# Andrew Kyle Lampinen

**Address**
Department of Psychology
Stanford University
450 Serra Mall
Stanford, CA 94305

**Contact Information**
lampinen@stanford.edu
web.stanford.edu/~lampinen

**Education**

**Ph.D. Psychology,** Stanford University, Fall 2015-Present
- Advisor: James L. McClelland.
- Area: Cognitive.
- Center for Mind, Brain, and Computation 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.)

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**Honors**

National Science Foundation Graduate Research Fellowship, Fall 2015-Present
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

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**Research Experience**

**PhD Candidate,** Stanford University Department of Psychology, August 2015 - Present
- Empirical and theoretical investigations of the effects of multiple tasks in deep learning.
- Research on a variety of approaches for reducing the quantity of data required to train a deep learning system.
- Research on curriculum learning in neural networks.
- Experiments to investigate the effects of presentations of concepts on learning of related concepts in mathematical cognition.

**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 classifying software as malicious based on features of its performance.

**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.

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**Publications**

**Andrew K. Lampinen**, James L. McClelland, and Surya Ganguli, (under review), "An analytic theory of generalization dynamics and transfer learning in deep linear networks", *under review at ICLR 2019*

**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 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*

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**Preprints**

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

**Andrew Kyle Lampinen**, David So, Douglas Eck, and Fred Bertsch, (2017), "Improving image generative models with human interactions", *arXiv*

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**Invited Talks**

"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

"Multi-task learning, transfer, and abstraction", *Parallel Distributed Processing and the Emergence of an Understanding of Mind*, Princeton University, September 29th 2017

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**Presentations**

"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

"An analytic theory of generalization dynamics and transfer learning in deep linear networks", Natural / Artificial Intelligence, Stanford Neurosciences Institute, October 2018

"Analogies emerge from learning dynamics in neural networks", 39th Annual Meeting of the Cognitive Science Society, July 2017

"Fast and sparse learning with compositional concept training", 15th Neural Computation and Psychology Workshop, August 2016

"Cherenkov Radiation Based False Positive Detection for Rare Decays", Berkeley Undergraduate Physics Spring Poster Session, May 2012

**Teaching Experience**

**Teaching Assistant,** Stanford University Department of Psychology, Fall 2016, Winter 2017 & Winter 2018

- Planned and taught discussion sections for undergraduate introdution to statistics course and graduate research statistics course.
- Gave lectures on reinforcement learning and wrote and graded homeworks for graduate course on Neural Network Models of Cognition.
- Held office hours.

**Undergraduate Student Instructor,** UC Berkeley Mathematics, Spring, Fall 2013, & Spring 2014

- Planned and taught discussion sections.
- Held office hours.
- Wrote and graded quizzes and midterms.

**Teaching Assistant,** UC Berkeley Early Academic Outreach Program, June-July 2013

- Held office hours.
- Substitute taught classes.

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**Other Work Experience**

**Statistics Consultant,** Stanford University Department of Psychology, Fall 2016-Spring 2017

- Advised graduate students on technical aspects of data collection and data analysis.

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**Technical Skills**

**Computer science:** Experienced with both theory and practice.

- 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, tidyr, dplyr, jquery, matplotlib, Matlab Computer Vision Toolbox, FFTW.
- Used many machine learning libraries, including TensorFlow, Torch, scikit-learn, Matlab Machine Learning Toolbox, and Caffe.
- Experienced with *NIX operating systems.

**Mathematics:** Knowledge across many domains, with applications.

- Algebraic geometry, group theory, category theory, 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 for a variety of phenomena

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

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**Other Activities**

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

**Rock climbing:** Bouldering, top rope, sport, and trad.