

Andrew Kyle Lampinen

Address

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Contact Information

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Education

Ph.D. Psychology, Stanford University, Fall 2015-Present

- Advisor: James L. McClelland.
- Area: Cognitive.
- Center for Mind, Brain, Computation, and Technology Trainee (Co-Mentor: Surya Ganguli).
- Minor in Computer Science.

B.A. Mathematics, Physics, UC Berkeley, May 2014

- Highest honors in mathematics, high distinction in general scholarship.
- GPA: 4.0 Math, 3.9 Physics, 3.9 cumulative.
- Study Abroad Internship, A*STAR IHPC Singapore, Summer 2012. (See Research Experience.)

Honors

Ric Weiland Graduate Fellowship in the Humanities and Sciences, Fall 2018-Present
National Science Foundation Graduate Research Fellowship, 2015-2018
Percy Lionel Davis Award for Excellence in Scholarship in Mathematics, May 2014
Berkeley Physics Olsen Scholar 2013-2014
Berkeley Letters & Science Dean's List 2012-2014
Berkeley Physics Undergraduate Research Scholar, Spring & Fall 2012

Research Experience

PhD Candidate, Stanford University Department of Psychology, August 2015 - Present

- Empirical and theoretical investigations of generalization, transfer, and abstraction in deep learning models.
- Research on reducing the quantity of data required to train a deep learning system, including transfer, memory, and curriculum learning.
- Research on zero-shot performance of new tasks by transforming task representations.
- Experiments to investigate the effects of presentations of concepts on learning of related concepts in mathematical cognition.

PhD Intern, DeepMind, May 2019 - September 2019

- Explored automated curriculum generation for goal-conditioned reinforcement learning.
- Explored generalization in reinforcement learning.

PhD Software Engineering Intern, Google Brain, June 2017 - September 2017

- Designed and developed a system for using low-quality data from human interactions to improve an adversarially trained image generative model.
- Contributed gradients to TensorFlow image resizing ops.

Associate Professional Staff I, Johns Hopkins University Applied Physics Laboratory, June 2014 - July 2015

- Worked on image classification using convolutional neural networks.
- Developed models and simulations of sensor systems, shipping and transportation, and autoimmune diseases.
- Devised metrics for assessing sensors.
- Worked on methods for identifying malicious software based on its behavior.

Student Research Associate, Lawrence Berkeley National Laboratories, January - May 2012 & August - December 2012

- Developed simulations of processes in nuclear physics.
- Engineered software and hardware for efficiently collecting & analyzing data.

Summer Research Intern, A*STAR Institute of High Performance Computing, Singapore, June - August 2012

- Wrote and adapted simulations of crystallization processes in super-cooled metals.
- Developed software for analyzing and visualizing the structure of crystals.

Research Assistant, UC Davis Plant Sciences, June - August 2011

- Developed procedures and software for testing the physical attributes of fruit.

Publications

Andrew K. Lampinen and James L. McClelland, (2019), “Zero-shot task adaptation by homoiconic meta-mapping”, *Learning Transferable Skills Workshop, NeurIPS*

James L. McClelland, Bruce L. McNaughton, and **Andrew K. Lampinen** (under review), “Integration of new information in memory: new insights from a complementary learning systems perspective”

Andrew K. Lampinen and Surya Ganguli, (2019), “An analytic theory of generalization dynamics and transfer learning in deep linear networks”, *Proceedings of the 7th International Conference on Learning Representations*

Andrew K. Lampinen and James L. McClelland, (2018), “Different presentations of a mathematical concept can support learning in complementary ways”, *Journal of Educational Psychology*

Robert X. D. Hawkins, Eric N. Smith, Carolyn Au, Juan Miguel Arias, Rhia Catapano, Eric Hermann, Martin Keil, **Andrew Lampinen**, Sarah Raposo, Jesse Reynolds, Shima Salehi, Justin Salloum, Jed Tan, and Michael C. Frank, (2018), “Improving the replicability of Psychological Science through pedagogy”, *Advances in Methods and Practices in Psychological Science*

Steven S. Hansen, **Andrew K. Lampinen**, Gaurav Suri, and James L. McClelland, (2017), “Building on prior knowledge without building it in”, *Behavioral & Brain Sciences*

Andrew K. Lampinen, Shaw Hsu, and James L. McClelland, (2017), “Analogies emerge from learning dynamics in neural networks”, *Proceedings of the 39th Annual Meeting of the Cognitive Science Society*

Preprints

Felix Hill, **Andrew K. Lampinen**, Rosalia Schneider, Stephen Clark, Matthew Botvinick, James L. McClelland, and Adam Santoro (2019), “Emergent systematic generalization in a situated agent”, *arXiv*

Sébastien Racanière*, **Andrew K. Lampinen***, Adam Santoro, David P. Reichert, Vlad Firoiu, and Timothy P. Lillicrap, (2019), “Automated curricula through setter-solver interactions”, *arXiv*, (*equal contribution)

Andrew K. Lampinen and James L. McClelland, (2017), “One-shot and few-shot learning of word embeddings”, *arXiv*

Andrew K. Lampinen, David So, Douglas Eck, and Fred Bertsch, (2017), “Improving image generative models with human interactions”, *arXiv*

Invited Talks

“Multi-task learning, transfer, and abstraction”, *Parallel Distributed Processing and the Emergence of an Understanding of Mind*, Princeton University, September 29th, 2018

“The Jabberwocky: One-shot and few-shot learning of word embeddings”, *Meaning in Context Workshop*, Center for the Study of Language and Information, Stanford University, September 12th, 2017

Presentations	<hr/> <p>“An analytic theory of generalization dynamics and transfer learning in deep linear networks”, Natural / Artificial Intelligence, Stanford Neurosciences Institute, October 2018</p> <p>“An analytic theory of generalization dynamics and transfer learning in deep linear networks”, Parallel Distributed Processing and the Emergence of an Understanding of Mind, Princeton University, September 2018</p> <p>“Analogies emerge from learning dynamics in neural networks”, 39th Annual Meeting of the Cognitive Science Society, July 2017</p> <p>“Fast and sparse learning with compositional concept training”, 15th Neural Computation and Psychology Workshop, August 2016</p> <p>“Cherenkov Radiation Based False Positive Detection for Rare Decays”, Berkeley Undergraduate Physics Spring Poster Session, May 2012</p> <hr/>
Teaching Experience	<p>Teaching Assistant, Stanford University Department of Psychology, 6 course between Fall 2016 and Winter 2019</p> <ul style="list-style-type: none"> • Planned and taught discussion sections for undergraduate statistics & memory courses and graduate statistics & research methods courses. • Gave lectures on reinforcement learning and wrote and graded homeworks for graduate course on Neural Network Models of Cognition. • Held office hours. <p>Undergraduate Student Instructor, UC Berkeley Mathematics, Spring, Fall 2013, & Spring 2014</p> <ul style="list-style-type: none"> • Planned and taught discussion sections. • Held office hours. • Wrote and graded quizzes and midterms. <p>Teaching Assistant, UC Berkeley Early Academic Outreach Program, June-July 2013</p> <ul style="list-style-type: none"> • Held office hours. • Substitute taught classes. <hr/>
Other Work Experience	<p>Statistics Consultant, Stanford University Department of Psychology, 2016-2017, 2019-2020</p> <ul style="list-style-type: none"> • Advised graduate students on technical aspects of data collection, analysis, and modeling. <hr/>
Service	<p>Reviewer:</p> <ul style="list-style-type: none"> • Journal of Educational Psychology. • Cognitive Science Society, 2019. • Conference on the Mathematical Theory of Deep Neural Networks (DeepMath), 2019 <hr/>
Technical Skills	<p>Computer science: Experienced with both theory and practice.</p> <ul style="list-style-type: none"> • Graduate coursework in machine learning, neural networks, and probabilistic models & algorithms. • Experienced user of Python, R, C++, C, JavaScript, Matlab, some knowledge of Mathematica, Macaulay2, Haskell. • Used many common libraries for these languages, e.g. numpy, scipy, tidy, dplyr, jquery, matplotlib, Matlab Computer Vision Toolbox, FFTW. • Used many machine learning libraries, including TensorFlow, Torch, scikit-learn, and Caffe. • Experienced with *NIX operating systems. <p>Mathematics: Knowledge across many domains, with applications.</p>

- Algebraic geometry, group theory, category theory, topology, etc.
- Practical applications to machine learning, computer vision, neural coding, etc.

Statistics: Significant experience with standard data analysis techniques.

- Linear modeling, hierarchical modeling, etc.
- Fitting algorithms & goodness-of-fit tests.

Physics: Experienced in a wide variety of applied and experimental contexts.

- Statistical mechanics, biophysics, analytic mechanics, etc.
- Experimentation ranging from NMR to quantum entanglement.

Modeling & Simulation: Developed models and simulations of various phenomena.

- Developed both from published methods and directly from physical principles.

Other Activities

Carillon: Carillonneur member of the Guild of Carilloneurs in North America (www.gcna.org).

Rock climbing: Bouldering, sport, and trad. Routesetter at Stanford Climbing Wall, set problems for Collegiate Climbing Series events.