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## **Education**

B.S. *magna cum laude* in Cognitive Psychology, Northeastern University (2002)

Ph.D. Brain and Cognitive Sciences. Massachusetts Institute of Technology (2009)

Post-Doctoral Associate, University of California, Berkeley (2009-. )

## **Fellowships, Grants, and Honors**

### ***Fellowships, Grants***

Finalist for a grant from the Templeton Foundation – Thrive Center for Human Development. (One of 30 chose for 16 awards; notification March 2013). April 2013 – May 2015, \$250,000

National Science Foundation, July 2010 – June 2013, \$323,030.  
(PI's Alison Gopnik & Tom Griffiths)

Elizabeth Munsterberg Koppitz Child Psychology Graduate Fellowships (2008-2009)  
Dissertation Fellowship from the American Psychological Foundation

National Science Foundation Research Fellowship: Honorable Mention (2005, 2004)

Faculty Undergraduate Research Institute Fellowship, Northeastern University (2002)

Provost Research Grant, Northeastern University (2001)

### ***Honors***

Walle Nauta Award for Continuing Dedication to Teaching (2007)  
MIT Department of Brain and Cognitive Sciences

Marr Prize for Best Student Paper, Cognitive Science Society (2006)  
“Modeling Cross-Domain Causal Learning in Preschoolers as Bayesian Inference”

Angus MacDonald Award for Excellence in Undergraduate Teaching (2006)  
MIT Department of Brain and Cognitive Sciences

Marr Prize for Best Student Paper Honorable Mention, Cognitive Science Society (2005)  
Second author, “Using Physical Theories to Infer Hidden Causal Structure”

Sullivan Scholarship: Multidisciplinary Research Award (2002) Northeastern University

Faculty Scholar Senior Award (2002) Northeastern University

National Society of Collegiate Scholars

University of Delaware Scholarship Winner (1999)

Chapter Founder at Northeastern University (2000)

Chapter President at Northeastern University (2001)

### **Travel Awards**

Cambridge University Machine Learning Summer School Grant (2009)

Cognitive Science Society Student Travel Award (2007, 2009)

Association for the Advancement of Artificial Intelligence Student Travel Award (2007)

### **Publications**

#### **Journal Articles**

Bonawitz, E.B. & Griffiths, T.L. (*in review*) Considering psychological mechanisms can change the interpretation of Bayesian models.

Denison, S., Bonawitz, E., Gopnik, A., & Griffiths, T. (*in review*) Rational variability in children's causal inferences: The Sampling Hypothesis.

Lombrozo, T., Bonawitz, E., Brooke, N.R. (*in review*) Asymmetries in young children's learning of teleological and mechanistic explanations.

Muentener, P., Bonawitz, E.B., Horowitz, A., & Schulz, L.E. (2012) Mind the gap: Investigating toddlers' sensitivity to contact relations in predictive events. *PLoS ONE* 7(4): e34061. doi:10.1371/journal.pone.0034061.

Bonawitz, E.B., van Schijndel, T., Friel, D., & Schulz, L. (2012) Children balance theories and evidence in exploration, explanation, and learning. *Cognitive Psychology*, 64(4), 215-234.

Bonawitz, E.B., & Lombrozo, T. (2012) Occam's Rattle: Children's use of simplicity and probability to constrain inference. *Developmental Psychology*, 48, 1156-1164.

Bonawitz, E.B., Fischer, A., & Schulz, L. (2012) Teaching 3.5-Year-Olds to Revise Their Beliefs Given Ambiguous Evidence. *Journal of Cognition and Development*, 13(2), 266-280. 10.1080/15248372.2011.577701

Bonawitz\*, E.B., Shafto\*, P., Gweon, H., Goodman, N.D., Spelke, E., & Schulz, L.E. (2011) The double-edged sword of pedagogy: Teaching limits children's spontaneous exploration and discovery. *Cognition*, 120(3), 322-330. (\*joint first author)

Bonawitz, E.B., Ferranti, D., Saxe, R., Gopnik, A., Meltzoff, A., Woodward, J., & Schulz, L. (2010) Just do it? Toddlers ability to integrate prediction and action. *Cognition*, 115, 104-117.

Schulz, L., Bonawitz, E.B., & Standing, H. (2008) Word, thought, and deed: The role of object labels in children's inductive inferences and exploratory play. *Developmental Psychology*, 44(5), 1266-1276.

Shafto, P., Kemp, C., Bonawitz, E.B., Coley, J.D., & Tenenbaum, J.B. (2008) Reasoning About Causal Transmission. *Cognition*, 109(2), 175-192.

Schulz, L., Bonawitz, E.B., & Griffiths, T.L. (2007) Can being scared give you a tummy ache? Naive theories, ambiguous evidence and preschoolers' causal inferences. *Developmental Psychology*, Sep Vol 43(5), 1124-1139.

Schulz, L., & Bonawitz, E.B. (2007) Serious fun: Preschoolers play more when evidence is confounded. *Developmental Psychology*, Jul Vol 43(4), 1045-1050.

### **Refereed Conference Proceedings**

Bonawitz, E.B., Ullman, T., Gopnik, A., & Tenenbaum, J.B. (*in review*) Sticking to the evidence? A computational and behavioral case study of micro-theory change in the domain of magnetism.

Pham, K., Bonawitz, E., & Gopnik, A. (2012). Seeing who sees: Contrastive access helps children reason about other minds. *Proceedings of the Thirty-fourth Cognitive Science Society*.

Gonzalez, A. Shafto, P., Bonawitz, E., & Gopnik, A. (2012) Is that your final answer? The effects of neutral queries on children's choices. *Proceedings of the Thirty-fourth Cognitive Science Society*.

Bonawitz, E., Denison, S., Chen, A., Gopnik, G., & Griffiths, T.L. (2011) A simple sequential algorithm for approximating Bayesian inference. *Proceedings of the Thirty-third Cognitive Science Society*.

Muentener, P., Bonawitz, E.B., Horowitz, A., & Schulz, L.E. (2011) Mind the Gap: Dispositional Agency Facilitates Toddlers' Causal Representations. *Proceedings of the Thirty-third Cognitive Science Society*.

Bonawitz, E.B., & Griffiths, T. (2010) Deconfounding Hypothesis Generation and Evaluation in Bayesian Models. *Proceedings of the Thirty-second Cognitive Science Society*.

Denison, S., Bonawitz, E.B., Gopnik, A., & Griffiths, T. (2010) Preschoolers sample from probability distributions. *Proceedings of the Thirty-second Cognitive Science Society*.

Bonawitz, E.B., Horowitz, A., Ferranti, D., Schulz, L. (2009) The Block Makes It Go: Causal Language Helps Toddlers Integrate Prediction, Action, and Expectations about Contact Relations. *Proceedings of the Thirty-first Cognitive Science Society*.

Bonawitz, E.B\*, Shafto, P\*, Gweon, H., Chang, I., Katz, S., & Schulz, L. (2009) The Double-Edged Sword of Pedagogy: Modeling the Effect of Pedagogical Contexts on Preschoolers Exploratory Play. *Proceedings of the Thirty-first Cognitive Science Society*.  
\*Equal author contribution.

Bonawitz, E.B. & Schulz, L.E. (2008) Why Learning is Hard. *Symposium on Naturally-Inspired Artificial Intelligence, Proceedings of AAAI*.

Bonawitz, E.B., Chang, I., Clark, C., & Lombrozo, T. (2008) Ockham's razor as inductive bias in preschoolers causal explanations. *Proceedings of the 7th International Conference of Development and Learning*.

Bonawitz, E.B., Fischer, A., Schulz, L.E. (2008) Training a Bayesian: Three-and-a-half-year-olds' reasoning about Ambiguous Evidence. *Proceedings of the Thirtieth Annual Conference of the Cognitive Science Society*.

Bonawitz, E.B., Lim, S., & Schulz, L.E. (2007) Weighing the Evidence: Children's theories of Balance affect play. *Proceedings of the Twenty-Ninth Annual Conference of the Cognitive Science Society*. Nashville, Tennessee.

Bonawitz, E.B., & Schulz, L. (2007) Children's Rational Exploration. *AAAI Fall Symposium on Computational Approaches to Representation Change During Learning and Development*.

Bonawitz, E.B., Griffiths, T.L., & Schulz, L. (2006) Modeling Cross-Domain Causal Learning in Preschoolers as Bayesian Inference. *Proceedings of the Twenty-Eighth Annual Conference of the Cognitive Science Society*. **Marr Prize for Best Student Paper**

Goodman, N.D., Baker, C.L, Bonawitz, E.B., Mansinghka, V.K., Gopnik, A., Wellman, H., Schulz, L.E., & Tenenbaum, J.B. (2006) Intuitive Theories of Mind: A Rational Approach to False Belief. *Proceedings of the Twenty-Eighth Annual Conference of the Cognitive Science Society*.

Shafto, P., Kemp, C., Baraff, E.R., Tenenbaum, J.B., and Coley, J. (2005) Inductive Generalizations of Novel Disease: Causal Generalizations over Foodweb Relations. *Proceedings of the Twenty-Seventh Annual Conference of the Cognitive Science Society*.

Griffiths, T.L., Baraff, E., & Tenenbaum, J.B. (2004) Using Physical Theories to Infer Hidden Causal Structure. *Proceedings of the Twenty-Sixth Annual Conference of the Cognitive Science Society*. **Marr Prize for Best Student Paper Honorable Mention**

## **Chapters and Theses**

Bonawitz, E. Gopnik, A., Denison, S., & Griffiths, T. (2012) Rational Randomness: The role of sampling in an algorithmic account of preschooler's causal learning. In Xu, F., & Kushnir, T. (Eds.) *Rational Constructivism in Cognitive Development*. Oxford, United Kingdom: Elsevier Limited.

Bonawitz, E.B. (2009) *The Rational Child: Theories and Evidence in Prediction, Exploration, and Explanation*. MIT PhD Thesis in Brain and Cognitive Sciences.

Coley, J.D., Shafto, P., Stepanova, O., & Baraff, E. (2005) Knowledge and Category-Based Induction. In Ahn, W., Goldstone, R. L., Love, B. C., Markman, A. B., & Wolff, P. (Eds.) *Categorization inside and outside the laboratory: Essays in honor of Douglas L. Medin*. Washington, DC: American Psychological Association.

Baraff, E. (2002). *The Effects of Time Constraints on Expert and Novice Reasoning about Music*. Northeastern University Honors Thesis.

### ***In Revision & Preparation***

Bonawitz E.B., Brenman, S., & Schulz, L. (*in prep*) Believing is Seeing: Children's Causal Beliefs Affect Visual Exploration and Prediction.

Bonawitz, E.B., Goodman, N.D., Pham, K., Baker, C.L, Gopnik, A., Wellman, H., Schulz, L.E., Saxe, R., & Tenenbaum, J.B. (*in prep*) Ideal Observers in Theory of Mind.

Bonawitz, E., Denison, S., Gopnik, G., & Griffiths, T.L. (*in prep*) Analyzing causal inferences with simple sampling algorithm: Win-stay, lose-shift.

Bonawitz, E., Hanson, M., Ramarajan, D., Shafto, P., Wellman, H., Gopnik, A. (*in prep*) Pedagogy and Theory of Mind: The relationship between children's teaching and their reasoning about others.

### **Selected<sup>1</sup> Talks and Presentations**

#### ***Invited Talks***

Bonawitz, E.B. (2013) Bayesian Models of Cognitive Development. *Budapest Conference on Cognitive Development*. Budapest, Hungary.

Bonawitz, E.B., (2012) How children change their minds. *University of California, Merced Psychology Department Colloquium*.

Bonawitz, E.B. (2012) Exploring the Sampling Hypothesis in Preschooler's causal inferences. *Bay area cognitive science conference*.

Bonawitz, E.B. (2012) What kids know about causality: Limitations of predictive relations Dispositional agency and causal language facilitate toddlers' causal representations. *Berkeley Cognitive Science Society Causality Seminar Series*.

Bonawitz, E.B. (2012) The child as a scientist: How children change their minds. Menlo-Atherton Coop Nursery School speaker series.

Bonawitz, E.B. (2010) When preschooler's are taught, and when they teach others. *Workshop on Social Cognition and Statistical and Causal Learning*. Stanford, CA.

Bonawitz, E.B. (2010) Algorithms of Children's Causal Learning: Sampling. *McDonnell Consortium Workshop*

Bonawitz, E.B., (2009) The Rational Child: Theories and Evidence in Prediction, Explanation, and Exploration. Change, Plasticity and Development Colloquium. Berkeley, CA.

Bonawitz, E.B. (2009) "The block makes it go!": Toddlers' ability to integrate prediction, action, and expectations about contact relations. *Probabilistic Models of Cognitive Development*. Banff International Research Station.

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<sup>1</sup> Only first author presentation roles listed; Maiden name Baraff

Bonawitz, E.B. (2009) Rational Explanation: Modeling the Role of Beliefs and Evidence. Mechanism & Explanation Workshop. Berkeley, CA.

Bonawitz, E.B. (2009) Beyond Bachelors: Pursuing Psychology in graduate school and beyond. Northeastern University Psychology Department Graduation.

Bonawitz, E.B., (2008) Children's Causal theories affect exploration, explanation, and visual attention. *McDonnell Workshop on Problems of Variable Definition*. Carnegie Mellon University.

Bonawitz, E.B. (2008) The Rational Child: Reasons behind kids quirky behaviors. Lecturer at Museum of Science Life Cycle Adult Workshop, special session on The science of kids, February, 2007. Boston, MA.

Bonawitz, E.B. (2006) Bunnies, Boxes, and Balances: The role of theories, evidence, and free play in children's causal learning. *Brown Conference on Causal Reasoning*. Providence, RI.

Bonawitz, E.B. (2006) Science of Cognitive Development; *Boston Museum of Science Innovators Day Discovery Center Exhibit*

Bonawitz, E.B. (2005) Evidence, Theories, and Spontaneous Play in Preschoolers: How Little Scientists Become Smart Scientists. Northeastern University.

### **Refereed Conference Presentations**

Bonawitz, E.B., Denison, S., Gopnik, A., & Griffiths, T. (2011) Exploring the "Sampling Hypothesis" in preschooler s causal inferences. *Cognitive Development Society*.

Bonawitz, E.B., Ramarajan, D., Wellman, H., Griffiths, T., & Gopnik, A. (2011) The ability to teach others is linked to Theory of Mind. *Society for Research in Child Development*

Bonawitz, E.B., Ullman, T., & Tenenbaum, J. (2011) Sticking to the evidence? A case study of preschoolers' micro-theory change in the domain of magnetism. *Society for Research in Child Development*

Bonawitz, E.B., & Griffiths, T. (2010) Deconfounding Hypothesis Generation and Evaluation in Bayesian Models. *Cognitive Science Society*.

Bonawitz, E.B., (2009) The Importance of Priming Sampling: Distinguishing hypothesis generation from hypothesis evaluation. NIPS Workshop "Bounded-rational analysis of human cognition".

Bonawitz E.B., Brenman, S., & Schulz, L. (2009) Believing is Seeing: Children's Causal Beliefs Affect Visual Exploration and Prediction. Thirty-first Cognitive Society Conference

Bonawitz, E.B., & Schulz, L. (2009) Language Influences Toddlers' Causal Reasoning: From Correlation to Intervention. *Society for Research in Child Development*. Symposium: Linguistic Contexts of Causal Cognition: How Children use Language to Learn, Represent and Reason About Cause

Bonawitz, E.B., & Schulz, L. (2009) Balancing Theories and Evidence in Children's Exploration, Explanations, and Learning. *Society for Research in Child Development*.

Bonawitz, E.B. (2007) Can Being Scared Cause Tummy Aches? Naive Theories, Ambiguous Evidence and Preschoolers Causal Inferences. *Society for Research in Child Development*.

Bonawitz, E.B., & Lombrozo, T. (2007) Simplicity and Probability in Children's Causal Explanations. *Cognitive Science Society*.

Standing, H., Bonawitz\*, E.B., & Schulz, L. (2007) The Role of Word Labels in Children's Causal Inductions and Exploratory Play. *Cognitive Science Society*. \*Presenting Role

Bonawitz, E.B., Griffiths, T.L., & Schulz, L. (2005) Theories, Evidence, and Preschoolers Causal Judgments. *Cognitive Development Society*, San Diego, CA.

Baraff, E.R., Cheries, E., and Carey, S. (2005) The Role of Spatiotemporal Relations in Infants Encoding of Individuals. *Society for Research in Child Development*. Atlanta, GA.

Baraff, E. & Tenenbaum, J.B. (2004). The Role of Theory of Mind Inferences in Bayesian Word Learning. *First Joint Conference of the Society for Philosophy & Psychology and The European Society for Philosophy & Psychology*. Barcelona, Spain.

Baraff, E., & Coley, J.D. (2003) Thinking About Music: Novice and Expert Inductive Reasoning. *25th Annual Conference of the Cognitive Science Society*. Boston, MA.

Baraff, L. & Coley, J.D. (2002). Expert and Novice Inductive Reasoning in Fast and Slow Conditions. *Northeastern University College of Arts & Sciences Experiential Education Expo*, May 2002.

Baraff, L., & Jacobson, J. (2002). Revisiting Jewish Musicality in America. *Northeastern University College of Arts & Science Experiential Education Expo*, May 2002.

## **Teaching Experience**

### **Teaching Assistant**

Infant and Childhood Cognition (MIT, F2005); *Angus MacDonald Award for Excellence in Undergraduate Teaching*

Infant and Childhood Cognition (MIT, F2006); *Walle Nauta Award for Continuing Dedication to Teaching*

Brain and Cognitive Sciences II for Graduate Students (MIT, S2008)

### **Invited Guest Lecturer**

Cognitive Development (MIT, F2007; F2008)

Introduction to Child Psychology (MIT Freshman Pre-orientation Program; F2008)

Topical Seminar in Developmental Psychology (Berkeley, F2009)

Basic Issues in Cognition (Berkeley, F2009)

BROCA, Berkeley Review of Cognitive Science Articles (Berkeley, F2010)

Cognition, Emotion, and Personality. Doctoral course in clinical psychology at the Wright Institute. (S2012)

Life Cycle Adult Workshop: Science of Kids (February, 2008) *The Rational Child: Reasons behind Kids' Quirky Behaviors*, Museum of Science, Boston MA

**Science Staff Training** (May, 2006; December, 2006; May, 2007, November 2007, May 2008, December 2008, April 2009) Early Childhood Cognition Lab & Discovery Center Collaborative Debriefing

## Professional Activities

### **Adhoc and Conference Reviewing**

*Cognition, Cognitive Science, Child Development, Developmental Science, British Journal of Development, Journal of Experimental Psychology: Learning, Memory and Cognition, Quarterly Journal of Experimental Psychology, PLoS ONE*

Society for Research in Child Development, Annual Conference of the Cognitive Science Society, International Conference of Development and Learning, Granting organizations (NSF, NIH,

### **Organizing Symposia & Workshops**

Symposium Chair: *The Problem of Probabilistic Inference: How Children Learn from and Search through Probabilistic Worlds*. Cognitive Development Society. October, 2011. Philadelphia, PA.

Symposium Chair: *Learning by Doing: The Role of Exploratory Play in Cognitive Development*. Cognitive Development Society. October, 2007. Santa Fe, NM.

Symposium Chair: *What Makes us Sick? Naïve Theories and Biological Reasoning*. March, 2007. Society for Research in Child Development. Boston, MA.

## Media Coverage

**National Geographic Television & Film - Ape Genius** (Aired NOVA, PBCS, Spring 2008)  
Research Consultant, Technical Assistant, Child Studies Coordinator

### **In the news:**

Psychology Today – *Does Curiosity Guide Children's Learning? Explaining "explaining away" and the process of revising beliefs*. (April, 2012)

UC Berkeley New Center - *Scientists tap the genius of babies and youngsters to make computers smarter* (March, 2012)

Psychology Today - *Choosing the Best Explanation Is Elementary, My Dear Watson Sherlock Holmes or Occam's Razor? Let the kids decide*. (January, 2012)



Huffington Post - *Give the Gift of Curiosity for the Holidays -- Lessons From Laura Schulz* (December, 2011)

Scientific American – The educational value of creative disobedience. (July, 2011)

MIT news – *Don't show, don't tell?* Featured MIT front page. (June, 2011)

The Economist – *Now you know: When should you teach children, and when should you let them explore?* (May, 2011)

Slate – *Why Preschool Shouldn't Be Like School* (March, 2011)

Boston Globe – *A squeeze, a squeak, a glimpse of learning* (March, 2011)

Discover Magazine – *When teaching restrains discovery* (January, 2011)

Scientific American – *How Babies Think* (July, 2010)

Slate Magazine – *Why do kids crave magic* (October, 2009)

New York Times – *Your Baby Is Smarter Than You Think* (August, 2009)

National Public Radio, KPW Utah (May, 2006)