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EMPLOYMENT

Massachusetts Institute of Technology

Postdoctoral Fellow, Computer Science and Artificial Intelligence Laboratory. **August 2011–present**
Research postdoc. Postdoctoral mentors: Joshua B. Tenenbaum and Leslie P. Kaelbling

University of Hawai‘i at Mānoa

Junior Researcher, Department of Mathematics. **August 2010–July 2011**
NSF-funded research and teaching postdoc. Postdoctoral mentor: Bjørn Kjos-Hanssen

Massachusetts Institute of Technology

Instructor in Pure Mathematics, Department of Mathematics. **July 2008–June 2010**
Research and teaching postdoc. Postdoctoral mentors: Hartley Rogers, Jr. and Michael Sipser

EDUCATION

Harvard University

Ph.D. in Mathematics, 2008. Dissertation: *Models with high Scott rank*. Advisor: Gerald E. Sacks

University of Chicago

S.B. in Mathematics with Honors, 2003.

RESEARCH INTERESTS

Computability and complexity theory of probabilistic inference, computable probability theory, model theory of graphs and graph limits, and the physics of causality and computation.

PUBLICATIONS

- C. E. Freer and D. M. Roy, *Computable de Finetti measures*, to appear in *Annals of Pure and Applied Logic*.
- N. L. Ackerman, C. E. Freer, and D. M. Roy, *Noncomputable conditional distributions*, *Proc. 26th Ann. IEEE Symp. on Logic in Computer Science (LICS 2011)*, pp. 107–116, 2011.
- A. D. Wissner-Gross and C. E. Freer, *Relativistic statistical arbitrage*, *Phys. Rev. E* 82, 056104, 2010.
- C. E. Freer and D. M. Roy, *Posterior distributions are computable from predictive distributions*, *Proc. of the 13th Int. Conf. on Artificial Intelligence and Statistics (AISTATS 2010)*, *J. of Machine Learning Research W&CP* 9, 2010.
- C. E. Freer and D. M. Roy, *Computable exchangeable sequences have computable de Finetti measures*, in K. Ambos-Spies, B. Löwe, and W. Merkle (eds.): *Mathematical Theory and Computational Practice*, *Proc. of the 5th Conf. on Computability in Europe (CiE 2009)*, LNCS 5635, Springer, 218–231, 2009.
- C. E. Freer, *Models with high Scott rank*, Ph.D. Dissertation, Harvard University, 2008.

PAPERS SUBMITTED

N. L. Ackerman, C. E. Freer, and D. M. Roy, *On the computability of conditional probability*, submitted.

SELECTED PAPERS IN PREPARATION

- N. L. Ackerman, C. E. Freer, and R. R. Patel, *Invariant measures on countable models*, in preparation.
- C. E. Freer, B. Kjos-Hanssen, and A. Nies, *Effective aspects of Lipschitz functions*, in preparation.

- PATENTS C. E. Freer and A. D. Wissner-Gross, *System and method for relativistic statistical securities trading*, U.S. Provisional Patent 61/349,238 (filed May 28, 2010).
- INVITED TALKS
- *Aspects of randomness in analysis, graph theory, and probability theory*. Asian Logic Conference, Special Session on Algorithmic Randomness, Wellington, NZ. Invited special session talk, December 15, 2011.
 - *Effective aspects of Lipschitz functions and variation*. Analysis and Randomness, Auckland. Invited workshop talk, December 12–13, 2011.
 - *Invariant measures concentrated on countable structures*. AIM Workshop on Graph and Hypergraph limits, American Institute of Mathematics, Palo Alto. Invited workshop talk, August 16, 2011.
 - *Invariant measures on countable structures*. KGRC Mini-workshop, Kurt Gödel Research Center, Vienna. Invited workshop talk, July 12, 2011.
 - *The unreasonable effectiveness of statistical artificial intelligence*. Foundational Questions in the Mathematical Sciences, International Academy Traunkirchen, Austria. Invited workshop talk, July 9, 2011.
 - *#P-complete conditional distributions*. Logic and Computational Complexity, Toronto. Invited workshop talk, June 25, 2011.
 - *Relativistic statistical arbitrage*. North American Financial Information Summit, New York City. Invited talk, May 24, 2011.
 - *Invariant measures on countable models*. AMS–ASL Joint Mathematics Meetings, Special Session on Logic and Analysis, New Orleans. Invited special session talk, January 7, 2011.
 - *The computability of exchangeable sequences*. Invited talk, MIT, February 10, 2010.
 - *Mechanising mathematics*. Interactive Theorem Proving workshop, Cambridge, UK. Invited workshop talk, August 24, 2009.
 - *Computable probability theory*. PROMYS 20th Year Celebration, Boston, MA. Invited conference talk, July 26, 2009.
 - *Computable exchangeable sequences have computable de Finetti measures*. Computability in Europe (CiE 2009), Heidelberg, Germany. Invited to give talk based on refereed conference proceedings; joint work presented by D. M. Roy, July 20, 2009.
 - *Computable de Finetti measures*. Mid-Atlantic Mathematical Logic Seminar, MAMLS @ Harvard: A meeting on the intersections of logic and mathematics, Cambridge, MA. Invited conference talk, May 9, 2009.
 - *Models with high Scott rank*. AMS Eastern Section Meeting, Special Session on Computability Theory and Effective Algebra, Wesleyan Univ., Middletown, CT. Invited special session talk, October 11, 2008.
- SEMINAR TALKS
- *Invariant measures on countable models*. Logic Workshop, Harvard, October 27, 2010.
 - *Invariant measures on countable models*. Logic Workshop, CUNY, October 22, 2010.
 - *Noncomputability of conditional probability*. Probability Seminar, MIT, March 1, 2010.
 - *Computable probability theory and de Finetti’s theorem*. Logic Seminar, Univ. of Chicago, May 18, 2009.
 - *Computable exchangeable sequences have computable de Finetti measures*. Logic and Computation Seminar, Univ. of Pennsylvania, April 13, 2009.
 - *Models with high Scott rank*. Logic Seminar, Univ. of Notre Dame, November 29, 2007.
- CONTRIBUTED TALKS
- *Invariant measures concentrated on countable structures*. Workshop on Homogeneous Structures, Leeds. July 21, 2011.
 - *Effective aspects of Lipschitz functions*. Association for Symbolic Logic, North American Annual Meeting, Berkeley. March 24, 2011.
 - *The computability of conditional probability distributions*. AMS–ASL Joint Mathematics Meetings, San Francisco. January 15, 2010.
 - *The complexity of computable conditional probability*. Computability in Europe (CiE 2009), Heidelberg, Germany. July 20, 2009.
 - *Computable exchangeable sequences have computable de Finetti measures*. Association for Symbolic Logic, North American Annual Meeting, Notre Dame. May 20, 2009.

WORKSHOPS

Model Theory and Combinatorics

- *Graph and Hypergraph limits*, American Institute of Mathematics, Palo Alto. Invited workshop participant, August 15–19, 2011.
- *Workshop on Homogeneous Structures*, University of Leeds. Workshop participant, July 19–22, 2011.
- *KGRC Mini-workshop*, Kurt Gödel Research Center, Vienna. Invited speaker, July 12–13, 2011.
- *Model Theory of Fields*, Mathematics Research Community, American Mathematics Society. Invited workshop participant, June 19–25, 2010, Snowbird, UT.

Computability and Complexity

- *Analysis and Randomness*, University of Auckland. Invited speaker, December 12–13, 2011, Auckland.
- *Foundational Questions in the Mathematical Sciences*, International Academy Traunkirchen, Austria. Invited speaker, July 9–11, 2011.
- *Logic and Computational Complexity (LCC 2011)* at Logic in Computer Science (LICS 2011). Invited speaker, June 25, 2011, Toronto.

Bayesian Statistics and Machine Learning

- *Monte Carlo Methods for Modern Applications* at Neural Information Processing Systems (NIPS 2010), *When are probabilistic programs probably computationally tractable?*, presented by coauthor V. K. Mansinghka, December 10, 2010, Whistler, Canada.
- *Nonparametric Bayes Workshop* at Neural Information Processing Systems (NIPS 2009), *Predictive computable iff posterior computable*, workshop paper, presented by coauthor D. M. Roy, December 12, 2009, Whistler, Canada.
- *Learning Workshop*, Computational and Biological Learning Society. *Probabilistic programs, computability, and de Finetti measures*, workshop paper, presented by coauthor D. M. Roy, April 13–16, 2009, Clearwater, FL.

Interactive Theorem Proving

- *Interactive Theorem Proving Workshop*, Computer Laboratory, Univ. of Cambridge. Invited speaker, August 24–25, 2009, Cambridge, UK.
- *Isabelle Theorem Prover Developer's Workshop*, Technische Universität München (TUM). Invited workshop participant, August 13–15, 2009, Munich, Germany.

TEACHING

University of Hawai'i at Mānoa

- *Math 243: Calculus III* (undergraduate course). Instructor, Spring 2011.
- *Math 649B: Logic* (graduate reading course on computational complexity). Co-instructor, Fall 2010.
- *Math 307: Linear Algebra and Differential Equations* (undergraduate course). Instructor, Fall 2010.

Massachusetts Institute of Technology

- *18.515: Mathematical Logic* (graduate course). Instructor, Spring 2010.
- *18.03: Differential Equations* (undergraduate course). Recitation Instructor and Course Administrator, Fall 2009.
- *18.575: Model Theory* (graduate course). Instructor, Spring 2009.
- *18.03: Differential Equations* (undergraduate course). Recitation Instructor, Fall 2008.

TEACHING (CONT'D)

Harvard University

- *QR 28: The Magic of Numbers* (undergraduate course). Head Teaching Fellow, Fall 2007.
- *Math 144: Model Theory and Algebra* (undergraduate course). Teaching Fellow, Spring 2007.
- *QR 28: The Magic of Numbers* (undergraduate course). Teaching Fellow, Fall 2006.
- *Math 141: Intro. to Mathematical Logic* (undergraduate course). Teaching Fellow, Fall 2006.
- *Math 143: Set Theory* (undergraduate course). Teaching Fellow, Spring 2006.
- *Math 141: Intro. to Mathematical Logic* (undergraduate course). Teaching Fellow, Fall 2005.
- *Math 137: Algebraic Geometry* (undergraduate course). Teaching Fellow, Spring 2005.
- *Math 144: Model Theory and Algebra* (undergraduate course). Teaching Fellow, Spring 2005.
- *Math 141: Intro. to Mathematical Logic* (undergraduate course). Teaching Fellow, Fall 2003.

MENTORING

Graduate

Boston University

- *Improved necessary and sufficient conditions for the existence of a subtle cardinal*, Peter Barendse, Ph.D. in Mathematics. Dissertation committee member, 2010.

Undergraduate

University of Hawai'i at Mānoa

- *Computability and the Lovász Local Lemma*, Travis Hee Wai. NSF-funded undergraduate research mentor, Fall 2010. Hee Wai was selected as the Hawai'i Council of Engineering Societies' 2011 Student Engineer of the Year.

Undergraduate Research Opportunities Program (UROP), Massachusetts Institute of Technology

- *Combinatorial games and random structures*, Tamvana Makuluni. Undergraduate research mentor, Summer 2009.
- *Combinatorial games, linear orders, and logic*, Manuel Rivera. Undergraduate research mentor, Fall 2008 and IAP 2009.

Summer Program in Undergraduate Research (SPUR), Massachusetts Institute of Technology

- *A q -analogue of the Narayana numbers and a combinatorial interpretation*, Guilherme Issao Fujiwara. Research Experience for Undergraduates (REU) project mentor, 2005.
- *Some combinatorial results on subset sums of $\mathbb{Z}/n\mathbb{Z}$* , Kyungmin Kim. Research Experience for Undergraduates (REU) project mentor, 2005.

High School

Research Science Institute (RSI)

- *Descriptive complexity of random bit strings*, Benjamin Dozier. High school mathematics research project mentor, 2007. Project led to Dozier being selected as a Finalist (top 40 nationwide) in the Intel Science Talent Search.
- *Cake-cutting with locally negative preference functions*, Winston Luo. High school mathematics research project mentor, 2007.

Program in Mathematics for Young Scientists (PROMYS)

- High school research project designer, 2008 and 2011.
- High school mathematics research project mentor, 2004–2007.
- Counselor, 2000–2003.

SERVICE

- Co-organizer, *Special Session on Computability and Complexity*, American Mathematical Society Sectional Meeting, University of Hawai'i at Mānoa, March 2012.
- Co-organizer, MIT Logic Seminar, 2008–2010.
- Local committee, *MAMLS @ Harvard: A meeting on the intersections of logic and mathematics*, May 9–10, 2009.
- Freshman advising, MIT. Advised 4 undergraduate math majors, Fall 2009.

REFEREEING

- *Annals of Pure and Applied Logic*
- *A K Peters*

MEMBERSHIP IN
PROFESSIONAL
SOCIETIES

- American Mathematical Society
- Association for Symbolic Logic
- Association Computability in Europe
- Association for Automated Reasoning