

JOSHUA BRETT TENENBAUM

Curriculum Vitae

Brain and Cognitive Sciences
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Degrees:

Ph.D., Brain and Cognitive Sciences, Massachusetts Institute of Technology, 1999, Thesis Advisor: Whitman Richards.

B.S. *magna cum laude*, Physics, Yale University, 1993

Employment:

Professor of Computational Cognitive Science, MIT, 2011-present
Associate Professor of Computational Cognitive Science, MIT, 2007-2011
Paul E. Newton Career Development Professor, MIT, 2004-2008
Principal Investigator, Computer Science and Artificial Intelligence Laboratory (CSAIL), MIT, 2003-present
Assistant Professor of Computational Cognitive Science, MIT, 2002-2007
Assistant Professor, Computer Science (by courtesy), Stanford University, 2000-2002
Assistant Professor, Psychology, Stanford University, 1999-2002
Postdoctoral Associate, Artificial Intelligence Laboratory, Massachusetts Institute of Technology, 1999

External Positions Held:

Member of DARPA ISAT (Information Science and Technology) Study Group, 2006-2009
Associate Editor, *Cognitive Science*, 2004-2008.

Honors:

Outstanding Paper Award, IEEE Conference on Computer Vision and Pattern Recognition, 1997, for “Learning bilinear models for two-factor problems in vision”, with William T. Freeman.
Distinguished Visiting Junior Scholar, Peter Wall Institute for Advanced Studies, University of British Columbia, July 2000.
Honorable Mention, Best Student Paper Award, Neural Information Processing Systems conference, 2002, for “Bayesian models of inductive generalization”, by Neville Sanjana (student advisee).
Best Student Paper Award, Neural Information Processing Systems conference [Natural Systems category], 2003, for “From algorithmic to subjective randomness”, by Thomas L. Griffiths (student advisee).
Best Student Paper Award, Neural Information Processing Systems conference [Synthetic Systems category], 2003, for “Hierarchical topic models and the nested Chinese restaurant process”, by David Blei, Thomas L. Griffiths (student advisee), and Michael I. Jordan.
Honorable mention, Marr Prize for Best Student Paper, Twenty-Sixth Annual Conference of the Cognitive Science Society, 2004, for “Using physical theories to infer hidden causal structure”, by Tom Griffiths (student advisee) and Liz Bonawitz.
New Investigator Award, Society for Mathematical Psychology, 2005.
Distinguished Lecturer, University of Edinburgh, Division of Informatics, 2006.

Honorable Mention, Outstanding Student Paper Award, Neural Information Processing Systems conference, 2006, for “Combining causal and similarity-based reasoning”, by Charles Kemp (student advisee), Patrick Shafto, and Allison Berke.

Early Investigator Award, Society of Experimental Psychologists, 2007.

Fellow, Society of Experimental Psychologists, 2007.

Distinguished Lecturer, University of British Columbia, Institute for Computing, Information, and Cognitive Systems, 2007.

Distinguished Lecturer, University of California, San Diego, Department of Cognitive Science, 2007.

Computational Modeling Prize for Best Paper on Perception and Action, Twenty-Ninth Annual Conference of the Cognitive Science Society, 2007, for “Learning grounded causal models”, with Noah Goodman and Vikash Mansinghka.

Computational Modeling Prize for Best Paper on Higher-Level Cognition, Twenty-Ninth Annual Conference of the Cognitive Science Society, 2007, for “Learning causal schemata”, with Charles Kemp and Noah Goodman.

Distinguished Scientific Award for Early Career Contribution to Psychology (in the area of cognition and human learning), American Psychological Association, 2008.

Wasow Visiting Scholar, Symbolic Systems Program, Stanford University, October 2010.

Posner Invited Lecture, Neural Information Processing Systems Conference, December 2010.

Troland Research Award, National Academy of Sciences, 2011.

Distinguished Lecturer, University of Toronto, Department of Computer Science, February 2011.

Computational Modeling Prize for Best Paper on Language, Thirty-Third Annual Conference of the Cognitive Science Society, 2011, for “Productivity and reuse in language”, with Timothy O’Donnell, Jesse Snedeker, and Noah D. Goodman.

Best Poster Award, International Joint Conference on Artificial Intelligence (IJCAI) 2011, for “Bayesian policy search with policy priors”, with David Wingate, Noah D. Goodman, Daniel M. Roy, and Leslie P. Kaelbling.

D. O. Hebb Lecturer, McGill University, February 2012.

Pinkel Endowed Lecture in Cognitive Science, University of Pennsylvania, March 2012.

Best Student Paper Award, UAI (Uncertainty in Artificial Intelligence) 2012, for “Exploiting compositionality to explore a large space of model structures”, with Roger Grosse, Ruslan Salakhutdinov, and William T. Freeman.

Best Paper (combining experiment with computational model), ICDL (International Conference on Learning and Development) 2012, for “Sticking to the Evidence? A computational and behavioral case study of micro-theory change in the domain of magnetism”, with Elizabeth Bonawitz, Tomer Ullman, and Alison Gopnik.

Roger N. Shepard Visiting Lecturer in Cognitive Science, University of Arizona, November 2012.

Elected Fellow of the Cognitive Science Society, 2013.

MIT Department of Brain and Cognitive Sciences Award for Excellence in Undergraduate Teaching, 2014.

MIT Department of Brain and Cognitive Sciences Award for Excellence in Graduate Mentoring, 2015.

Best Paper Honorable Mention, CVPR (Computer Vision and Pattern Recognition) 2015, for “Picture: A probabilistic programming language for scene perception”, with Tejas Kulkarni, Pushmeet Kohli, and Vikash Mansinghka.

Computational Modeling Prize for Best Paper on Applied Cognition, Thirty-Seventh Annual Conference of the Cognitive Science Society, 2015, for “Emergent collective sensing in human groups”, with Peter Krafft, Robert Hawkins, Sandy Pentland, and Noah Goodman.

Howard Crosby Warren Medal, Society of Experimental Psychologists, April 2016.

19th Annual Norman Anderson Distinguished Lecturer, University of California, San Diego, 2016.

Frijda Honorary Chair, University of Amsterdam, June 2016.

Bayesian Program Learning research featured as one of *Scientific American*’s “10 World Changing Ideas” of 2016.

William James Award for Best Contributed Paper by a Graduate Student at the Annual Meeting of the Society for Psychology and Philosophy, 2017, for “Learning a Commonsense Moral Theory” with Max Kleiman-Weiner (student advisee and first author) and Rebecca Saxe.

Best Paper, Third Multidisciplinary Conference on Reinforcement Learning and Decision-Making (RLDM 2017), for “Learning to Cooperate and Compete” with Max Kleiman-Weiner, Mark Ho, Joseph Austerweil, and Michael Littman.

Best Paper, Robotics: Science and Systems (RSS) conference 2018, for “Differentiable Physics and Stable Modes for Tool-Use and Manipulation Planning” with Marc Toussaint, Kelsey Allen and Kevin Smith.

Best paper in Cognitive Robotics, International Conference on Intelligent Robots and Systems (IROS) 2018, Augmenting Physical Simulators with Stochastic Neural Networks: Case Study of Planar Pushing and Bouncing, with Anurag Ajay, Jiajun Wu, Nima Fazeli, Maria Bauza, Leslie P. Kaelbling, and Alberto Rodriguez.

MacArthur Fellow, 2019.

Elected Member of the American Academy of Arts and Sciences, 2020.

Computational Modeling Prize for Best Paper in Higher-Level Cognition, Forty-Second Annual Conference of the Cognitive Science Society, 2020, for “Too many cooks: Coordinating multi-agent collaboration through inverse planning”, with Rose E. Wang, Sarah A. Wu, James A. Evans, David C. Parkes, and Max Kleiman-Weiner.

Undergraduate and Masters Research Supervised:

Pearson, Mark, 2000..

Sanjana, Neville, 2000-2001.

Ramos, Khara, 2000-2001.

Bell, Matt, 2000-2001.

Berger, Eric, 2000-2001.

D’India, John Paul 2001.

Blum, Ben, 2001-2002.

Bryan, Ronnie, 2002-2004.

Chen, Anne, 2002-2004.

Dwyer, Brigid, 2003-2004.

Niziolek, Carrie, 2003-2005.

Jarudi, Izzat, 2004.

Marzloff, George, 2004.

Luther, Suzanne, 2004.

Yu, Ben, 2004.

Berke, Allison, 2005.

Chan, Gabe, 2006.

Shabir, Laila, 2006.

Kitch, Lacey, 2006.

Gordon, Matt, 2006.

Antwi-Boampong, Sadik, 2006.

Brenman, Stephanie, 2006.

Tobenkin, Mark, 2006.

Jotwani, Pooja, 2006.

Schapiro, Anna, 2006.

Johnson, Lindsay, 2008.

Gross, Jason, 2010.

Gramling, Hannah, 2009.

Steinhardt, Jacob, 2010.

Hamrick, Jessica, 2010-2012.

Wu, Jeffrey, 2011-2012.

Pratiksha Thaker, 2013-2014.

Mark Velednitsky, 2013-2014.

Sun, Felix, 2014-2015.

Michael Chang, 2015-2017.
Will Whitney, 2015-2016.
Michael Janner, 2015-present.
Alejandro Vientos, 2015-present.
Joey Velez-Ginorio 2016-present.
Chengkai Zhang, 2016-present.

Ph.D. Theses Supervised:

Griffiths, Thomas L. (Stanford PhD), Causes, coincidences and theories, 2004. Professor of Psychology and Cognitive Science, University of California, Berkeley.

Saxe, Rebecca, What functional magnetic resonance imaging can tell us about theory of mind (secondary advisor; primary advisor Nancy Kanwisher), 2003, Professor of Cognitive Neuroscience, MIT.

Krynski, Tevye R. (NSF Fellowship), The role of temporal factors and prior knowledge in causal learning and judgment, 2006, Currently at A9.com.

Kemp, Charles, (Albert Memorial Fellowship, MIT), The acquisition of inductive constraints, 2007, Associate Professor of Psychology, Carnegie Mellon University.

Perfors, Amy (NSF Fellowship, NDSEG Fellowship), Learnability, representation, and language: a Bayesian approach, 2008, Senior Lecturer in Psychology, University of Adelaide.

Schmidt, Lauren (NSF Fellowship), Meaning and compositionality as statistical induction of categories and constraints, 2009, Founder and chief scientist, HeadLamp Research.

Bonawitz, Elizabeth Baraff, The rational child: theories and evidence in [prediction, exploration and explanation (secondary advisor; primary advisor Laura Schulz), 2009, Associate Professor of Psychology, Rutgers University Newark.

Mansinghka, Vikash (NSF Fellowship), Natively probabilistic computation, 2009. Research Scientist, MIT.

Frank, Michael C. (NSF Fellowship, Javits Fellowship), Early word learning through communicative inference (secondary advisor; primary advisor Ted Gibson), 2010, Associate Professor of Psychology, Stanford University.

Vul, Ed (NSF Fellowship), Sampling in human cognition (secondary advisor; primary advisor Nancy Kanwisher), 2010, Associate Professor of Psychology, UC San Diego.

Roy, Daniel (EECS PhD, NSF Fellowship), Nonparametric Bayesian models and probabilistic programming languages. (Secondary advisor; primary advisor Leslie Kaelbling), 2011, Assistant Professor, Department of Computer and Mathematical Sciences, University of Toronto Scarborough, Department of Statistical Sciences, University of Toronto.

O'Donnell, Tim (Harvard PhD, Probabilistic models for language reuse and computation (Secondary advisor; primary advisor is Jesse Snedeker), 2011. Assistant Professor of Linguistics, McGill University.

Piantadosi, Steve (NSF Fellowship). Models of compositional language acquisition (Secondary advisor; primary advisor is Ted Gibson), 2011, Assistant Professor, Brain and Cognitive Sciences, University of Rochester.

Baker, Chris, (NSF Fellowship, DHS Fellowship), Computational models of theory of mind, 2012, Postdoctoral Fellow, MIT.

Ullman, Tomer (NSF Fellowship), On the nature and origin of intuitive theories: Learning, physics and psychology, 2015. Postdoctoral Fellow, Center for Brains, Minds and Machines, MIT/Harvard.

McCoy, John, (Fulbright International Science Fellowship). Models for collective prediction (Secondary advisor; primary advisor is Drazen Prelec), in progress.

Lake, Brenden (NSF Fellowship), Towards human-like concept learning in a machine, 2014. As of Fall 2017, Assistant Professor, Department of Psychology and Center for Data Science, NYU.

Grosse, Roger (EECS PhD, NDSEG Fellowship). Unsupervised learning of hierarchical representations (co-advised with William Freeman), 2014. Assistant Professor of Computer Science, University of Toronto.

Stuhlmüller, Andreas (ONR grant). Adaptive inference for probabilistic programs, 2015. Founder, Ought.

Kulkarni, Tejas. (Siemens Graduate Fellowship), Generative models and probabilistic programming languages for visual scene understanding, 2016. Research Scientist, Google DeepMind.

Jara-Ettinger, Julian (CBMM, Simons Center Grant), The inner life of goals: costs, rewards, and commonsense psychology, 2017. Assistant Professor of Psychology, Yale University.

Reshef, David (HST MD/PhD, NSF Fellowship), 2017, Algorithms for theory learning (co-advised with Tommi Jaakkola).

Malmaud, Jon (NSF Fellowship). Probabilistic models of value-based decision making.

Siegel, Max (BCS Training Grant). Probabilistic modeling for vision and physical scene understanding.

Krafft, Peter (EECS PhD, NSF Fellowship), Models of social epistemology (co-advised with Sandy Pentland). As of Fall 2017, Postdoctoral researcher, UC Berkeley.

Kleiman-Weiner, Max (Hertz Fellowship), Models and experiments on human social interaction.

Rule, Josh (NSF Fellowship). Learning systems of concepts in computation and cognitive development.

Allen, Kelsey (NSERC Fellowship). Integrating generative and discriminative models for perception and social cognition.

Wu, Jiajun (Adobe Fellowship, Facebook Fellowship). Physically based and infant-inspired scene understanding in computer vision (co-advised with Bill Freeman).

Ellis, Kevin (NSF Fellowship). Program induction for machine learning and artificial intelligence (co-advised with Armando Solar-Lezama).

Postdoctoral Research Supervised

Steyvers, Mark, 2000-2002, Professor at UC Irvine, Department of Cognitive Sciences.

de Silva, Vin, 2000-2004, Associate Professor at Pomona College, Department of Mathematics.

Stromsten, Sean, 2003-2004, Member of Research Staff at BAE Systems Advanced Information Technologies.

Koerding, Konrad, 2004-2006, Associate Professor at Northwestern University, Rehabilitation Institute and Department of Physiology.

Shafto, Pat, 2004-2007, Professor of Data Science, Department of Math and Computer Science, Rutgers University (Newark).

Goodman, Noah, 2005-2010, Associate Professor of Psychology and (by courtesy) Computer Science and Linguistics, Stanford University.

Jakel, Frank, 2008-2010, Lecturer, University of Osnabrück.

Savova, Virginia, 2007-2010, Postdoctoral scholar, Broad Institute.

Wingate, David, 2008-2012, Professor of Computer Science, Brigham Young University.

Battaglia, Peter, 2008-2013, Research Scientist, DeepMind/Google.

Salakhutdinov, Ruslan, 2009-2011, Professor of Computer Science, Carnegie Mellon University.

Heller, Katherine, 2011-2012, Research Scientist, Google AI.

Gao, Tao, 2011-2015. Assistant Professor of Statistics and Communications, UCLA.

Hartshorne, Josh, 2012-2016. Assistant Professor of Psychology, Boston College.

Gershman, Samuel, 2012-2015. Assistant Professor of Psychology, Harvard University.

O'Donnell, Timothy 2012-2016. Assistant Professor of Linguistics, McGill University.

Gerstenberg, Tobi, 2012-present. Assistant Professor of Psychology, Stanford University.

Yildirim, Ilker 2014-2019. Assistant Professor of Psychology, Yale University.

Zhao, Yibiao, 2015-2017, Founder and CEO, iSEE.

Kevin Smith, 2015-present.

Sydney Levine, 2017-present.

Tianmin Shi, 2019-present.

Tuan-Anh Le, 2019-present.

Bernhard Egger, 2019-present.

Teaching Experience

Stanford University

Psychology 205, Foundations of Cognition, Fall 1999, 2000, 2001

Psychology 224, Learning and Inference in Humans and Machines, Spring 2000, 2001

MIT

9.012, The Brain and Cognitive Sciences II, Spring 2002, 2003, 2004, 2005.

9.69/9.690, Foundations of Cognition, Spring 2003

9.52/9.914, Computational Models of Concepts and Theories, Fall 2003

9.66/9.660/6.804, Computational Cognitive Science, Fall 2004-7, 2009, 2011-present.

9.012, Cognitive Science, Spring 2006-present.

9.916, 9.914 Computational Models in Cognitive Development, Fall 2008, Spring 2013.

Service

Open Mind editorial board, 2016-present.

Department of Brain and Cognitive Sciences, Computational Search sub-head, 2015.

Department of Brain and Cognitive Sciences, BCS Council, 2013-present.

Rumelhart Prize Selection Committee, 2013-present.

Decision editorial board, 2013-present.

MIT Ad hoc Committee on Statistics, 2011-2012.

Department of Brain and Cognitive Sciences, Cognitive Search Committee, 2003-present.

McGovern Institute for Brain Research, Faculty Search Committee, 2008-2013.

Department of Brain and Cognitive Sciences, Department Head Search Committee, 2008, 2011.

Department of Brain and Cognitive Sciences, Department representative at MIT

Commencement PhD Hooding, 2009.

Organizer and instructor for 9.9X, From Vision to Cognition, IAP 2004.

Organizer and instructor for 9.94, The Cognitive Science of Intuitive Theories, IAP 2006.

Co-instructor for 9.93, Marathon Moral Reasoning Laboratory, IAP 2007.

Co-organizer, MIT Intelligence Initiative, 2008-present.

Convener, MIT IdeasLab, "The Nature of Intelligence", World Economic Forum, 2010.

Program Committee member, Annual Conference of the Cognitive Science Society, 2002-2010.

Program Committee member, Neural Information Processing Systems Conference, 2000-2002.

Chair of Cognitive Science section.

Tutorials Chair, Neural Information Processing Systems Conference, 2005.

Program Committee member, National Academy of Sciences Sackler Colloquium on Mapping Knowledge Domains, May 2003.

Program Committee member, Workshop on "Statistical Network Analysis: Models, Issues, and New Directions", June 2006.

Cognitive Science editorial board 2001-2008.

Journal reviewing: *Behavioral and Brain Sciences*, *BioMedCentral Bioinformatics*, *Child Development*, *Cognition*, *Cognitive Science*, *Communications of the ACM*, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, *IEEE Transactions on Neural Networks*, *Journal of Classification*, *Journal of Experimental Psychology: General*, *Journal of Machine Learning Research*, *Journal of Mathematical Imaging and Vision*, *Language Learning and Development*, *Machine Learning*, *Memory and Cognition*, *Nature*, *Neural Computation*, *Proceedings of the National Academy of Sciences*, *Psychological Review*, *Psychological Science*, *Psychonomic Bulletin and Review*, *Science*, *Trends in Cognitive Sciences*.

Conference reviewing: IEEE Conference on Computer Vision and Pattern Recognition (CVPR), National Conference on Artificial Intelligence (AAAI), Neural Information Processing Systems (NIPS), Annual Conference of the Cognitive Science Society (COGSCI).

Grant reviewing: National Science Foundation (NSF), Natural Sciences and Engineering Research Council of Canada (NSERC), Social Science and Humanities Research Council of Canada (SSHRC), Human Frontiers Science Program (HFSP).
Book proposals reviewed for: MIT Press, CRC Press, Oxford University Press.

Publications:

Refereed Journals

1. Shult, D. L. and Tenenbaum, J. B. (1988). A three-dimensional multiplication table inspires mathematical discovery. *The Mathematics Teacher* 81(2), 92-25.
2. Tenenbaum, J. B. and Freeman, W. T. (2000). Separating style and content with bilinear models. *Neural Computation*, 12 (6), 1247-1283.
3. Tenenbaum, J. B., de Silva, V., and Langford, J. C. (2000). A global geometric framework for nonlinear dimensionality reduction. *Science*, 290 (5500): 2319-2323.
4. Tenenbaum, J. B. and Griffiths, T. L. (2001). Generalization, similarity, and Bayesian inference. *Behavioral and Brain Sciences*, 24(4), 629-641.
5. Tenenbaum, J. B. and Griffiths, T. L. (2001). Some specifics about generalization. *Behavioral and Brain Sciences*, 24(4), 772-778.
6. Balasubramanian, M., Shwartz, E. L., Tenenbaum, J. B., de Silva, V., and Langford, J. C. (2002). The Isomap Algorithm and Topological Stability. *Science* Jan 4 2002: 7.
7. Freeman, W. T., Tenenbaum, J. B., and Pasztor, E. (2002). Learning style translation for line drawings. *ACM Transactions on Graphics*, 22(1), 33-46.
8. Steyvers, M., Tenenbaum, J. B., Wagenmakers, E., and Blum, B. (2003). Inferring causal networks through observations and interventions. *Cognitive Science*, 27, 453-489.
9. Sharma, J., Dragoi, V., Tenenbaum, J. B., Miller, E. K., and Sur, M. (2003). V1 neurons signal acquisition of an internal representation of stimulus location. *Science*, 300, 1758-1763.
10. Sobel, D., Tenenbaum, J. B., and Gopnik A. (2004). Children's causal inferences from indirect evidence: Backwards blocking and Bayesian reasoning in preschoolers. *Cognitive Science* 28(3), 303-333.
11. Steyvers, M. and Tenenbaum, J. B. (2005). The large-scale structure of semantic networks: statistical analyses and a model of semantic growth. *Cognitive Science* 29(1), 41-78.
12. Griffiths, T. L. and Tenenbaum, J. B. (2005). Structure and strength in causal induction. *Cognitive Psychology* 51, 334-384.
13. Saxe, R., Tenenbaum, J. B., and Carey, S. (2005). Secret agents: Inferences about hidden causes by 10- and 12-month-old infants. *Psychological Science* 16(12), 995-1001.
14. Tenenbaum, J. B., Griffiths, T. L., and Kemp, C. (2006). Theory-based Bayesian models of inductive learning and reasoning. *Trends in Cognitive Sciences* 10(7), 309-318.
15. Griffiths, T. L. and Tenenbaum, J. B. (2006). Optimal predictions in everyday cognition. *Psychological Science* 17(9), 767-773.
16. Griffiths, T. L. and Tenenbaum, J. B. (2007). From mere coincidences to meaningful discoveries. *Cognition* 103(2), 180-226.
17. Xu, F. and Tenenbaum, J. B. (2007). Sensitivity to sampling in Bayesian word learning. *Developmental Science* 10(3), 288-297.
18. Kemp, C., Perfors, A. and Tenenbaum, J. B. (2007). Learning overhypotheses with hierarchical Bayesian models. *Developmental Science* 10(3), 307-321.
19. Griffiths, T. L., Steyvers, M. and Tenenbaum, J. B. (2007). Topics in semantic representation. *Psychological Review* 114(2), 211-244.
20. Xu, F. and Tenenbaum, J. B. (2007). Word learning as Bayesian inference. *Psychological Review* 114(2), 245-272.
21. Krynski, T. R. and Tenenbaum, J. B. (2007). The role of causality in judgment under uncertainty. *Journal of Experimental Psychology: General* 136(3) 430-450.
22. Kording, K., Tenenbaum, J. B., and Shadmehr, R. (2007). The dynamics of motor memory are a consequence of optimal adaptation to a changing body. *Nature Neuroscience* 10, 779-786.
23. Iwata, T., Saito, K., Ueda, N., Stromsten, S., Griffiths, T. L., and Tenenbaum, J. B. (2007).

- Parametric Embedding for Class Visualization. *Neural Computation* 19, 2536-2556.
24. Kording, K., Beierholm, U., Ma, W. J., Quartz, S., Tenenbaum, J. B., and Shams, L. (2007). Causal inference in multisensory perception. *Public Library of Science ONE* 2(9), e943.
 25. Goodman, N., Tenenbaum, J. B., Griffiths, T. L., and Feldman, J. (2008). A rational analysis of rule-based concept learning. *Cognitive Science* 32:1, 108-154.
 26. Kemp, C. and Tenenbaum, J. B. (2008). The discovery of structural form. *Proceedings of the National Academy of Sciences*. 105(31), 10687-10692.
 27. Shafto, P., Kemp, C., Baraff, E. R., Coley, J., and Tenenbaum, J. B. (2008). Inductive reasoning about causally transmitted properties. *Cognition* 109(2), 175-192.
 28. Schulz, L. E., Goodman, N. D., Tenenbaum, J. B., and Jenkins, A. (2008). Going beyond the evidence: Abstract laws and preschoolers' responses to anomalous data. *Cognition* 109(2), 211-223.
 29. Kemp, C. and Tenenbaum, J. B. (2009). Structured statistical models of inductive reasoning. *Psychological Review* 116(1), 20-58.
 30. Foraker, S., Regier, T., Khetarpal, N., Perfors, A., and Tenenbaum, J. B. (2009). Indirect evidence and the poverty of the stimulus: The case of anaphoric one. *Cognitive Science* 33, 287-300.
 31. Frank, M., Goodman, N. D., and Tenenbaum, J. B. (2009). Using speakers' referential intentions to model early cross-situational word learning. *Psychological Science* 20, 578-585.
 32. Baker, C. L., Tenenbaum, J. B., and Saxe, R. R. (2009). Action understanding as inverse planning. *Cognition* 113(3), 329-349.
 33. Griffiths, T. L. and Tenenbaum, J. B. (2009). Theory-based causal induction. *Psychological Review* 116, 661-716.
 34. Kemp, C., Tenenbaum, J. B., Griffiths, T. L., and Niyogi, S. (2010). A probabilistic model of theory formation. *Cognition* 114(2), 165-196.
 35. Henderson, L., Goodman, N. D., Tenenbaum, J. B., and Woodward, J. F. (2010). The structure and dynamics of scientific theories: A hierarchical Bayesian perspective. *Philosophy of Science* 77(2), 172-200.
 36. Perfors, A., Tenenbaum, J. B., and Wonnacott, E. (2010) Variability, negative evidence, and the acquisition of verb argument constructions. *Journal of Child Language* 37, 607-642.
 37. Griffiths, T. L., Chater, N., Kemp, C., Perfors, A., and Tenenbaum, J. B. (2010). Probabilistic models of cognition: Exploring the laws of thought. *Trends in Cognitive Sciences* 14, 357-364.
 38. Gweon, H., Tenenbaum, J. B., and Schulz, L. E. (2010). Infants jointly infer sampling processes and the extension of non-obvious properties. *Proceedings of the National Academy of Sciences* 107 (20), 9066-9071.
 39. Kemp, C., Goodman, N. D., and Tenenbaum, J. B. (2010). Learning to learn causal relations. *Cognitive Science* 34, 1185-1243.
 40. Goodman, N. D., Ullman, T., and Tenenbaum, J. B. (2011). Learning a theory of causality. *Psychological Review* 118(1), 110-119.
 41. Perfors, A., Tenenbaum, J. B., and Regier, T. (2011). The learnability of abstract syntactic principles. *Cognition* 118(3): 306-338.
 42. Frank, M. C., Goldwater, S., Griffiths, T. L., and Tenenbaum, J. B. (2010). Modeling human performance in statistical word segmentation. *Cognition* 117, 107-125.
 43. Tenenbaum, J. B., Kemp, C., Griffiths, T. L., and Goodman, N. D. (2011). How to grow a mind: statistics, structure and abstraction. *Science* 331 (6022), 1279-1285.
 44. Frank, M. C. and Tenenbaum, J. B. (2011). Three ideal observer models for rule learning in simple languages. *Cognition*, 120, 360-371.
 45. Griffiths, T. L., Sobel, D. M., Tenenbaum, J. B., and Gopnik, A. (2011). Bayes and Blickets: Effects of Knowledge on Causal Induction in Children and Adults. *Cognitive Science* 35(8), 1407-1455.
 46. Shafto, P., Kemp, C., Mansinghka, V. K., and Tenenbaum, J. B. (2011). A probabilistic model of cross-categorization. *Cognition* 120(1), 1-25.
 47. Perfors, A., Tenenbaum, J. B., Griffiths, T.L., Xu, F. (2011) A tutorial introduction to Bayesian models of cognitive development. *Cognition* 120, 302-321.
 48. Griffiths, T. L. and Tenenbaum, J. B. (2011). Predicting the future as Bayesian inference:

- People combine prior knowledge with observations when estimating duration and extent. *Journal of Experimental Psychology: General* 140(4), 725-743.
49. Téglás, E., Vul, E., Girotto, V., Gonzalez, M., Tenenbaum, J. B., and Bonatti, L. (2011). Pure Reasoning in 12-Month-Old Infants as Probabilistic Inference. *Science* 332, 1054-1059.
 50. Piantadosi, S., Tenenbaum, J. B., and Goodman, N. (2012). Bootstrapping in a language of thought: A formal model of numerical concept learning. *Cognition* 123, 199–217
 51. Kemp, C., Shafto, P., and Tenenbaum, J. B. (2012). An integrated account of generalization across objects and features. *Cognitive Psychology* 64 (1-2), 35-73.
 52. Gershman, S. J., Vul, E., and Tenenbaum, J. B. (2012). Multistability and perceptual inference. *Neural Computation* 24(1), 1-24.
 53. Salakhutdinov, R., Tenenbaum, J. B., and Torralba, A. (2012). One-Shot Learning with a Hierarchical Nonparametric Bayesian Model. *Journal of Machine Learning Research (JMLR) Workshop & Conference Proceedings (W&CP)* 25:195-207 (Workshop on Unsupervised and Transfer Learning).
 54. Ullman, T. D., Goodman, N. D., and Tenenbaum, J. B. (2012). Theory learning as stochastic search in the language of thought. *Cognitive Development* 27(4): 455-480.
 55. Brady, T. F., & Tenenbaum, J. B. (2013). A probabilistic model of visual working memory: Incorporating higher order regularities into working memory capacity estimates. *Psychological Review*, 120(1), 85.
 56. Frank, M. C., Tenenbaum, J. B., & Fernald, A. (2013). Social and discourse contributions to the determination of reference in cross-situational word learning. *Language Learning and Development*, 9(1), 1-24.
 57. Hamlin, J. K., Ullman, T. D., Tenenbaum, J. B., Goodman, N. D., Baker, C. L. (2013). The mentalistic basis of core social cognition: experiments in preverbal infants and a computational model. *Developmental Science* 16(2): 209-226.
 58. Salakhutdinov, R., Tenenbaum, J., & Torralba, A. (2013). Learning with Hierarchical-Deep Models. *IEEE PAMI (Transactions on Pattern Analysis and Machine Intelligence)* 35(8), 1958-1971.
 59. Frank, M. C., Tenenbaum, J. B., & Gibson, E. (2013). Learning and long-term retention of large-scale artificial languages. *PloS one*, 8(1), e52500
 60. Battaglia, P., Hamrick, J. & Tenenbaum, J. B. (2013). Simulation as an engine of physical scene understanding. *Proceedings of the National Academy of Sciences*. 110(45), 18327-18332.
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188. Salakhutdinov, R., Tenenbaum, J. B., and Torralba, A. (2012). Learning to learn with compound hierarchical-deep models. *Neural Information Processing Systems (NIPS)*.

189. Grosse, R. B., Salakhutdinov, R., Freeman, W. T., and Tenenbaum, J. B. (2012). Exploiting compositionality to explore a large space of model structures. *Conference on Uncertainty in Artificial Intelligence (UAI)*.
190. Gerstenberg, T., Goodman, N. D., Lagnado, D. A., & Tenenbaum, J. B. (2012). Noisy Newtons: Unifying process and dependency accounts of causal attribution. In *Proceedings of the Thirty-Fourth Annual Conference of the Cognitive Science Society*. Austin, TX: Cognitive Science Society.
191. Bonawitz, E., Ullman, T., Gopnik, A., & Tenenbaum, J.B. (2012). Sticking to the Evidence? A computational and behavioral case study of micro-theory change in the domain of magnetism. In *ICDL (International Conference on Learning and Development)*.
192. Lloyd, J., Duvenaud, D., Grosse, R., Tenenbaum, J. B., and Ghahramani, Z. (2013). Structure Discovery in Nonparametric Regression through Compositional Kernel Search. *ICML (International Conference on Machine Learning)*.
193. Jara-Ettinger, J., Tenenbaum, J. B., & Schulz, L. E. (2013) Not so innocent: Reasoning about costs, competence, and culpability in very early childhood. *Proceedings of the Annual Meeting of the Cognitive Science Society*.
194. Smith, K. A., Dechter, E., Tenenbaum, J. B., & Vul, E. (2013). Physical predictions over time. *Proceedings of the Annual Meeting of the Cognitive Science Society*.
195. Gershman, S. J., Jäkel, F., & Tenenbaum, J. B. (2013). Bayesian Vector Analysis and the Perception of Hierarchical Motion.. *Proceedings of the Annual Meeting of the Cognitive Science Society*.
196. Jara-Ettinger, J., Tenenbaum, J. B., & Schulz, L. E. (2013) Not so innocent: Reasoning about costs, competence, and culpability in very early childhood. *Proceedings of the Annual Meeting of the Cognitive Science Society*.
197. Dechter, E., Malmaud, J., Adams, R. P., & Tenenbaum, J. B. (2013). Bootstrap Learning via Modular Concept Discovery. *International Joint Conference on Artificial Intelligence (IJCAI)*.
198. Mansinghka, V. K., Kulkarni, T. D., Perov, Y. N., & Tenenbaum, J. B. (2013). Approximate Bayesian Image Interpretation using Generative Probabilistic Graphics Programs. *Advances in Neural Information Processing Systems*. *arXiv preprint arXiv:1307.0060*. [Oral presentation]
199. Lake, B., Salakhutdinov, R., and Tenenbaum, J. B. (2013). One-shot learning by inverting a compositional causal process. *Advances in Neural Information Processing Systems*.
200. Lin, D., Dechter, E., Ellis, K., Tenenbaum, J. B., & Muggleton, S. H. (2014). Bias reformulation for one-shot function induction. In *Proceedings of the 23rd European Conference on Artificial Intelligence (ECAI 2014)*, Amsterdam.
201. Ullman, T.D, Stuhlmüller A., Goodman, N. D., Tenenbaum, J. B. (2014). Learning physics from dynamical scenes. *Proceedings of the Thirty-Sixth Annual Conference of the Cognitive Science society*.
202. Gerstenberg, T., Ullman, T. D., Kleiman-Weiner, M., Lagnado, D. A. & Tenenbaum, J. B. (2014). Wins above replacement: Responsibility attributions as counterfactual replacements. In P. Bello, M. Guarini, M. McShane, & B. Scassellati (Eds.), *Proceedings of the 36th Annual Conference of the Cognitive Science Society*. Austin, TX: Cognitive Science Society.
203. Gerstenberg, T., Goodman, N. D., Lagnado, D. A. & Tenenbaum, J. B. (2014). From counterfactual simulation to causal judgment. In P. Bello, M. Guarini, M. McShane, & B. Scassellati (Eds.), *Proceedings of the 36th Annual Conference of the Cognitive Science Society*. Austin, TX: Cognitive Science Society.
204. Tsividis, P., Gershman, S. J., Tenenbaum, J. B., & Schulz, L. (2014). Information selection in noisy environments with large action spaces. In *Proceedings of the thirty-sixth annual conference of the cognitive science society*.
205. Lake, B. M., Lee, C. Y., Glass, J. R., & Tenenbaum, J. B. (2014). One-shot learning of generative speech concepts. In *Proceedings of the 36th Annual Meeting of the Cognitive Science Society*.
206. Jara-Ettinger, J., Gweon, H., Tenenbaum, J. B., & Schulz, L. E. (2014). That's the way the utility crumbles. In *Proceedings of the 36th Annual Conference of the Cognitive Science Society* (pp. 678-683).
207. Wu, Y., Baker, C.L., Tenenbaum, J.B., & Schulz, L.E. (2014). Joint Inferences of Belief and Desire from Facial Expressions. In *Proceedings of the Thirty-Fifth Annual Conference of the*

- Cognitive Science Society.*
208. Lloyd, J. R., Duvenaud, D., Grosse, R., Tenenbaum, J. B., & Ghahramani, Z. (2014). Automatic construction and natural-language description of nonparametric regression models. *AAAI 2014. arXiv preprint arXiv:1402.4304.*
 209. Kulkarni, T. D., Kohli, P., Tenenbaum, J. B., and Mansinghka, V. K. (2015). Picture: An imperative probabilistic programming language for scene perception. *CVPR 2015* [oral presentation].
 210. Gershman, S. J. & Tenenbaum, J. B. (2015). Phrase similarity in humans and machines. *Proceedings of the Thirty-Seventh Annual Conference of the Cognitive Science Society (CogSci 2015).*
 211. Schulz, E., Tenenbaum, J. B., Reshef, D. N., Speekenbrink, M., and Gershman, S. J. (2015). Assessing the perceived predictability of functions. *Proceedings of the Thirty-Seventh Annual Conference of the Cognitive Science Society (CogSci 2015).*
 212. Kleiman-Weiner, M., Gerstenberg, T., Levine, S., and Tenenbaum, J. B. (2016). Inference of intention and permissibility in moral decision making. *Proceedings of the Thirty-Seventh Annual Conference of the Cognitive Science Society (CogSci 2015).*
 213. Allen, K., Jara-Ettinger, J., Gerstenberg, T., and Tenenbaum, J. B. (2015). Go fishing! Responsibility judgments when cooperation breaks down. *Proceedings of the Thirty-Seventh Annual Conference of the Cognitive Science Society (CogSci 2015).*
 214. Gerstenberg, T., Goodman, N. D., Lagnado, D. A. & Tenenbaum, J. B. (2015). How, whether, why: Causal judgments as counterfactual contrasts. *Proceedings of the 37th Annual Conference of the Cognitive Science Society.*
 215. Gerstenberg, T., Halpern, J. Y. & Tenenbaum, J. B. (2015). Responsibility judgments in voting scenarios. *Proceedings of the 37th Annual Conference of the Cognitive Science Society.*
 216. Tsividis, P., Tenenbaum, J. B., and Schulz, L. E. (2015). Constraints on hypothesis selection in causal learning. *Proceedings of the Thirty-Seventh Annual Conference of the Cognitive Science Society (CogSci 2015).*
 217. Jara-Ettinger, J., Schulz, L. E., and Tenenbaum, J. B. (2015). The naïve utility calculus: Joint inferences about the costs and rewards of actions. *Proceedings of the Thirty-Seventh Annual Conference of the Cognitive Science Society (CogSci 2015).*
 218. Jara-Ettinger, J., Lydic, E., Tenenbaum, J. B., and Schulz, L. E. (2015). Beliefs about desires: Children's understanding of how knowledge and preference influence choice. *Proceedings of the Thirty-Seventh Annual Conference of the Cognitive Science Society (CogSci 2015).*
 219. Krafft, P., Hawkins, R. X. D., Pentland, A., Goodman, N. D., and Tenenbaum, J. B. (2015). Emergent collective sensing in human groups. *Proceedings of the Thirty-Seventh Annual Conference of the Cognitive Science Society (CogSci 2015).*
 220. Bates, C., Battaglia, P., Yildirim, I., and Tenenbaum, J. B. (2015). Humans predict liquid dynamics using probabilistic simulation. *Proceedings of the Thirty-Seventh Annual Conference of the Cognitive Science Society (CogSci 2015).*
 221. Huggins, J. and Tenenbaum, J. B. (2015). Risk and regret of hierarchical Bayesian learners. *ICML (International Conference on Machine Learning) 2015.*
 222. Kulkarni, T. D., Whitney, W. F., Kohli, P., and Tenenbaum, J. B. (2015). Deep convolutional inverse graphics networks. *Advances in Neural Information Processing Systems (NIPS 29)*, 2539-2547.
 223. Wu, J., Yildirim, I., Lim, J. J., Freeman, W. T. and Tenenbaum, J. B. (2015). Galileo: Perceiving physical object properties by integrating a physics engine with deep learning. *Advances in Neural Information Processing Systems (NIPS 29)*, 127-135.
 224. R Zhang, J Wu, C Zhang, WT Freeman, JB Tenenbaum (2016). A Comparative Evaluation of Approximate Probabilistic Simulation and Deep Neural Networks as Accounts of Human Physical Scene Understanding. *Proceedings of the Thirty-Eighth Annual Conference of the Cognitive Science Society (CogSci 2016).*
 225. Kryven, M., Ullman, T. D., Cowan, W., and Tenenbaum, J. B. (2016). Outcome or Strategy? A Bayesian model of intelligence attribution. *Proceedings of the Thirty-Eighth Annual Conference of the Cognitive Science Society (CogSci 2016).*
 226. Bramley, N. R., Gerstenberg, T., and Tenenbaum, J. B. (2016). Natural science: Active learning in dynamic physical microworlds. *Proceedings of the Thirty-Eighth Annual*

- Conference of the Cognitive Science Society (CogSci 2016).*
227. Bramley, N. R., Gerstenberg, T., and Tenenbaum, J. B. (2016). Natural science: Active learning in dynamic physical microworlds. *Proceedings of the Thirty-Eighth Annual Conference of the Cognitive Science Society (CogSci 2016).*
228. Kleiman-Weiner, M., Ho, M. K., Austerweil, J. L., Littman, M., and Tenenbaum, J. B. (2016). Coordinate to cooperate or compete: Abstract goals and joint intentions in social interaction. *Proceedings of the Thirty-Eighth Annual Conference of the Cognitive Science Society (CogSci 2016).*
229. Wu, J., Lim, J. J., Zhang, H., Tenenbaum, J. B. and Freeman, W. T. (2016). Physics 101: Learning physical object properties from unlabeled videos. *British Machine Vision Conference.*
230. Wu, J., Xue, T., Lim, J. J., Tian, Y., Tenenbaum, J. B., Torralba, A., and Freeman, W. T. (2016). Single image 3D interpreter network. *European Conference on Computer Vision (ECCV)*, 365-382.
231. Holtzen, S., Zhao, Y., Gao, T., Tenenbaum, J. B. and Zhu, S-C. (2016). Inferring human intent from video by sampling hierarchical plans. *International Conference on Intelligent Robots and Systems (IROS)*, 1489-1496.
232. Wu, J., Chang, C., Xue, T., Freeman, W. T. and Tenenbaum, J. B. (2016). Learning a probabilistic latent space of object shapes via 3D generative-adversarial modeling. *Advances in Neural Information Processing Systems (NIPS 30)*, 82-90.
233. Schulz, E., Tenenbaum, J. B., Duvenaud, D., Speekenbrink, M., and Gershman, S. J. (2016). Probing the compositionality of intuitive functions. *Advances in Neural Information Processing Systems (NIPS 30).*
234. Ellis, K., Solar-Lezama, A., and Tenenbaum, J. B. (2016). Sampling for Bayesian program learning. *Advances in Neural Information Processing Systems (NIPS 30)*, 1297-1305.
235. Kulkarni, T. D., Narasimhan, K., Saeedi, A., and Tenenbaum, J. B. (2016). Hierarchical deep reinforcement learning: Integrating temporal abstraction and intrinsic motivation. *Advances in Neural Information Processing Systems (NIPS 30)*, 3675-3683.
236. Chang, M. B., Ullman, T. D., Torralba, A., and Tenenbaum, J. B. (2016). A compositional object-based approach to learning physical dynamics. *International Conference on Learning Representations (ICLR).*
237. Wu, J., Tenenbaum, J. B., and Kohli, P. (2017). Neural scene de-rendering. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR).*
238. Arsalan Soltani, A., Huang, H., Wu, J., Kulkarni, T. D., and Tenenbaum, J. B. (2017). Synthesizing 3D Shapes via Modeling Multi-View Depth Maps and Silhouettes with Deep Generative Networks. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR).*
239. Zhang, Z., Wu, J., Li, Q., Huang, Z., Traer, J., McDermott, J. H., Tenenbaum, J. B., and Freeman, W. T. (2017). Generative modeling of audible shapes for object perception. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR).*
240. Yildirim, I., Gerstenberg, T., Saeed, B., Toussaint, M., and Tenenbaum, J. B. (2017). Physical problem solving: Joint planning with symbolic, geometric and dynamic constraints. *Proceedings of the Thirty-Ninth Annual Conference of the Cognitive Science Society (CogSci 2017).*

Book Chapters (not competitively refereed)

241. Tenenbaum, J. B. and Bricolo, E. (1997). Analyzing the view-dependence of population codes in inferior temporal cortex. In J. M. Bower, (ed.) *Computational Neuroscience: Trends in Research 1997*. New York: Plenum. 867-872.
242. de Silva, V., and Tenenbaum, J. B. (2002). Unsupervised learning of curved manifolds. In D. D. Denison, M. H. Hansen, C. C. Holmes, B. Mallick and B. Yu (eds.), *Nonlinear Estimation and Classification*, Springer-Verlag, New York.
243. Tenenbaum, J.B., Griffiths, T. L., and Niyogi, S. (2007). Intuitive theories as grammars for causal inference. In A. Gopnik and L. Schulz (eds.), *Causal Learning*. Oxford University Press.
244. *Griffiths, T. L. and Tenenbaum, J.B. (2007). Two proposals for causal grammar. In A. Gopnik and L. Schulz (eds.), *Causal Learning*. Oxford University Press.

245. Tenenbaum, J. B., Kemp, C., Shafto, P. (2007). Theory-based Bayesian models for inductive reasoning. In A. Feeney and E. Heit (eds.), *Induction*. Cambridge University Press.
246. *Griffiths, T. L., Kemp, C., and Tenenbaum, J. B. (2008). Bayesian models of cognition. R. Sun (ed.), *Cambridge Handbook of Computational Psychology*. Cambridge University Press.
247. Goodman, N. D., Tenenbaum, J. B., Griffiths, T. L., & Feldman, J. (2008). Compositionality in rational analysis: Grammar-based induction for concept learning. M. Oaksford and N. Chater (Eds.). *The probabilistic mind: Prospects for rational models of cognition*. Oxford: Oxford University Press.
248. *Perfors, A., Tenenbaum, J.B., Gibson, E., Regier, T. (2010). How recursive is language? Bayesian exploration. In *Recursion and Human Language*, H.van der Hulst (ed). Mouton De Gruyter.
249. Griffiths, T. L., Tenenbaum, J. B., & Kemp, C. (2012). 3 Bayesian Inference. *The Oxford Handbook of Thinking and Reasoning*, 22.
250. Freer, C. E., Roy, D. M., and Tenenbaum, J. B. (2012). Towards common-sense reasoning via conditional simulation: Legacies of Turing in Artificial Intelligence. *Turing's Legacy, ASL Lecture Notes in Logic*, 2013. arXiv:[1212.4799](https://arxiv.org/abs/1212.4799). (Also: Freer, C. E., Roy, D. M., & Tenenbaum, J. B. (2014). Towards common-sense reasoning via conditional simulation: legacies of Turing in Artificial Intelligence. *Turing's Legacy: Developments from Turing's Ideas in Logic*, 42, 195.)
251. Oppenheimer, D. M., Tenenbaum, J. B., & Krynski, T. R. (2013). Categorization as causal explanation: Discounting and augmenting in a Bayesian framework. *Psychology of Learning and Motivation* 58, 203-231.
252. Goodman, N. D., Tenenbaum, J. B. & Gerstenberg, T. (to appear). Concepts in a probabilistic language of thought.
253. Baker, C. L., & Tenenbaum, J. B. (2014). Modeling human plan recognition using Bayesian theory of mind. *Plan, activity, and intent recognition: Theory and practice*, 177-204.
254. Austerweil, J. L., Gershman, S. J., Tenenbaum, J. B., & Griffiths, T. L. (2015). Structure and flexibility in Bayesian models of cognition. In J. R. Busemeyer, J. T. Townsend, Z. Wang, & A. Eidels (Editors), *Oxford Handbook of Computational and Mathematical Psychology*. Oxford U Press.
255. Gerstenberg, T. and Tenenbaum, J. B. (2017). Intuitive theories. In M. Waldmann (ed.), *Oxford Handbook of Causal Reasoning*. Oxford U Press.

Other Publications (not competitively refereed)

256. Xu, F., Tenenbaum, J. B., and Sorrentino, C. (1998). Concepts are not beliefs, but having concepts is having beliefs. Comment on R. Millikan, "A Common structure for concepts of individuals, stuffs and real kinds and real kinds; more mama, more milk, and more mouse." *Behavioral and Brain Sciences*, 22 (1).
257. Tenenbaum, J. B. (1999). *A Bayesian Framework for Concept Learning*. Ph.D. Thesis, Massachusetts Institute of Technology.
258. *C. Kemp, T. L. Griffiths, and J. B. Tenenbaum (2004). Discovering latent classes in relational data. MIT AI Memo 2004-019.
259. Chater, N., Tenenbaum, J. B., and Yuille, A. (2006). Probabilistic models of cognition: Conceptual foundations. *Trends in Cognitive Sciences* 10(7), 287-291.
260. * Griffiths, T. L. and Tenenbaum, J. B. (2006), Statistics and the Bayesian Mind. *Significance*. [Magazine of the Royal Statistical Society]

Selected Invited Presentations:

Yale University, Department of Computer Science, Vision seminar, November 1996.

University of Toronto, Department of Computer Science, Neural Networks Research Group, October 1997.

Brown University, Department of Cognitive and Linguistic Sciences, Vision and Neural Networks seminar, November 1997.

Schlumberger Cambridge Research, UK, November 1997.

NEC Research Institute, Vision Research seminar, January 1998.

University of California, Irvine, Department of Cognitive Sciences Colloquium, February, 1998.

University of Rochester, Department of Brain and Cognitive Science Colloquium, February 1998.

Stanford University, Department of Psychology Colloquium, February 1998.

Workshop on Learning from Relational Data Representations, Breckenridge, CO, December 1998.

Yale University, Department of Psychology, Cognitive Seminar, February 1999.

Invited Discussant, "Finding the Words..." workshop, Stanford University, April 2000.

Stanford University, Center for the Study of Language and Information, May 2000.

Cold Spring Harbor Laboratory, Bainbury Center Workshop on Network Models of Brain Function, September 2000.

Schlumberger Doll Research, Ridgefield, CT, September 2000.

UC Berkeley, Cognitive Science Colloquium, November 2000.

MIT, Brain and Cognitive Sciences Seminar, February 2001.

MIT, Perceptual Sciences Seminar, February 2001.

Stanford University, Department of Statistics Colloquium, April 2001.

University of Edinburgh, Division of Informatics, Colloquium, August 2001.

Gatsby Institute, University College London, Colloquium, August 2001.

Indiana University, Cognitive Science Colloquium, April 2002.

Indiana University, Mathematical Psychology Seminar, April 2002

Harvard University, Concepts and Words Seminar, April 2002

Brown University, Causality Seminar, April 2002.

New York University, Cognitive Psychology Colloquium, September 2002.

University of Pennsylvania, Institute for Research in Cognitive Science (IRCS) Colloquium, September 2002.

Cornell University, Department of Psychology Colloquium, October 2002.

Harvard University, Department of Psychology, Cognition, Brain and Behavior Seminar, October 2002.

Symposium on Causal Inference, Biennial Meeting of the Philosophy of Science Association, Milwaukee, WI, November 2002.

NTT Communication Sciences Research Labs, Intelligent Communication Laboratory, January 2003.

Yale University, Department of Psychology, Cognitive Lunch, February 2003.

Brown University, Brain Sciences Program Speaker Series, March 2003.

Northwestern University, Cognitive Science Program, Week-long Tutorial, May 2003.

Annual Meeting of the Society for Mathematical Psychology, Invited Tutorial, July 2003.

Rutgers University, Center for Cognitive Science (RUCCS), Colloquium, October 2003.

MIT Sloan School, Marketing Seminar, November 2003.

MIT Japan program, Mitsui/Toshiba Executive Mission, November 2003.

Air Force Office of Scientific Research, Workshop on Culture and Personality in Models of Adversarial Decision Making, McLean, VA, November 2003.

MIT Language, Cognition, and Computation Seminar Series, December 2003.

Knight Fellows Medical Evidence Bootcamp, Keynote talk, December 2003.

Workshop on Syntax, Semantics, and Statistics, Invited discussant, Whistler, B.C., Canada, December 2003.

Workshop on Infinite Models and Nonparametric Bayesian methods, Invited talk, December 2003.

The Johns Hopkins University, Center for Language and Speech Processing, Invited talk, February 2004.

MIT Stochastic Systems Seminar, Laboratory for Information and Decision Systems, April 2004.

Carnegie Mellon University, Department of Psychology, Colloquium, April 2004.

Carnegie Mellon University, Department of Psychology, Brownbag lunch speaker, April 2004.

Center for Advanced Study in the Behavioral Sciences, Stanford, CA, Invited Symposium on Causation, Theory Formation, and Explanation, April 2004.

International workshop on “Theories of Causality in Cognition: Frameworks, Frailties and Future Directions”, Invited speaker, July 2004.

International Conference on Thinking, Invited Symposium on Induction, July 2004.

Workshop on Probabilistic Models of Cognition: The Mathematics of Mind, Institute for Pure and Applied Mathematics, UCLA, January 2005.

University of Rochester, Department of Brain and Cognitive Sciences, Colloquium, February, 2005.

Brown University, Symposium for Undergraduates in the Mathematical Sciences, February 2005.

Stanford University, Department of Computer Science, Broad Area Colloquium for Artificial Intelligence, Graphics, Geometry and Computer Vision, March 2005.

California Institute of Technology, Sloan-Swartz Center for Theoretical Neuroscience, Colloquium, March 2005.

Rensselaer Polytechnic Institute, Cognitive Science Colloquium, September 2005.

Harvard University, Applied Statistics Workshop, October 2005.

International workshop on Bayesian Cognition, College de France, Paris, France, January 2006.

University of Arizona, Cognitive Science Colloquium, March 2006.

University of Southern California/Information Sciences Institute, “Young Stars” Colloquium Series, March 2006.

Harvard University, Computer Science Colloquium, May 2006.

University of Rochester, Center for Visual Science symposium on “Statistical learning and brain plasticity”, May 2006.

New York University Conference on Causation, Villa La Pietra, Florence, Italy, June 2006.

University of Edinburgh, Distinguished Lecture in Informatics, June 2006.

Rational Models of Cognition, Invited Conference Address, University College London, June 2006.

DARPA ISAT/IXO Workshop on “Adaptive and Interactive Representations”, Cambridge, MA, July 2006.

Society for Mathematical Psychology, Plenary address, July 2006.

NSF Workshop on “Mind and Brain: Strategies and Directions for Future Research”, Arlington, VA, July 2006.

Symposium on “Exploring Mind and World” (in honor of Roger Shepard), Annual Conference of the Cognitive Science Society, July 2006.

Symposium on “Building and Evaluating Models of Human-Level Intelligence”, Annual Conference of the Cognitive Science Society, July 2006.

Invited Tutorial, Neural Information Processing Systems Conference, Vancouver, B.C., Canada, December 2006.

Carnegie Mellon University, School of Computer Science, Intelligence Seminar, February 2007.

Air Force Office of Scientific Research Workshop on “Robust Decision Making”, February 2007.

NSF Workshop on Learning, Development and Plasticity, Arlington, VA, March 2007.

University of British Columbia, Distinguished Lecture, Institute for Computing, Information, and Cognitive Systems, March 2007.

University of Washington, Center for Statistics in the Social Sciences (CSSS) seminar, March 2007.

University of California, San Diego, Distinguished Lecture, Department of Cognitive Science, April 2007.

Origins of Causal Cognition, Workshop sponsored by the University of Leuven, Belgium, May 2007.

Max Plank Institute for Biological Cybernetics, Colloquium, May 2007.
International Conference on Machine Learning, invited plenary address, June 2007.
Symposium on “Cognitive Decision Theory: Developing Models of Real-World Decision Behavior”, Annual Conference of the Cognitive Science Society, July 2007.
Workshop on “Cases, rules and probabilities”, Cowles Institute, Yale University, September 2007.
Workshop on “Where does syntax come from?”, Cambridge, MA, October 2007.
Symposium on “Generalization in Language Learning”, Society for Language Development, Boston, MA, November 2007.
Workshop on “Bridging the developmental divide: Sentence processing meets word and grammar learning”, Institute for Research in Cognitive Science, University of Pennsylvania, November 2007.
Columbia University, Department of Psychology, Colloquium, February 2008.
CUNY conference on sentence processing, invited address, March 2008.
Rockefeller University, Center for Studies in Physics and Biology seminar, April 2008.
University of Wisconsin, Cognitive Science cluster, Colloquium, May 2008.
Workshop on “Connecting probabilistic models of cognition and neural networks”, Berkeley, CA, August 2008.
Tufts University, Department of Computer Science Colloquium, September 2008.
Brown University, Department of Cognitive and Linguistic Sciences, Colloquium, November 2008.
Yale University, Cognitive Science seminar series, December 2008.
COSYNE (Computational and Systems Neuroscience) meeting, Invited speaker, February 2009.
Princeton University, Department of Psychology, Colloquium, March 2009.
Workshop on “Probabilistic models in cognitive development”, Banff International Research Station, May 2009.
Plenary address, Thirty-First Annual Conference of the Cognitive Science Society, July 2009.
Plenary address, Cognitive Development Society, October 2009.
Keynote address, Computational Cognitive Neuroscience Conference, November 2009.
Convener and presenter, IdeasLab Session on “The Nature of Intelligence”, World Economic Forum, Davos, January 2010.
Brandeis University, Department of Psychology Colloquium, February 2010.
Brain Theory Seminar, Harvard University, March 2010.
MIT Lincoln Labs Colloquium, March 2010.
Cognitive Science Colloquium, University of Maryland, April 2010.
Cognitive Science Seminar, The Johns Hopkins University, April 2010.
Keynote speaker, Statistical and Relational Artificial Intelligence (StarAI) workshop, AAAI, July 2010.
Computation and Neural Systems Colloquium, Caltech, October 2010.
Symbolic Systems Forum, Stanford University, October 2010.
UC Berkeley Institute for Cognitive and Brain Sciences Seminar, October 2010.
Public Lecture on Interdisciplinary Mathematics, UCLA IPAM (Institute for Pure and Applied Mathematics) Tenth Anniversary Meeting, November 2010.
Posner Lecture, Neural Information Processing Systems conference, December 2010.
Distinguished Lecturer, Department of Computer Science, University of Toronto, February 2011.
UC San Diego Cognitive Science Department, May 2011.
Keynote speaker, Ohio State University CogFest, May 2011.
Hebb Lecture, McGill University, February 2012.
Pinkel endowed lecture in Cognitive Science, Institute for Research in Cognitive Sciences, University of Pennsylvania, March 2012.
Keynote speaker, Spring Research Day, Center for Cognitive Sciences, University of Minnesota.
Keynote speaker, Sixth International Conference on Thinking, July 2012, London.

Keynote speaker, Association for the Advancement of Artificial Intelligence (AAAI) annual meeting, July 2012 .

Simons Foundation Science Series, October 2012.

Roger N. Shepard Visiting Lecturer, University of Arizona Cognitive Science Program, November 2012.

Keynote talk of the workshop on Probabilistic Programming, "Modeling human common sense with probabilistic programs" at NIPS, 2012, Lake Tahoe, NV. December 2012.

"Turing Enduring" Symposium, Rockefeller University, December 2012.

Keynote talk of the workshop on Decision Making in Nature, "Modeling human decision making with probabilistic programs" at Imperial College, London, England. May 2013.

Keynote speaker, "Modeling common-sense scene understanding with probabilistic programs" at the 29th Conference on Uncertainty in Artificial Intelligence, in Bellevue, WA. July 2013.

Keynote speaker, "Learning as program induction" at the 23rd International Joint Conference on Artificial Intelligence, Beijing, China. August 2013.

Carnegie Mellon University, Machine Learning Department Distinguished Speaker Series, March 2014

Carnegie Mellon University, Center for the Neural Basis of Cognition Colloquium, March 2014.

University of Massachusetts, Amherst, Computational Social Science Program, April 2014.

Columbia University, Theoretical Neuroscience Colloquium, April 2014.

Keynote speaker CVPR 2014 workshop, "Vision meets Cognition", June 2014

Invited speaker, Annual Meeting of the Cognitive Science Society, Plenary Symposium on Computational Models of Moral Cognition, July 2014.

Invited speaker, MIT Center for Art, Science and Technology (CAST) Symposium on "Seeing, Sounding, Sensing", September 2014.

Keynote speaker, Gulf Coast Consortium Conference on Theoretical and Computational Neuroscience, February 2015.

Invited talk, AAAI Spring Symposium on "Knowledge Representation and Reasoning: Integrating Symbolic and Neural Approaches", March 2015.

Keynote speaker, Federation of European Neuroscience Societies (FENS) Brain Conference on "Bridging neural mechanisms and cognition", April 2015.

Invited speaker, Boston University Conference on Neural Processing in Humans, Animals and Machines, June 2015.

Invited speaker, CVPR 2015 Workshop on scene understanding, June 2015.

Invited speaker, Kavli Meeting on Frontiers of Brain Science, June 2015.

Heller Lecturer, Safra Center for Brain Sciences, Hebrew University, June 2015.

Invited speaker CogSci 2015 Workshop on Vision meets Cognition, July 2015.

Keynote speaker, "Is the Brain Bayesian?" Workshop at New York University, Center for Mind, Brain and Consciousness.

Invited speaker, NIPS Workshop on Computation and Cognition: Neuro-symbolic models, December 2015.

Invited speaker, NIPS Symposium on Intelligence in Brains, Minds and Machines, December 2015.

Presentation to the Swiss Computational Neuroscience Forum in Geneva, February 2016

Keynote speaker, Robotics@MIT conference, February 2016.

Norman Anderson Distinguished Lectureship, UC San Diego, March 2016.

Frijda Honorary Lecture, University of Amsterdam, June 2016.

Invited Symposium on Causation, Society for Philosophy and Psychology, June 2016.

Invited Speaker, Rovereto Cog-Evo meeting, July 2016.

Invited Symposium on Causal Reasoning, International Conference on Thinking, August 2016.

Keynote speaker, Annual Meeting of the Simons Collaboration on the Global Brain, September 2016.

Distinguished Lecture, Toyota Technological Institute-Chicago, October 2016.

Address to the Vatican (Pontifical Academy of Sciences) conference on AI and the Brain, November 2016.

Invited Speaker, NIPS Workshop on Deep Reinforcement Learning, December 2016.
 Invited Speaker, NIPS Workshop on Neural Abstract Machines and Program Induction, December 2016.
 Invited Speaker, NIPS Workshop on Intuitive Physics, December 2016.
 Keynote speaker at i-CORE (Israeli Center for Research Excellence) in Cognitive Science annual conference, January 2017.
 Jon Postel Distinguished Lecturer, UCLA Department of Computer Science, February 2017.
 Emory University, Department of Psychology, Colloquium, February 2017.
 Annual Invited Lecturer, Washington University's program in Cognitive, Computational and Systems Neuroscience, March 2017.
 Keynote speaker, AAAI Symposium on Intelligence in Brains Minds and Machines, March 2017.
 AFOSR Future of Machine Learning Workshop, Arlington, VA, May 2017.
 Keynote speaker, O'Reilly AI Conference, New York City, June 2017.
 Invited speaker, Deep Learning in Robotics workshop, Robotics: Science and Systems (RSS) conference, July 2017.
 Invited speaker, Learning from Demonstrations workshop, Robotics: Science and Systems (RSS) conference, July 2017.
 Invited speaker, Gatsby Computational Neuroscience Unit, London, July 2017.
 Opening keynote speaker, Inaugural Cognitive Computational Neuroscience (CCN) meeting, New York City, September 2017.
 Keynote speaker, National Robotics Initiative (NRI) Annual Meeting, Washington, D. C., November, 2017.

Research Contracts and Grants:

The Schlumberger Foundation, September 1999, \$30,000, "Manifold learning for nonlinear inverse problems."
 Center for the Study of Language and Information, Stanford University, November 1999, \$12,500, "A Bayesian framework for example-driven database search."
 MERL (Mitsubishi Electric Research Labs), January 2000, \$20,000, "Bayesian models of perception and cognition."
 The Schlumberger Foundation, May 2000, \$30,000, "Manifold learning for nonlinear inverse problems" (continuation of previous award).
 DARPA/ONR, October 2000 – July 2002, \$137,613, "Human ID and the structure of perceptual face space."
 NTT Communications Sciences Laboratory, April 2001-April 2002, \$115,000, "Theory and applications of Bayesian concept learning."
 MERL (Mitsubishi Electric Research Labs), April 2001, \$10,000, "Bayesian models of perception and cognition".
 NSF Focused Research Group, July 2001-July 2004, \$1,000,000, "Topological methods in data analysis", with Gunnar Carlsson and Persi Diaconis.
 NTT Communications Sciences Laboratory, July 2002-December 2010, \$890,000 (approximate), "Learning semantic structure".
 DARPA/SRI CALO Project, July 2004-February 2009, \$470,000, "Topic modeling and identification."
 AFOSR MURI, June 2005-June 2008, \$4,600,000, "Computational modeling of adversary attitudes and behaviors: computational models for belief structures and intentions", with Whitman Richards (PI) and eight other investigators across five institutions. MIT component, supporting Richards, Winston, Tenenbaum and several students and postdoctoral researchers, is \$840,000.
 James S. McDonnell Foundation Causal Learning Research Collaborative, September 2005-July 2010, \$225,000 (approximate), "Prior knowledge in causal learning and

categorization.”

DARPA BICA (Biologically Inspired Cognitive Architectures) Program, October 2005-May 2007. Support for Phase I study by CSAIL team, with Patrick Winston (PI) and several other investigators. Total support for Tenenbaum is \$75,000.

Eli Lilly & Co., October 2006, \$50,000, “Finding structure in heterogenous scientific data”.

ONR MURI, June 2007-June 2012, \$6,500,000, “Robust learning and skill transfer with video games”, with Daphne Bavelier (PI) and six other investigators across six institutions. MIT component is approximately \$650,000 over five years.

AFOSR Cognition and Decision Program, December 2006-December 2009, \$225,000, “Theory-based Bayesian models of inductive inference”.

Google Research Award, December 2007, \$100,000, “Scalable Approximate Inference for Structured Probabilistic Models”.

ARL MURI, June 2008-July 2011, “A unified approach to abductive inference”, with Pedro Domingos (PI) and five other investigators across seven institutions. MIT component is approximately \$750,000 over five years.

ONR Cognitive Science Program, July 2009-July 2012, \$458,802, “A framework for core cognition”, with Noah Goodman as co-PI.

AFOSR Robust Decision Making program, September 2009-September 2012, \$600,000, “Rich causal models for robust decision making”, with Leslie Kaelbling and Michael Littman.

Shell, \$375,000, July 2009 – July 2012, “Manifold learning for multi-attribute dynamic co-visualization”, with Alan Willsky.

Qualcomm, \$200,000, “A generative approach to visual scene understanding”, with Antonio Torralba.

IARPA ICARUS (Integrated Cognitive Architectures for Understanding Sensemaking; Award approved subject to contract negotiation). Joint with BBN and multiple MIT faculty. MIT component is approximately \$850,000/year, for 3-5 years.

ONR MURI, 2010-2015, “Knowledge Representation, Reasoning and Learning for Understanding Scenes and Events”, joint with multiple faculty at Stanford, Berkeley, MIT, Caltech, and USC (Song-Chun Zhu, PI).

ONR, 2013-2016, “Probabilistic programming for cognitive modeling”, \$150,000/year (joint with Vikash Mansinghka).

ARO, 2013-2017, “Probabilistic programming foundations and theory”, \$200,000/year (joint with Vikash Mansinghka).

ONR MURI, 2015-2020, “Common-sense scene understanding”, joint with multiple faculty at UCLA, Stanford, CMU, MIT, Yale, Oxford, and Glasgow (Song-Chun Zhu, PI). MIT component \$225,000/year.

NSF Center for Brains, Minds and Machines, 2013-2018, Research thrust leader, budget roughly \$850,000/year.

DARPA Robotics seedling, 2015-2016, \$600,000 (joint with Emo Todorov, UWashington and Tao Gao, GE Research).

IARPA MICRONS, 2016-2019.

AFOSR, 2015-2018, “Concept learning as program induction”, \$200,000/year.