

Sébastien Lachapelle

Curriculum Vitae

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Education

2024 **Ph.D. in Computer Science**, *Université de Montréal*, QC, CA

Département d'informatique et de recherche opérationnelle

Specialization: Artificial Intelligence at Mila, Quebec Artificial Intelligence Institute

Dissertation title: Identifying Latent Structures in Data

Committee: [Yoshua Bengio](#) (President), [Simon Lacoste-Julien](#) (Ph.D. Advisor), [Dhanya Sridhar](#) (Member) and [Aapo Hyvärinen](#) (External examiner)

Dissertation rated **exceptional** and deemed worthy of the **Rector's honor list**.

Recipient of the Université de Montréal's 2024–2025 **Best Thesis Award** in the Natural Sciences and Engineering category ([link to video highlighting the award for the general public, in French](#)).

[Link to Ph.D. dissertation](#)

[Link to Ph.D. defense recording](#)

2014–2017 **B.Sc. in Mathematics and Economics**, *Université de Montréal*, QC, CA

GPA: 4.27/4.3

Research Experience

Since 2023 **Research Scientist**, *Samsung AI Lab*, Montreal

- Academic-style research lab where members
 - collaborate with Samsung researchers in South Korea to define and lead projects for the semiconductor division, e.g., label-efficient imitation learning for robotics; and
 - carry out their own independent research agenda to publish in open venues.
- Academic collaborations with researchers from, e.g., the University of Amsterdam, the Max Planck Institute for Intelligent Systems in Germany, the University of Copenhagen, ETH Zürich and the Université de Montréal on topics such as
 - Interpretability and steering in language models [3, 16]
 - Extrapolation and compositionality in object-centric learning [4]
 - Sparse representation learning [5]
 - Multi-view representation learning [6]

2017–2024 **M.Sc./Ph.D. Student**, *Mila - Quebec Artificial Intelligence Institute*, Montreal
(Fast-tracked from M.Sc., under [Emma Frejinger](#) & [Yoshua Bengio](#), to Ph.D. in 2018)

- Identifiability of deep generative models [9, 18, 1, 7] and multi-task learning [8]
- Identifiability in causal representation learning [9, 18, 1]
- Collaboration with climate scientists to apply causal representation learning [17]
- Extrapolation & compositional generalization [7]
- Learning causal graphs via continuous constrained optimization [13, 12, 10]
- Identifiability of causal graphs [12]
- Worked at the intersection of Operations Research and Machine Learning [2]

2019 **Research Intern**, *Element AI (acquired by ServiceNow)*, Montreal

- Learning flexible causal models with interventions and neural autoregressive flows [12]

2016 **Intern**, *DAMÉCO*, Montreal

- Estimation of a demand system for Quebec consumers

Teaching & Mentoring Experience

2025 **Internship Supervisor**, *Samsung AI Lab*, Montreal

Supervising the internship of Sacha Morin on imitation learning

2021 & 2022 **Teaching Assistant**, *Université de Montréal*

Probabilistic Graphical Models - IFT6269 - [A21](#) & [A22](#)

Graduate class taught by Prof. Simon Lacoste-Julien

- 2021 **Teaching Assistant**, *Université de Montréal*
Representation Learning - IFT6135 - [H21](#) (general deep learning course)
Graduate class taught by Prof. Aaron Courville
- 2021 **Academic Supervisor for professional M.Sc. students**, *Mila*
Supervised Étienne Boucher and Guillaume Laporte during 6-month internships at Hydro-Québec.

Academic Service

- 2025 **Associate Chair for ICML 2025**
Member of the organizing committee for the *Forty-Second International Conference on Machine Learning*. Improved robustness against collusion in reviewer-submission matching.
- 2024 **Reporter for CIFAR Workshop on World Models**, *CIFAR*
Producing a report summarizing the talks and discussions of the workshop (paid work)
- 2023 **Co-organizer of the Workshop on Causal Representation Learning**
Member of the organization committee for [NeurIPS 2023 Workshop on Causal Representation Learning](#). Tasks included area chairing, deciding on contributed talks, managing schedule, finding panelists and introducing speakers.
- 2021-2022 **Grader for professional M.Sc. students internship reports**, *Mila*
Reading and evaluating final internship reports of seven Professional M.Sc. students (paid work)
- Since 2021 **Reviewer for various venues**
Including the Journal of Machine Learning Research (JMLR), the Conference on Neural Information Processing Systems (NeurIPS) and the International Conference on Learning Representations (ICLR).
- 2021 **Member of the Mila Recruitment Committee**
Evaluating applications of prospective candidates for M.Sc. and Ph.D. research programs
- 2018 **Volunteer at Montreal AI Symposium**

Programming Experience

- Extensive experience in Python, NumPy and PyTorch (7 years)
- Proficient in Git and experiment tracking with Weights and Biases
- Experience with R
- Experience with JAX
- Experience with multi-GPU computing

Honors & Awards

- 2024-2025 **Best thesis award**, *Natural Sciences and Engineering*, Université de Montréal
Awarded for the best thesis written by a student of the Université de Montréal in the *Natural Sciences and Engineering* category (one of three categories)
- 2024 **Invited participant to CIFAR workshop on World Models**, Tuebingen, Germany
Invitation-only workshop on Causality, Neuroscience and AI safety attended primarily by senior researchers including Yann LeCun, Yoshua Bengio, Aapo Hyvarinen, Bernhard Scholkopf and more
- 2022 **Best Paper Award at UAI 2022 Workshop on Causal Representation Learning**
For "Partial Disentanglement via Mechanism Sparsity" [\[18\]](#)
- 2021 **NeurIPS 2021 Outstanding Reviewer Award**
Given to top 8% of reviewers who were judged to be instrumental to the review process based on Area Chair and author feedback
- 2020-2024 **IVADO excellence scholarship for PhD**
Four years scholarship awarded to PhD students based on grades and research proposal
- 2018-2019 **Bourse d'excellence du CIRRELT – Accueil au doctorat**
Prize awarded to seven PhD students (before they completed one year and a half) based on their grades, research aptitudes and implication in CIRRELT
- 2017 **Prix d'excellence des anciens**, *Université de Montréal*
Prize awarded to the student finishing his B.Sc. in Mathematics and Economics with the highest GPA in his cohort

- 2016 **Bourse de la doyenne**, *Université de Montréal*
Excellence prize awarded to the top 13 students from the Faculté des arts et des sciences
- 2016 **Roger-Dehem award in microeconomics**, *Université de Montréal*
Excellence prize awarded to the student with the highest grades in microeconomics
- 2016 **Robert-Lacroix award in macroeconomics**, *Université de Montréal*
Excellence prize awarded to the student with the highest grades in macroeconomics

Selected Presentations

- 2024 **Max Planck Institute for Intelligent Systems – Invited talk**, Tuebingen, Germany
Nonparametric Partial Disentanglement via Mechanism Sparsity: Sparse Actions, Interventions and Sparse Temporal Dependencies
- 2024 **Valence Labs – Invited talk**, Virtual
Additive Decoders for Latent Variables Identification and Cartesian-Product Extrapolation
- 2024 **Bellairs Workshop on Causality – Invited talk**, Holetown, Barbados
A Means to an End: Identifiability for Downstream Performance
- 2023 **NeurIPS – Contributed oral**, New Orleans, USA
Additive Decoders for Latent Variables Identification and Cartesian-Product Extrapolation
- 2023 **Mila’s GFlowNet Workshop**, Montreal, Canada
Tutorial on probabilistic inference and variational methods
- 2023 **Workshop on Causal Representation Learning – Invited talk**, Tuebingen, Germany
Synergies between Disentanglement and Sparsity: Generalization and Identifiability in Multi-Task Learning
- 2022 **Workshop on Causal Representation Learning at UAI – Contributed oral**, Eindhoven, Netherlands
Partial Disentanglement via Mechanism Sparsity
- 2022 **ServiceNow Research – Invited talk**, Montreal, Canada
Disentanglement via Mechanism Sparsity Regularization: A new Principle for Nonlinear ICA
- 2020 **NeurIPS – Spotlight presentation**, Virtual
Differentiable Causal Discovery from Interventional Data
- 2020 **Element AI – Invited talk**, Montreal, Canada
Learning Causal Structures via Gradient-Based Optimization
- 2019 **Montreal AI Symposium – Contributed oral**, Montreal, Canada
Gradient-Based Neural DAG Learning
- 2018 **DIMACS – Poster**, Bethlehem, USA
Predicting solution summaries to integer linear programs under imperfect information with machine learning

Journal publications

- [1] **S. Lachapelle**, P. R. López, Y. Sharma, K. Everett, R. Le Priol, A. Lacoste, and S. Lacoste-Julien. “Nonparametric Partial Disentanglement via Mechanism Sparsity: Sparse Actions, Interventions and Sparse Temporal Dependencies”. In: *Journal of Machine Learning Research*, accepted with minor revisions (2025). URL: <https://arxiv.org/abs/2401.04890>.
- [2] E. Larsen, **S. Lachapelle**, Y. Bengio, E. Frejinger, S. Lacoste-Julien, and A. Lodi. “Predicting Tactical Solutions to Operational Planning Problems Under Imperfect Information”. In: *INFORMS Journal on Computing* (2022). URL: <https://arxiv.org/abs/1807.11876>.

Conference publications

* indicates joint first authors

- [3] E. Marconato, **S. Lachapelle**, S. Weichwald, and L. Gresele. “All or None: Identifiable Linear Properties of Next-Token Predictors in Language Modeling”. In: *Proceedings of the 28th International Conference on Artificial Intelligence and Statistics*. 2025. URL: <https://arxiv.org/abs/2410.23501>.

- [4] J. Brady, J. von Kügelgen, **S. Lachapelle**, S. Buchholz, T. Kipf, and W. Brendel. “Interaction Asymmetry: A General Principle for Learning Composable Abstractions”. In: *International Conference on Learning Representations*. 2025. URL: <https://arxiv.org/abs/2411.07784>.
- [5] D. Xu, D. Yao, **S. Lachapelle**, P. Taslakian, J. von Kügelgen, F. Locatello, and S. Magliacane. “A Sparsity Principle for Partially Observable Causal Representation Learning”. In: *Proceedings of the 41st International Conference on Machine Learning*. 2024. URL: <https://arxiv.org/abs/2403.08335>.
- [6] D. Yao, D. Xu, **S. Lachapelle**, S. Magliacane, P. Taslakian, G. Martius, J. von Kügelgen, and F. Locatello. “Multi-View Causal Representation Learning with Partial Observability”. In: *The Twelfth International Conference on Learning Representations*. **Spotlight**. 2024. URL: <https://arxiv.org/abs/2311.04056>.
- [7] **S. Lachapelle***, D. Mahajan*, I. Mitliagkas, and S. Lacoste-Julien. “Additive Decoders for Latent Variables Identification and Cartesian-Product Extrapolation”. In: *Advances in Neural Information Processing Systems*. **Oral**. 2023. URL: <https://arxiv.org/abs/2307.02598>.
- [8] **S. Lachapelle***, T. Deleu*, D. Mahajan, I. Mitliagkas, Y. Bengio, S. Lacoste-Julien, and Q. Bertrand. “Synergies between Disentanglement and Sparsity: Generalization and Identifiability in Multi-Task Learning”. In: *Proceedings of the 40th International Conference on Machine Learning*. 2023. URL: <https://arxiv.org/abs/2211.14666>.
- [9] **S. Lachapelle**, P. Rodriguez Lopez, Y. Sharma, K. E. Everett, R. Le Priol, A. Lacoste, and S. Lacoste-Julien. “Disentanglement via Mechanism Sparsity Regularization: A New Principle for Nonlinear ICA”. In: *First Conference on Causal Learning and Reasoning*. 2022. URL: <https://arxiv.org/abs/2107.10098>.
- [10] I. Ng, **S. Lachapelle**, N. R. Ke, S. Lacoste-Julien, and K. Zhang. “On the Convergence of Continuous Constrained Optimization for Structure Learning”. In: *Proceedings of The 25th International Conference on Artificial Intelligence and Statistics*. 2022. URL: <https://arxiv.org/abs/2011.11150>.
- [11] P. Brouillard, P. Taslakian, A. Lacoste, **S. Lachapelle**, and A. Drouin. “Typing assumptions improve identification in causal discovery”. In: *First Conference on Causal Learning and Reasoning*. **Oral**. 2022. URL: <https://arxiv.org/abs/2107.10703>.
- [12] P. Brouillard*, **S. Lachapelle***, A. Lacoste, S. Lacoste-Julien, and A. Drouin. “Differentiable Causal Discovery from Interventional Data”. In: *Advances in Neural Information Processing Systems*. **Spotlight**. 2020. URL: <https://arxiv.org/abs/2007.01754>.
- [13] **S. Lachapelle**, P. Brouillard, T. Deleu, and S. Lacoste-Julien. “Gradient-Based Neural DAG Learning”. In: *Proceedings of the 8th International Conference on Learning Representations*. 2020. URL: <https://arxiv.org/abs/1906.02226>.
- [14] Y. Bengio, T. Deleu, N. Rahaman, N. R. Ke, **S. Lachapelle**, O. Bilaniuk, A. Goyal, and C. Pal. “A Meta-Transfer Objective for Learning to Disentangle Causal Mechanisms”. In: *International Conference on Learning Representations*. 2020. URL: <https://arxiv.org/abs/1901.10912>.

Preprints & workshop papers

- [15] **S. Lachapelle**. “On the Identifiability of Latent Action Policies”. In: *UniReps: 3rd Edition of the Workshop on Unifying Representations in Neural Models*. 2025. URL: <https://arxiv.org/abs/2510.01337>.
- [16] S. Joshi, A. Dittadi, **S. Lachapelle**, and D. Sridhar. “Identifiable Steering via Sparse Autoencoding of Multi-Concept Shifts”. Under review. 2025. URL: <https://arxiv.org/abs/2502.12179>.
- [17] P. Brouillard, **S. Lachapelle**, J. Kaltenborn, Y. Gurwicz, D. Sridhar, A. Drouin, P. Nowack, J. Runge, and D. Rolnick. “Causal Representation Learning in Temporal Data via Single-Parent Decoding”. To be submitted. 2024. URL: <https://arxiv.org/abs/2410.07013>.
- [18] **S. Lachapelle** and S. Lacoste-Julien. “Partial Disentanglement via Mechanism Sparsity”. In: *UAI 2022 Workshop on Causal Representation Learning*. **Best paper award**. 2022. URL: <https://arxiv.org/abs/2207.07732>.