

Christopher G. Lucas

PERSONAL INFORMATION

Address: 3.31 Informatics Forum
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EMPLOYMENT

2013–present University of Edinburgh
Chancellor’s Fellow
School of Informatics

2010–2013 Carnegie Mellon University
Postdoctoral Researcher
Department of Psychology

EDUCATION

Ph.D. in Psychology, University of California, Berkeley, 2010
Dissertation title: *Acquired abstract knowledge in causal induction: a hierarchical Bayesian approach*
Dissertation advisors: Thomas Griffiths and Alison Gopnik

M.Eng. in Computer Science, Massachusetts Institute of Technology, 2004

S.B. in Computer Science, Massachusetts Institute of Technology, 2003

RESEARCH INTERESTS

Computational models and empirical studies of inductive learning, with emphasis on causal inference; cognitive development; transfer learning and generalization; conceptual and representational change.

PEER-REVIEWED ARTICLES AND CONFERENCE PAPERS

Jern, A., **Lucas, C. G.**, Kemp, C. (accepted). People learn other people’s preferences through inverse decision-making. *Cognition*.

Gopnik, A., O’Grady, S., **Lucas, C. G.**, Griffiths, T., Wente, A., Bridgers, S., Aboody, R., Fung, H., Dahl, R. (accepted). Life History and Learning: Changes in cognitive flexibility and hypothesis search from childhood to adolescence to adulthood. *Proceedings of the National Academy of Science*.

Herbst, E., **Lucas, C. G.**, Buchsbaum, D. (accepted). Investigating the Explore/Exploit Trade-off in Adult Causal Inferences. *CogSci* 2017.

Wilson, A. G., Dann, C., **Lucas, C. G.**, & Xing, E. P. (2015). The human kernel. *Advances in Neural Information Processing Systems* 28: 2836-2844.

- Hu, J., **Lucas, C. G.**, Griffiths, T., Xu, F. (2015). Preschoolers' understanding of graded preferences. *Cognitive Development*, 36: 93–102.
- Lucas, C. G.**, Kemp, C. (2015) An improved probabilistic account of counterfactual reasoning. *Psychological Review*, 4 (122): 700–734.
- Doan, T., Denison, S., **Lucas, C. G.**, & Gopnik, A. (2015). Learning to reason about desires: An infant training study. In D.C. Noelle, R. Dale, A.S. Warlaumont, J. Yoshimi, T. Matlock, C.D. Jennings, & P.P. Maglio (Eds.), *Proceedings of the 37th Annual Conference of the Cognitive Science Society*. Austin, TX: Cognitive Science Society (pp. 578-583). (Marr prize for best student paper.)
- Lucas, C. G.**, Griffiths, T. L., Williams, J. J., & Kalish, M. L. (2015). A rational model of function learning. *Psychonomic Bulletin and Review*, 22 (5): pp. 1193–1215.
- Gopnik, A., Griffiths, T. L., **Lucas, C. G.** (2015). When younger learners can be better (or at least more open-minded) than older ones. *Current Directions in Psychological Science* 24(2): 87–92.
- Lucas, C. G.**, Holstein, K., Kemp, C. (2014). Discovering hidden causes using statistical evidence. In P. Bello, M. Guarini, M. McShane, & B. Scassellati (Eds.), *Proceedings of the 36th Annual Conference of the Cognitive Science Society* (pp. 892–897). Austin, TX: Cognitive Science Society.
- Lucas, C. G.**, Bridgers, S. B., Griffiths, T. L., Gopnik, A. (2014). When children are better (or at least more open-minded) learners than adults: Developmental differences in learning the forms of causal relationships. *Cognition*, 131 (2): pp. 284-299
- Lucas, C. G.**, Griffiths, T. L., Xu, F., Fawcett, C., Gopnik, A., Kushnir, T., Hu, J., & Markson, L. (2014). The child as econometrician: A rational model of preference understanding in children. *PLOS ONE*.
- Lucas, C. G.**, Sterling, D. J., Kemp, C. (2012). Superspace extrapolation reveals inductive biases in function learning. In N. Miyake, D. Peebles, & R. P. Cooper (Eds.), *Proceedings of the 34th Annual Conference of the Cognitive Science Society* (pp. 713–718). Austin, TX: Cognitive Science Society.
- Lucas, C. G.**, Kemp, C. (2012). A unified theory of counterfactual reasoning. In N. Miyake, D. Peebles, & R. P. Cooper (Eds.), *Proceedings of the 34th Annual Conference of the Cognitive Science Society* (pp. 707–712). Austin, TX: Cognitive Science Society.
- Bes, B., Sloman, S., **Lucas, C. G.**, & Raufaste, E. (2012). Non-Bayesian Inference: Causal Structure Trumps Correlation. *Cognitive Science*, 36: 1178–1203
- Jern, A., **Lucas, C. G.**, Kemp, C. (2011). Evaluating the inverse decision-making approach to preference learning. In J. Shawe-Taylor, R. Zemel, P. Bartlett, F. Pereira, & K. Weinberger (Eds.), *Advances in Neural Information Processing Systems 24* (pp. 2276–2284).
- Waisman, A. S., **Lucas, C. G.**, Griffiths, T. L. & Jacobs, L.F. (2011). A Bayesian model of navigation in squirrels. In L. Carlson, C. Hölscher, & T. Shipley (Eds.), *Proceedings of the 33rd Annual Conference of the Cognitive Science Society* (pp. 1274–1279). Austin, TX: Cognitive Science Society.
- Kushnir, T., Gopnik, A., **Lucas, C. G.**, & Schulz, L. E. (2010). Inferring hidden causal structure. *Cognitive Science*, 34: 148–160
(This was one of the five most frequently downloaded articles in *Cognitive Science* in 2010.)

Lucas, C. G., & Griffiths, T. L. (2010). Learning the form of causal relationships using hierarchical Bayesian models. *Cognitive Science*, 34: 113–147

(This was one of the five most frequently downloaded articles in *Cognitive Science* in 2010.)

Lucas, C. G., Gopnik, A., & Griffiths, T. L. (2010). Developmental differences in learning the forms of causal relationships. In S. Ohlsson & R. Catrambone (Eds.), *Proceedings of the 32nd Annual Conference of the Cognitive Science Society* (pp. 2852–2857). Austin, TX: Cognitive Science Society.

Lucas, C. G., Griffiths, T. L., Xu, F., & Fawcett, C. (2009). A rational model of preference learning and choice prediction by children. *Advances in Neural Information Processing Systems 21*.

Griffiths, T. L., **Lucas, C. G.**, Williams, J. J., & Kalish, M. L. (2009). Modeling human function learning with Gaussian processes. *Advances in Neural Information Processing Systems 21*.

PEER-REVIEWED ABSTRACTS AND SHORT PAPERS

Nuamah, K., Bundy, A., & **Lucas, C. G.** (2016). Functional inferences over heterogeneous data. *International Conference on Web Reasoning and Rule Systems* (pp. 159-166). Springer.

Collignon, N. & **Lucas, C. G.** (2016). Active learning in changing environments. *Machine Intelligence 20: Human-like Computing*.

Leon Villagra, P. & **Lucas, C. G.** (2016). Human-like function learning and transfer. *Machine Intelligence 20: Human-like Computing*.

PUBLICATIONS UNDER REVIEW, UNDER REVISION OR IN PREPARATION

León-Villagrá, P. Schulz, E., Speekenbrink, M. Gershman, S. & **Lucas, C. G.** (under revision).

Ghosh, A., **Lucas, C. G.**, Sarkar, R. (under review). Discovering periodicity in noisy streams of point events.

Lucas, C. G., Sterling, D. J., Kemp, C. (in preparation). Superspace extrapolation: discovering inductive biases using sparse evidence.

Yeung, S., **Lucas, C. G.**, & Griffiths, T. L. (in preparation). Modeling the form of causal relationships using a grammar-based prior.

SYMPOSIA, INVITED PRESENTATIONS, AND CONFERENCE PRESENTATIONS

- DALI: Data, Learning, and Inference. Tenerife, Canary Islands, 2017.
- Gatsby Computational Neuroscience Unit. UCL, London, UK, 2017.
- Experimental Psychology/Neuroscience seminar. Oxford, UK, 2017.
- CBCD Colloquium. Birkbeck University of London, UK, 2015.
- LJDM seminar. University College London, UK, 2014.
- Departmental psychology seminar. Warwick, UK, 2014.
- Annual meeting of the Cognitive Science Society. Quebec City, Canada, 2014.
- ILCC Seminar Series. Edinburgh, UK, 2013.
- Annual meeting of the Cognitive Science Society. Berlin, Germany, 2013.
- Biennial meeting of the Society for Research in Child Development. Seattle, WA, 2013.
- CMU Formal epistemology workshop. Pittsburgh, PA, USA, 2013.
- Annual meeting of the Cognitive Science Society. Sapporo, Japan, 2012.
- Departmental cognitive modeling seminar. Pittsburgh, PA, USA, 2012.
- Annual meeting of the Cognitive Science Society. Boston, MA, USA, 2012.
- Biennial Meeting of the Society for Research in Child Development. Boston, MA, USA, 2011.
- Annual Meeting of the Psychonomic Society. Boston, MA, USA, 2009.
- Annual Meeting of the Cognitive Science Society. Amsterdam, 2009.
- Workshop on Probabilistic Models of Cognitive Development. Banff, Canada, 2009.
- Annual Meeting of the Society for Mathematical Psychology. Washington, D.C., USA, 2008.
- Annual Meeting of the Cognitive Science Society. Washington, D.C., USA, 2008.
- Annual Meeting of the Cognitive Science Society. Nashville, TN, USA, 2007.
- Berkeley-Stanford-Santa Cruz Developmental Talks. Santa Cruz, CA, USA, 2006.

TEACHING

University of Edinburgh

Autumn 2017 Computational Cognitive Science
Spring 2017 Foundations of Natural Language Processing
Spring 2017 Informatics 1: Cognitive Science
Spring 2016 Informatics 1: Cognitive Science
Spring 2016 Topics in Cognitive Modelling
Spring 2015 Topics in Cognitive Modelling
Spring 2014 Topics in Cognitive Modelling

Graduate Student Instructor, University of California, Berkeley

Spring 2008 Psychological Statistics and Data Analysis with Thomas Wickens
Fall 2007 Psychological Statistics and Data Analysis with Thomas Wickens
Spring 2007 Computational Models of Cognition with Thomas Griffiths
Fall 2006 Research and Data Analysis in Psychology with Sheldon Zedeck
Spring 2005 Scientific Approaches to Consciousness with John Kihlstrom

Guest Lectures

Fall 2014-2016 Introduction to Data Science.
Fall 2014 Computational Cognitive Science.
Spring 2009 Computational Models of Cognition: Introduction to Gaussian Processes.
Fall 2008 Computational Models of Cognition: Bayesian Generalization.

RESEARCH SUPERVISED

2015-present Pablo León Villagr  (PhD supervisor).
2015-present Nicolas Collignon (PhD supervisor).
2014-present Kwabena Nuamah (PhD supervisor).

2016 Christopher Lambin (UG4 honours thesis).
2016 Cameron McSorley (UG4 honours thesis).
2016 Yashvir Surana (UG4 honours thesis).
2016 Victoria Atanasova (MSc thesis).
2016 Vikas Madan (MSc thesis).
2016 Yue Yu (MSc thesis).
2015-2016 Paulius Gedminas (UG4 honours thesis).
2015 Mateusz Rogozinski (MSc thesis).
2015 Robert Stirrups (MSc thesis).
2014 Ragna Soennecken (MSc thesis).
2013 Kenneth Holstein.
2011-2012 Vivek Sainanee.
2011 D. J. Sterling
2010 Lestin Lee.
2009 Amit Deutsch.
2006 Chetan Amar.

AD-HOC REVIEWING

Frontiers in Cognitive Science	JEXP: General
Neural Information Processing Systems	Cognition
Acta Psychologia	Cognitive Science
The Journal of Mathematical Psychology	Interface Focus
Proceedings of the Cognitive Science Society	EuroCogSci
JEXP: Learning, Memory & Cognition	British Journal for the Philosophy of Science
PLOS Computational Biology	Psychological Reivew