href="mailto:mona.ghassemian@kcl.ac.uk">mona.ghassemian@kcl.ac.uk</a>