


**Committee on Energy and Commerce**  
**U.S. House of Representatives**  
Witness Disclosure Requirement - "Truth in Testimony"  
Required by House Rule XI, Clause 2(g)(5)

<b>1. Your Name: Michael Kearns</b>		
<b>2. Your Title: Professor, Computer and Information Science, University of Pennsylvania</b>		
<b>3. The Entity(ies) You are Representing: Self</b>		
<b>4. Are you testifying on behalf of the Federal, or a State or local government entity?</b>	<b>Yes</b>	<b>No X</b>
<b>5. Please list any Federal grants or contracts, or contracts or payments originating with a foreign government, that you or the entity(ies) you represent have received on or after January 1, 2015. Only grants, contracts, or payments related to the subject matter of the hearing must be listed.</b>  NSF: ECONOMIC FOUNDATIONS OF DIGITAL PRIVACY; for basic research in differential privacy and related topics, terminated 8/31/15. Received approx. 10K 		
<b>6. Please attach your curriculum vitae to your completed disclosure form.</b>		

Signature: 

Date: Nov 28, 2017

**Prof. Michael Kearns**  
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**(website contains most of the information here and more)**

### **Education**

- *PhD in Computer Science, Harvard University, Cambridge MA, May 1989.*
  - Dissertation title: *The Computational Complexity of Machine Learning.*
  - Winner of a 1990 Distinguished Dissertation Award from the Association for Computing Machinery (ACM).
  - Advisor: Prof. L.G. Valiant.
- *MS in Computer Science, Harvard University, Cambridge MA, May 1986.*
- *BA in Mathematics; BA in Computer Science, University of California at Berkeley, Berkeley, CA, June 1985.*
  - Graduated with highest academic honors.

### **Academic and Research Experience and Appointments**

- *January 2002 – Present: Professor of Computer and Information Science, University of Pennsylvania, Philadelphia PA.*
  - National Center Chair in Resource Management and Technology.
  - Founding Director, Penn Engineering program in Networked and Social Systems Engineering ([www.nets.upenn.edu](http://www.nets.upenn.edu))
  - Founding Director, Warren Center for Network and Data Sciences ([www.warrencenter.upenn.edu](http://www.warrencenter.upenn.edu))
  - Secondary appointments in the department of Economics, and in the Wharton School, departments of Operations and Decisions (OID) and Statistics.
  - Co-director of Penn's Institute for Research in Cognitive Science, January 2002 – July 2006.
- *July 1997 – February 2001: Division Manager, Artificial Intelligence Research Department, AT&T Laboratories Research, Florham Park, NJ.*
  - Responsible for building a world-class research group of approximately 15 PhDs in artificial intelligence, machine learning, and related disciplines.
  - Project management for AI-based applications and services; foundational research in AI and machine learning.
- *July 1999 – December 1999: Division Manager, Secure Systems Research Department, AT&T Laboratories Research, Florham Park, NJ.*
  - Responsible for directing a research group of approximately 10 PhDs in computer and network security, cryptographic protocols, and related disciplines.
- *October 1991 – June 1997: Principal Member of Technical Staff, AT&T Bell Laboratories and AT&T Laboratories Research, Murray Hill, NJ.*
  - Conducted a wide range of basic mathematical, algorithmic and applied research in machine learning, artificial intelligence, and related disciplines.

- *September 1990 – September 1991: Postdoctoral Associate, International Computer Science Institute, Berkeley, CA.*
  - Conducted basic research in machine learning and related disciplines.
- *May 1989 – September 1990: Postdoctoral Associate, Laboratory for Computer Science, Massachusetts Institute of Technology, Cambridge, MA.*
  - Conducted basic research in machine learning and related areas.

### **Industry and Consulting Experience**

- *July 2016 – Present: Chief Scientist, MANA Partners, New York, NY.*
  - Lead research efforts for quantitative trading/fintech firm.
- *October 2013 – June 2016: Co-Portfolio Manager, Engineers Gate, New York, NY.*
  - Ran a quantitative trading group on proprietary strategy research, backtesting, and implementation.
- *June 2009 – September 2013: Co-Portfolio Manager, SAC Capital, New York, NY.*
  - Ran a quantitative trading group on proprietary strategy research, backtesting, and implementation.
- *June 2007 – March 2009: Principal, Banc of America Securities, New York, NY.*
  - Lead a quantitative trading and strategy research group within the Electronic Trading Services (ETS) Division. Proprietary trading and algorithmic trading.
- *September 2005 – May 2007: Senior Vice President, Lehman Brothers, New York, NY.*
  - Led a statistical arbitrage proprietary trading and strategy research group within the Equities Division.
- *March 2001 – December 2001: Chief Technology Officer, Syntek Capital, New York, NY.*
  - Technology investment strategy, deal sourcing and deal diligence for \$250M Munich-based venture capital firm.
- *January 2008 – Present: Act as expert witness/consultant on a variety of technology-related legal and regulatory cases, including on behalf of various Federal regulatory agencies.*
- *Advisor to a number of technology startup companies and venture capital firms*

### **Academic Service**

- *September 2015 – Present: Member, Scientific Advisory Board, Turing Institute, London.*
- *September 2015 – Present: Member, Science Advisory Board, Institute for Pure and Applied Mathematics (IPAM).*
- *July 2013 – Present: Member of Computer Science and Telecommunications Board, National Academies.*
- *August 2006 – September 2008: Chair, DARPA Information Science and Technology (ISAT) study group. Vice-chair 2004 – 2006. ISAT member 2002 – 2004.*
- *Past program chair: Neural Information Processing Systems (NIPS); National Conference on Artificial Intelligence (AAAI); Annual Conference on Computational Learning Theory (COLT); ACM Conference on Electronic Commerce (EC);*
- *Past program committee member: NIPS, AAAI, IJCAI, COLT, UAI, ICML, STOC, FOCS (see note under Publications below to decode acronyms).*
- *Current editorial boards: Mathematics of Operations Research; Games and Economic Behavior; Journal of the ACM; MIT Press series on Adaptive Computation and Machine Learning.*

- Past editorial boards: *SIAM Journal on Computing*; *Machine Learning*; *Journal of AI Research (JAIR)*; *Journal of Machine Learning Research (JMLR)*.

### **Selected Awards and Honors**

- Fellow of the Association for Computing Machinery (ACM); elected 2014
- Fellow of the American Academy of Arts and Sciences; elected 2012
- Heilmeier Faculty Award for Excellence in Research, University of Pennsylvania, 2005.
- Henry and Bryna David Endowment Award, Division of Behavioral and Social Sciences and Education, National Academy of Sciences, 2004.
- Appointed National Center Chair in Resource Management and Technology, University of Pennsylvania, 2004.
- Fellow of the American Association for Artificial Intelligence; elected 2003.
- Distinguished Dissertation Award, Association for Computing Machinery, 1989.
- Award for Academic Distinction, Computer Science Division, University of California at Berkeley, 1985.
- Klumpke Prize, Mathematics Department, University of California at Berkeley, 1985.
- Elected to Phi Beta Kappa, 1984.

### **Grant and Funding History**

- Available on request.

### **Publications: Books**

- *An Introduction to Computational Learning Theory*. With U.V. Vazirani. The MIT Press, 1994.
- *The Computational Complexity of Machine Learning*. The MIT Press, 1990. ACM Distinguished Dissertation Series.

### **Publications: Research Articles**

Notes: All articles below appeared in refereed journals and/or highly refereed technical conferences. All articles are available for download at [www.cis.upenn.edu/~mkearns](http://www.cis.upenn.edu/~mkearns). Acronyms used: AAAI: Annual National Conference on Artificial Intelligence; AAMAS: International Conference on Autonomous Agents and Multiagent Systems; CACM: Communications of the ACM; COLT: Annual Conference on Computational Learning Theory; EC: ACM Conference on Economics and Computation; FOCS: IEEE Foundations of Computer Science; HCOMP: AAAI Conference on Human Computation and Crowdsourcing. ICML: International Conference on Machine Learning; IJCAI: International Joint Conference on Artificial Intelligence; NIPS: Neural Information Processing Systems; PNAS: Proceedings of the National Academy of Science; SAGT: Symposium on Algorithmic Game Theory; SODA: ACM Symposium on Discrete Algorithms; STOC: ACM Symposium on the Theory of Computation; UAI: Annual Conference on Uncertainty in Artificial Intelligence; WINE: Workshop on Internet and Network Economics.

- *Meritocratic Fairness for Cross-Population Selection*. With S. Wu and A. Roth. ICML 2017.
- *Fairness in Reinforcement Learning*. With S. Jabbari, M. Joseph, J. Morgenstern, and A. Roth. ICML 2017.
- *Predicting with Distributions*. With S. Wu. COLT 2017.
- *Fair Incentives for Myopic Agents*. With S. Kannan, J. Morgenstern, M. Pai, A. Roth, R. Vohra, and S. Wu. ACM EC 2017.

- *Mathematical Foundations for Social Computing*. With Y. Chen, A. Ghosh, T. Roughgarden, and J. Wortman Vaughan. CACM, December 2016.
- *Fairness in Learning: Classic and Contextual Bandits*. With Matthew Joseph, Jamie Morgenstern, and Aaron Roth. NIPS 2016.
- *Strategic Network Formation with Attack and Immunization*. With S. Goyal, S. Jabbari, S. Khanna, and J. Morgenstern. WINE 2016.
- *Tight Policy Regret Bounds for Improving and Decaying Bandits*. With Hoda Heidari and Aaron Roth. IJCAI 2016.
- *Private Algorithms for the Protected in Social Network Search*. With A. Roth, S. Wu, and G. Yaroslavtsev. PNAS, January 2016.
- *The Small-World Network of Squash*. With R. Rayfield. Squash Magazine, October 2015.
- *Privacy and Truthful Equilibrium Selection for Aggregative Games*. With R. Cummings, A. Roth and S. Wu. WINE 2015.
- *From “In” to “Over”: Behavioral Experiments on Whole-Network Computation*. With L. Dworkin. HCOMP 2015.
- *Online Learning and Profit Maximization from Revealed Preferences*. With K. Amin, R. Cummings, L. Dworkin, and A. Roth. AAI 2015.
- *Pursuit-Evasion Without Regret, with an Application to Trading*. With L. Dworkin and Y. Nevmyvaka. ICML 2014.
- *Learning from Contagion (Without Timestamps)*. With H. Heidari and K. Amin. ICML 2014.
- *Efficient Inference for Complex Queries on Complex Distributions*. With L. Dworkin and L. Xia. AISTATS 2014.
- *Mechanism Design in Large Games: Incentives and Privacy*. With M. Pai, A. Roth, and J. Ullman. Innovation in Theoretical Computer Science, 2013.
- *Marginals-to-Models Reducibility*. With T. Roughgarden. NIPS 2013.
- *Depth-Workload Tradeoffs for Workforce Organization*. With H. Heidari. HCOMP 2013.
- *Machine Learning for Market Microstructure and High Frequency Trading*. With Y. Nevmyvaka. In *High Frequency Trading*, M. O'Hara, M. Lopez de Prado, D. Easley, eds. Risk Books, 2013.
- *Large-Scale Bandit Problems and KWIK Learning*. With J. Abernethy, K. Amin, and M. Draief. ICML 2013.
- *Experiments in Social Computation*. CACM, October 2012.
- *Behavioral Experiments on a Network Formation Game*. With S. Judd and Y. Vorobeychik. ACM EC 2012.
- *Competitive Contagion in Networks*. With S. Goyal. STOC 2012.
- *Budget Optimization for Sponsored Search: Censored Learning in MDPs*. With K. Amin, P. Key and A. Schwaighofer. UAI 2012.
- *Colonel Blotto on Facebook: The Effect of Social Relations on Strategic Interaction*. with P. Kohli, Y. Bachrach, D. Stillwell, R. Herbrich, T. Graepel. ACM Web Science, 2012.
- *Learning and Predicting Dynamic Behavior with Graphical Multiagent Models*. With Q. Duong, M. Wellman, and S. Singh. AAMAS 2012.
- *Behavioral Conflict and Fairness in Social Networks*. With S. Judd and E. Vorobeychik. WINE 2011.
- *A Clustering Coefficient Network Formation Game*. With M. Brautbar. Symposium on Algorithmic Game Theory (SAGT), 2011.

- *Learning and Predicting Dynamic Behavior with Graphical Multiagent Models*. With Q. Duong, M. Wellman, and S. Singh. ACM Workshop on Social Network Mining and Analysis (SNA-KDD) 2011.
- *Graphical Models for Bandit Problems*. With K. Amin and U. Syed. UAI 2011.
- *Bandits, Query Learning, and the Haystack Dimension*. With K. Amin and U. Syed. COLT 2011. (K. Amin, Best Student Presentation at NY Academy of Sciences ML workshop)
- *Market Making and Mean Reversion*. With T. Chakraborty. ACM EC 2011.
- *Designing a Digital Future: Federally Funded Research and Development in Networking and Information Technology*. PCAST Working Group. Report to the President and Congress, December 2010.
- *Empirical Limitations on High Frequency Trading Profitability*. With A. Kulesza and Y. Nevmyvaka. Journal of Trading, Fall 2010. (JOT Best Paper Award for 2010)
- *Behavioral Dynamics and Influence in Networked Coloring and Consensus*. With S. Judd and Y. Vorobeychik. PNAS, August 2010.
- *Private and Third-Party Randomization in Risk-Sensitive Equilibrium Concepts*. With M. Brautbar, U. Syed. AAAI 2010.
- *A Behavioral Study of Bargaining in Social Networks*. With T. Chakraborty, S. Judd, J. Tan. ACM Electronic Commerce 2010.
- *Local Algorithms for Finding Interesting Individuals in Large Networks*. With M. Brautbar. Innovations in Computer Science (ICS), 2010.
- *Coexpression Network Based on Natural Variation in Human Gene Expression Reveals Gene Interactions and Functions*. With R. Nayak, R. Spielman, V. Cheung. Genome Science, November 2009.
- *Censored Exploration and the Dark Pool Problem*. With K. Ganchev, Y. Nevmyvaka, J. Wortman. UAI 2009. Best student paper award, K. Ganchev and J. Wortman.
- *Networked Bargaining: Algorithms and Structural Results*. With T. Chakraborty and S. Khanna. ACM EC 2009.
- *Behavioral Experiments on Biased Voting in Networks*. With S. Judd, J. Tan and J. Wortman. PNAS, January 2009.
- *Bargaining Solutions in a Social Network*. With T. Chakraborty. WINE 2008.
- *Biased Voting and the Democratic Primary Problem*. With J. Tan. WINE 2008.
- *Learning from Collective Behavior*. With J. Wortman. COLT 2008.
- *Behavioral Experiments in Networked Trade*. With S. Judd. ACM EC 2008.
- *Graphical Games*. In Algorithmic Game Theory, N. Nisan, T. Roughgarden, E. Tardos and V. Vazirani, editors, Cambridge University Press, September, 2007.
- *Privacy-Preserving Belief Propagation and Sampling*. With J. Tan and J. Wortman. NIPS 2007.
- *Sponsored Search with Contexts*. With E. Even-Dar and J. Wortman. WINE 2007. Long version appeared in the Third Workshop on Sponsored Search Auctions, WWW 2007.
- *Empirical Price Modeling for Sponsored Search*. With K. Ganchev, A. Kulesza, J. Tan, R. Gabbard, Q. Liu. WINE 2007. Long version appeared in the Third Workshop on Sponsored Search Auctions, WWW 2007.
- *Regret to the Best vs. Regret to the Average*. With E. Even-Dar, Y. Mansour, and J. Wortman. COLT 2007.
- *A Network Formation Game for Bipartite Exchange Economies*. With E. Even-Dar and S. Suri. ACM SODA 2007.

- *Learning from Multiple Sources*. With K. Crammer and J. Wortman. NIPS
- *A Small World Threshold for Economic Network Formation*. With E. Even-Dar. NIPS 2006.
- *Risk-Sensitive Online Learning*. With E. Even-Dar and J. Wortman. Proceedings of the Conference on Algorithmic Learning Theory (ALT), 2006.
- *An Experimental Study of the Coloring Problem on Human Subject Networks*. With S. Suri and N. Montfort. Science 313(5788), August 2006, pp. 824-827.
- *Networks Preserving Evolutionary Stability and the Power of Randomization*. With S. Suri. ACM Conference on Electronic Commerce (EC), 2006.
- *(In)Stability Properties of Limit Order Dynamics*. With E. Even-Dar, S. Kakade, and Y. Mansour. ACM Conference on Electronic Commerce (EC), 2006.
- *Reinforcement Learning for Optimized Trade Execution*. With Y. Nevmyvaka and Y. Feng. ICML 2006.
- *Economics, Computer Science, and Policy*. Issues in Science and Technology, Winter 2005.
- *Electronic Trading in Order-Driven Markets: Efficient Execution*. With Y. Nevmyvaka, A. Papandreou and K. Sycara. IEEE Conference on Electronic Commerce (CEC), 2005.
- *Trading in Markovian Price Models*. With S. Kakade. COLT 2005
- *Learning from Data of Variable Quality*. With K. Crammer and J. Wortman. NIPS 2005.
- *Economic Properties of Social Networks*. With S. Kakade, L. Ortiz, R. Pemantle, and S. Suri. Proceedings of NIPS 2004.
- *Graphical Economics*. With S. Kakade and L. Ortiz. Proceedings of COLT 2004.
- *Competitive Algorithms for VWAP and Limit Order Trading*. With S. Kakade, Y. Mansour and L. Ortiz. Proceedings of the ACM Conference on Electronic Commerce (EC), 2004.
- *Algorithms for Interdependent Security Games*. With L. Ortiz. NIPS 2003.
- *Correlated Equilibria in Graphical Games*. With S. Kakade, J. Langford, and L. Ortiz. ACM Conference on Electronic Commerce (EC), 2003.
- *The Penn-Lehman Automated Trading Project*. With L. Ortiz. IEEE Intelligent Systems, Nov/Dec 2003.
- *Exploration in Metric State Spaces*. With S. Kakade and J. Langford. ICML 2003.
- *Nash Propagation for Loopy Graphical Games*. With L. Ortiz. Proceedings of NIPS 2002.
- *Efficient Nash Computation in Large Population Games with Bounded Influence*. With Y. Mansour. Proceedings of UAI 2002.
- *A Note on the Representational Incompatibility of Function Approximation and Factored Dynamics*. With E. Allender, S. Arora, C. Moore, A. Russell. Proceedings of NIPS 2002.
- *CobotDS: A Spoken Dialogue System for Chat*. With C. Isbell, S. Singh, D. Litman, J. Howe. Proceedings of AAI 2002.
- *An Efficient Exact Algorithm for Singly Connected Graphical Games*. With M. Littman, S. Singh. 2001. NIPS 2001.
- *Graphical Models for Game Theory*. With M. Littman, S. Singh. 2001. *Proceedings of UAI 2001*.
- *ATTac-2000: An Adaptive Autonomous Bidding Agent*. With P. Stone, M. Littman, S. Singh. *Journal of Artificial Intelligence Research* . Also appeared in *Proceedings of Agents 2001*.
- *A Social Reinforcement Learning Agent*. With C. Shelton, C. Isbell, S. Singh, P. Stone. *Proceedings of Agents 2001*. Winner of Best Paper Award at the Conference.

- *Nash Convergence of Gradient Dynamics in General-Sum Games.* With S. Singh, Y. Mansour. *Proceedings of the Sixteenth Conference on Uncertainty in Artificial Intelligence*, Morgan Kaufmann, pages 541-548, 2000.
- *Fast Planning in Stochastic Games.* With Y. Mansour, S. Singh. *Proceedings of the Sixteenth Conference on Uncertainty in Artificial Intelligence*, Morgan Kaufmann, pages 309-316, 2000.
- *Fast Planning in Stochastic Games.* With Y. Mansour, S. Singh. *Proceedings of the Sixteenth Conference on Uncertainty in Artificial Intelligence*, Morgan Kaufmann, pages 541-548, 2000.
- *Bias-Variance Error Bounds for Temporal Difference Updates.* With S. Singh. *Proceedings of the 13th Annual Conference on Computational Learning Theory*, 2000, pages 142--147.
- *Approximate Planning in Large POMDPs via Reusable Trajectories.* With Y. Mansour and A. Ng. *Advances in Neural Information Processing Systems 12*, MIT Press, 2000.
- *Testing Problems with Sub-Learning Sample Complexity.* With D. Ron. *Journal of Computer and System Sciences*, 61, pp. 428-456, 2000. See also *Proceedings of the 12th Annual Workshop on Computational Learning Theory*.
- *Cobot in LambdaMOO: A Social Statistics Agent.* With C. Isbell, D. Kormann, S. Singh, P. Stone. *Proceedings of the 17th National Conference on Artificial Intelligence*, pp. 36-41, 2000, AAAI Press/MIT Press.
- *Empirical Evaluation of a Reinforcement Learning Spoken Dialogue System.* With S. Singh, D. Litman, M. Walker. *Proceedings of the 17th National Conference on Artificial Intelligence*, pp. 645-651, 2000, AAAI Press/MIT Press.
- *Automatic Optimization of Dialogue Management.* With D. Litman, S. Singh, M. Walker. Appeared in COLING 2000.
- *A Boosting Approach to Topic Spotting on Subdialogues.* With K. Myers, S. Singh, M. Walker. Appeared in ICML 2000.
- *Reinforcement Learning for Spoken Dialogue Systems.* With S. Singh, D. Litman and M. Walker. *Advances in Neural Information Processing Systems 12*, MIT Press, 2000.
- *A Sparse Sampling Algorithm for Near-Optimal Planning in Large Markov Decision Processes.* With Y. Mansour and A. Ng. *Proceedings of the Sixteenth International Joint Conference on Artificial Intelligence* Morgan Kaufmann, 1999, pages 1324--1331. To appear in a special issue of the journal *Machine Learning*.
- *Efficient Reinforcement Learning in Factored MDPs.* With D. Koller. *Proceedings of the Sixteenth International Joint Conference on Artificial Intelligence*, Morgan Kaufmann, 1999, pages 740--747.
- *Finite-Sample Rates of Convergence for Q-Learning and Indirect Methods.* With S. Singh. *Advances in Neural Information Processing Systems 11*, The MIT Press, 1999, pages 996--1002.
- *Inference in Multilayer Networks via Large Deviation Bounds.* with L. Saul. *Advances in Neural Information Processing Systems 11*, The MIT Press, 1999, pages 260--266.
- *On the Boosting Ability of Top-Down Decision Tree Learning Algorithms.* With Y. Mansour. *Journal of Computer and Systems Sciences*, 58(1), 1999, pages 109-128. Also in *Proceedings of the 28th ACM Symposium on the Theory of Computing*, pp.459-468, 1996, ACM Press.
- *Algorithmic Stability and Sanity-Check Bounds for Leave-One-Out Cross-Validation.* With D. Ron. *Neural Computation* 11(6), pages 1427-1453, 1999. Also in *Proceedings of the*



- Tenth Annual Conference on Computational Learning Theory*, ACM Press, 1997, pages 152-162.
- *Automatic Detection of Poor Speech Recognition at the Dialogue Level*. With D. Litman and M. Walker. *Proceedings of the 37th Annual Meeting for Computational Linguistics*, 1999, pages 309-316.
  - *Near-Optimal Reinforcement Learning in Polynomial Time*. With S. Singh. *Proceedings of the 15th International Conference on Machine Learning*, pp. 260-268, 1998, Morgan Kaufmann. To appear in a special issue of the journal *Machine Learning*.
  - *Large Deviation Methods for Approximate Probabilistic Inference, with Rates of Convergence*. With L. Saul. *Proceedings of the Fourteenth Conference on Uncertainty in Artificial Intelligence*, Morgan Kaufmann, 1998, pages 311--319.
  - *Exact Inference of Hidden Structure from Sample Data in Noisy-OR Networks*. With Y. Mansour. *Proceedings of the Fourteenth Conference on Uncertainty in Artificial Intelligence*, Morgan Kaufmann, 1998, pages 304--310.
  - *A Fast, Bottom-Up Decision Tree Pruning Algorithm with Near-Optimal Generalization*. With Y. Mansour. *Proceedings of the 15th International Conference on Machine Learning*, 1998, Morgan Kaufmann, pages 269--277.
  - *Efficient Noise-Tolerant Learning from Statistical Queries*. *Journal of the ACM*, 45(6), pp. 983 --- 1006, 1998. See also *Proceedings of the 25th ACM Symposium on the Theory of Computing*, pp. 392-401, 1993, ACM Press.
  - *An Information-Theoretic Analysis of Hard and Soft Assignment Methods for Clustering*. with Y. Mansour and A. Ng. *Proceedings of the Thirteenth Conference on Uncertainty in Artificial Intelligence*, pp. 282-293, 1997, Morgan Kaufmann.
  - *Algorithmic Stability and Sanity-Check Bounds for Leave-One-Out Cross-Validation*. With D. Ron. *Neural Computation* 11(6), pages 1427-1453, 1999. Also in *Proceedings of the Tenth Annual Conference on Computational Learning Theory*, ACM Press, 1997, pages 152-162.
  - *An Experimental and Theoretical Comparison of Model Selection Methods*. With Y. Mansour, A. Ng, and D. Ron. *Machine Learning* 27(1), 1997, pages 7--50. Also in *Proceedings of the Eighth ACM Conference on Computational Learning Theory*, ACM Press, 1995, pages 21--30.
  - *A Bound on the Error of Cross Validation Using the Approximation and Estimation Rates, with Consequences for the Training-Test Split*. *Neural Computation* 9(5), 1997, pages 1143--1161. Also in *Advances in Neural Information Processing Systems 8*, The MIT Press, pages 183--189, 1996.
  - *Applying the Weak Learning Framework to Understand and Improve C4.5*. With T. Dietterich and Y. Mansour. *Proceedings of the 13th International Conference on Machine Learning*, pp. 96-104, 1996, Morgan Kaufmann.
  - *Rigorous Learning Curve Bounds from Statistical Mechanics*. With D. Haussler, H.S. Seung, and N. Tishby. *Machine Learning*, 25, 1996, pages 195--236. Also in *ACM Conference on Computational Learning Theory*, pp. 76-87, 1994, ACM Press.
  - *A Bound on the Error of Cross Validation Using the Approximation and Estimation Rates, with Consequences for the Training-Test Split*. *Neural Computation* 9(5), 1997, pages 1143--1161. Also in *Advances in Neural Information Processing Systems 8*, The MIT Press, pages 183--189, 1996.

- *Efficient Algorithms for Learning to Play Repeated Games Against Computationally Bounded Adversaries.* With Y. Freund, Y. Mansour, D. Ron, R. Rubinfeld, and R. Schapire. *Proceedings of the 36th IEEE Symposium on the Foundations of Computer Science*, pp. 332-341, 1995, IEEE Press.
- *Learning Boolean Formulae.* With M. Li and L. Valiant. *Journal of the ACM* 41(6), pp. 1298-1328, 1995. See also *Proceedings of the 19th ACM Symposium on the Theory of Computing*, pp. 285-195, 1987, ACM Press.
- *Horn Approximations of Empirical Data.* With H. Kautz and B. Selman. *Artificial Intelligence*, 74(1), pages 129-145, 1995.
- *Learning from a Population of Hypotheses.* With S. Seung. *Machine Learning* 18, pp. 255-276, 1995. See also *Proceedings of the Sixth Annual Workshop on Computational Learning Theory*, pp. 101-110, 1993, ACM Press.
- *On the Complexity of Teaching.* With S. Goldman. *Journal of Computer and Systems Sciences*, 50(1), pp. 20-31, 1995.
- *On the Learnability of Discrete Distributions.* With Y. Mansour, R. Rubinfeld, D. Ron, R. Schapire, and L. Sellie. *Proceedings of the 26th Annual ACM Symposium on the Theory of Computing*, pp. 273-282, 1994, ACM Press.
- *Bounds on the Sample Complexity of Bayesian Learning Using Information Theory and the VC Dimension.* With D. Haussler and R. Schapire. *Machine Learning* 14, pp. 83-113, 1994. See also *Proceedings of the Fourth Annual Workshop on Computational Learning Theory*, pp. 61-74, 1991, Morgan Kaufmann.
- *Weakly Learning DNF and Characterizing Statistical Query Learning Using Fourier Analysis.* With A. Blum, M. Furst, J. Jackson, Y. Mansour, and S. Rudich. *Proceedings of the 26th Annual ACM Symposium on the Theory of Computing*, pp. 253-262, 1994, ACM Press.
- *Towards Efficient Agnostic Learning.* With R. Schapire and L. Sellie. *Machine Learning* 17, pp. 115-141, 1994. See also *Proceedings of the Fifth Annual Workshop on Computational Learning Theory*, pp. 341-352, 1992, ACM Press.
- *Cryptographic Limitations on Learning Boolean Formulae and Finite Automata.* With L. Valiant. *Journal of the ACM* 41(1), pp. 67-95, 1994. See also *Proceedings of the 21st ACM Symposium on the Theory of Computing*, pp. 433-444, 1989, ACM Press.
- *Cryptographic Primitives Based on Hard Learning Problems.* With A. Blum, M. Furst, and R. Lipton. *Advances in Cryptology*, Lecture Notes in Computer Science, Volume 773, pp. 278-291, 1994, Springer-Verlag.
- *Learning in the Presence of Malicious Errors.* With M. Li. *SIAM Journal on Computing* 22(4), pp. 807-837, 1993. See also *Proceedings of the 20th ACM Symposium on the Theory of Computing*, pp. 267-280, 1988, ACM Press.
- *Efficient Learning of Typical Finite Automata from Random Walks.* With Y. Freund, D. Ron, R. Rubinfeld, R. Schapire, and L. Sellie. *Proceedings of the 25th ACM Symposium on the Theory of Computing*, pp. 315-324, 1993, ACM Press.
- *Equivalence of Models for Polynomial Learnability.* With D. Haussler, N. Littlestone, and M. Warmuth. *Information and Computation* 95(2), pp. 129-161, 1991.
- *Efficient Distribution-free Learning of Probabilistic Concepts.* With R. Schapire. *Journal of Computer and System Sciences* 48(3), pp. 464-497. See also *Proceedings of the 31st Annual IEEE Symposium on Foundations of Computer Science*, pp. 382-391, 1990, IEEE Press.
- *Exact Identification of Read-once Formulas Using Fixed Points of Amplification Functions.* With S. Goldman and R. Schapire. *SIAM Journal on Computing* 22(4), pp. 705-726. See also

*Proceedings of the 31st IEEE Symposium on Foundations of Computer Science*, pp. 193-202, 1990, IEEE Press.

- *A General Lower Bound on the Number of Examples Needed for Learning*. With A. Ehrenfeucht, D. Haussler, and L. Valiant. *Information and Computation* 82(3), pp. 247-261, 1989. See also *Proceedings of the 1988 Workshop on Computational Learning Theory*, pp. 139-154, 1988, Morgan Kaufmann.
- *On the Learnability of Boolean Formulae*. With M. Li, L. Pitt, and L. Valiant. *Proceedings of the 19th ACM Symposium on the Theory of Computing*, pp. 285-195, 1987, ACM Press.
- *Recent Results in Boolean Concept Learning*. With M. Li, L. Pitt and L. Valiant. *Proceedings of the Fourth International Workshop on Machine Learning*, pp. 337-352, 1987, Morgan Kaufmann.

## References

- Available on request.

## Personal

- Born October 24, 1962 in California.
- U.S. citizen.
- Married; two children, 10 and 12 years old.
- Hobbies: squash, music, reading, NYC, San Diego Chargers.