

Geoffrey Roeder

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EDUCATION

Princeton University, Laboratory for Intelligent Probabilistic Systems *In progress*
Ph.D., Computer Science
Advisor: Dr. Ryan Adams

Vector Institute for Artificial Intelligence 2018
University of Toronto, Machine Learning Group
M.Sc., Computer Science
Advisor: Dr. David Duvenaud

University of British Columbia 2016
B.Sc., Statistics, Computer Science
Advisor: Dr. Mark Schmidt
A+ GPA overall, graduated with first-class honours

EXPERIENCE

X, the Moonshot Factory (Formerly Google X; Mountain View, CA)
Quantum & AI Resident Oct. 2019 – May 2020
Extending deep learning methodologies to automating engineering design, improving materials science, learning to compute with non-traditional computational substrates

Google Research (San Francisco, CA)
Research Intern, Google Brain Group Jun–Sep 2019
Mentor: Diederik Kingma
Extended statistical identifiability to large family of deep classifier models in (1) [On Linear Identifiability of Learned Representations](#) (paper, in submission); (2) On the Identifiability of Representations in Supervised and Self-Supervised Learning (at [DeepMath 2019](#)).

Microsoft Research (Cambridge, UK)
Research Intern, Machine Intelligence and Perception Jun–Aug 2018
Mentors: Edward Meeds, Neil Dalchau
Extended conditional variational autoencoder framework to solve nonlinear dynamical systems. Publications: [ICML 2019](#), [Microsoft Research blog post](#).

Twitter (London, UK)
Research Intern, Machine Learning and Computer Vision Sept–Dec 2017
Mentor: Ferenc Huszár
Studied optimization methodologies for black-box function approximation, used for image compression in Twitter platform backend

HONORS AND AWARDS

NSERC Post-Graduate Scholarship (PGS-D): \$66,000	2018
American Statistical Association's Project Competition: <i>Honorable Mention</i>	2016
NSERC Undergrad Student Research Award: \$4500	2016
Joseph-Armand Bombardier Canada Graduate Scholarship (CGS-M): \$17,500	2010

INVITED TALKS

On Linear Identifiability of Learned Representations. *Yale Department of Mathematics*. Yale University, New Haven, CT. (March 2020).

Better Inference through Lower-Variance Stochastic Gradients. *Machine Learning Group*, University of British Columbia, Vancouver, Canada (Apr 2018).

Generative Models for Automated Design. *Vector Institute for Artificial Intelligence: Endless Summer School*. Toronto, Canada (Apr 2018).

Neural Evolution Strategies: Non-Linear Gradient Approximation for Black-Box Optimization. *Google Brain*. Toronto, Canada (Mar 2018).

Automating Design through Probabilistic Generative Models. *Humans+AI = Future of Design+Make*. MaRS. Autodesk. Toronto, Canada (Mar 2018).

Optimizing Control Variates for Black-Box Gradient Estimation. *Machine Learning Group*, University of Cambridge, Cambridge, UK (Dec 2017).

SELECTED PUBLICATIONS

Roeder, Geoffrey, Luke Metz, Diederik P. Kingma. [On Linear Identifiability of Learned Representations](#). (2020). *In submission*.

Alex Beatson, Jordan T. Ash, **Geoffrey Roeder**, Tianju Xue, Ryan P. Adams. (2020). [Learning Composable Energy Surrogates for PDE Order Reduction](#). *In submission*.

Tianju Xue, Alex Beatson, Maurizio Chiaramonte, **Geoffrey Roeder**, Jordan T. Ash, Yigit Menguc, Sigrid Adriaenssens, Ryan P. Adams and Sheng Mao. (2020). [A Data-Driven Computational Scheme for the Nonlinear Mechanical Properties of Cellular Mechanical Meta-Materials under Large Deformation](#). *Soft Matter*.

Brady, Jack, and **Geoffrey Roeder**. (2020). [iSprites: A Dataset for Identifiable Multi-Object Representation Learning](#). Object-Oriented Learning (OOL): Perception, Representation, and Reasoning Workshop at *International Conference on Machine Learning*.

Roeder, Geoffrey, Paul K. Grant, Andrew Phillips, Neil Dalchau, and Edward Meeds. (2019). [Efficient Amortised Bayesian Inference for Hierarchical and Nonlinear Dynamical Systems](#). *International Conference on Machine Learning (Short Oral)*.

Geoffrey Roeder, Nathan Killoran (co-first author), Will Grathwohl, David Duvenaud. [Design Motifs for Probabilistic Generative Design](#). *Submitted to ICLR 2018 Workshop Track*.

Grathwohl, Will, Dami Choi, Yuhuai Wu, **Geoffrey Roeder**, and David Duvenaud. (2018). [Backpropagation through the Void: Optimizing control variates for black-box gradient estimation](#). *International Conference on Learning Representations, 2018*, and *Deep Reinforcement Learning Symposium (Oral Presentation)*. *Neural Information Processing Systems, 2017*.

Roeder, Geoffrey, Yuhuai Wu, and David Duvenaud. (2017). [Sticking the Landing: Simple, Lower-Variance Gradient Estimators for Variational Inference](#). *Neural Information Processing Systems, 2017*.

Roeder, Geoffrey, Yuhuai Wu, and David Duvenaud. (2016). [Sticking the Landing: A Simple Reduced-Variance Gradient Estimator for Automatic Differentiation Variational Inference](#). *Advances in Approximate Bayesian Inference Workshop*. NeurIPS, 2016..

Roeder, Geoffrey, X. She, M. Schmidt et al. (2016). [MatLearn: Fundamental Machine Learning Algorithms in Matlab](#). *Matlab Software package*.

REVIEWING

Journal of Machine Learning Research (JMLR): 2020

Neural Information Processing Systems (NeurIPS): 2017, 2018, 2019, 2020

International Conference on Machine Learning (ICML): 2017, 2020

Artificial Intelligence and Statistics (AISTATS): 2019

International Conference on Learning Representations (ICLR): 2017, 2018, 2019

Symposium on Advances in Approximate Bayesian Inference (AABI): 2016, 2017