DEAN PHILLIPS FOSTER

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August 5, 2026

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Education

Ph.D. (1988) Statistics. University of Maryland, Thesis: "Conditional Least Squares for Semimartingales" Advisor: Grace Yang.

M.S. (1984) AI and Computer Science. Rutgers University.

M.A. (1982) Mathematics. University of Maryland.

B.S. (1980) Biochemistry. University of Maryland.

Employment / Academic Appointments

Amazon (2015 - present) Senior Principal Research Scientist, New York.

University of Pennsylvania (1992 -) First Associate, then Full, then The William H. Lawrence Professor of Statistics, then The Marie and Joseph Melone Professor of The Wharton School, and currently Emeritus.

University of Chicago (1988 - 1992) Assistant then Associate Professor of Statistics, Graduate School of Business.

Visiting positions Yahoo Labs (2014) Principal Research Scientist, New York. Microsoft Research (2013, 2015) Visiting researcher in the NY labs. The Hebrew University (1996, 2006 - 2007, 2012). Winston Fellow, Institute for Advanced Studies. Northwestern University (1997) Visiting Research Professor, Center for Mathematical Studies.

Students/Honors

Students: Choong Tze Chua (2003), Liang Wang (2004), Abhishek Gupta (2008), Dongyu Lin (2009), Jordan Rodu (2014), Parmaveer Dhillion (2014), Yichao Lu (2015), Kory Johnson (2016), Peichao Peng (2016), Zhuang Ma (2017), Joao Sedoc (2019).

NSF Grants: Statistics (2011-1013) *Martingale Control of mFDR in Variable Selection*, with Robert Stine. Statistics (1998 - 2000) *Information Theory and Statistical Model Selection*, with Robert Stine. Economics (1993) *Measuring Risk in Financial Asset Markets*, with Dan Nelson. Economics (1991,1992) *Estimating Conditional Variances and Covariances: Measurement Accuracy and Implications for Asset Pricing and Portfolio Choice*, with Dan Nelson.

Other: Elected to the Game Theory Society Council (2005-2011) and granted Fellow (2017). Editor (2005-2007) for *Statistical Science*. Associate Editor (1997-2005) for *Mathematical Social Sciences*. Granted fellow (2000) in the Institute of Mathematical Statistics. Distinguished Alumnus Award (2009) Mathematics, U Md. Test of time 2020 at *EC*.

BIBLIOGRAPHY

Refereed Papers

"Efficient RL for optimizing conversation level outcomes with an LLM-based tutor," with Nam, Gottesman, Zhang, Brunskill, Ungar, *NeurIPS workshop MTI-LLM*, 2025.

"How Does Critical Batch Size Scale in Pre-training?" with H. Zhang, D. Morwani, N. Vyas, J. Wu, D. Zou, U. Ghai and S. Kakade, *ICLR 2025*.

"Mind the Gap: Examining the Self-Improvement Capabilities of Large Language Models," with Y. Song, H. Zhang, C. Eisenach, S. Kakade and U. Ghai, *ICLR 2025*.

"Scaling Laws for Imitation Learning in Single-Agent Games," with J. Tuyls, D. Madeka, K. Torkkola, K. Narasimhan, S. Kakade, *TMLR*, 2024.

"A Study on the Calibration of In-context Learning," with Hanlin Zhang, YiFan Zhang, Yaodong Yu, Dhruv Madeka, Eric P. Xing, Himabindu Lakkaraju, Sham M. Kakade, *NACCL 2024*.

"Mean and Variance Estimation for Distribution-Free Representation," with Vincent Quenneville-Bélair, *Consumer Science Summit*, 2023.

"Linear Reinforcement Learning with Ball Structure Action Space," with Zeyu Jia, Randy Jia, Dhruv Madeka, *ALT 2023*.

"A Few Expert Queries Suffices for Sample-Efficient RL with Resets and Linear Value Approximation ," with Philip Amortila, Nan Jiang, and Dhruv Madeka *NeurIPS 2022*.

"'Calibeating:' Beating forecasters at their own game," with Sergiu Hart, 2021, *Theoretical Economics.*, 2022.

"Impartial Predictive Modeling and the Use of Proxy Variables," with Kory Johnson and Robert Stine, *iConference* 2022.

"The Benefits of Implicit Regularization from SGD in Least Squares Problems," with Difan Zou, Jingfeng Wu, Vladimir Braverman, Quanquan Gu, and, and Sham Kakade *NeurIPS*, 2021.

"Forecast Hedging and Calibration," with Sergiu Hart, *Journal of Political Economy*, 3447-3490, 2021.

"What are the Statistical Limits of Offline RL with Linear Function Approximation?," with Ruosong Wang and Sham Kakade, *ICLR* 2021.

"Top-k eXtreme Contextual Bandits with Arm Hierarchy," with Rajat Sen, Alexander Rakhlin, Lexing Ying, Rahul Kidambi, Daniel Hill, and Inderjit Dhillon, *ICML* 2021.

"Variance Reduction in Training Forecasting Models with Subgroup," with Yucheng Lu, Youngsuk Park, Lifan Chen, Bernie Wang, and Christopher De Sa, *ICML*, 2021.

"Single-index models in the high signal regime," with Aswin Pananjady, *IEEE Transactions on Information Theory*, **67**, 4092-4124, 2021.

"Estimation of product-level demand lift of sub-sameday program," with Yifei Yan *AMLC*, 2020.

"Dynamic Local Regret for Non-convex Online Forecasting," with Sergul Aydore and Tianhao Zhu, *NeurIPS*, 2019.

"Coupled Recurrent Models for Polyphonic Music Composition" with John Thickstun, Sham Kakade, and , Zaid Harchaoui, *ISMIR 2019*.

"Deep factors for forecasting," with Bernie Wang, Alex Smola, and Tim Januschowski *ICML 2019*.

"A local Regret in Nonconvex Online Learning," with Sergul Aydore and Lee Dicker, *NeurIPS 2018 Workshop* on Continual Learning.

"Advances in Sample Path Generation for Probabilistic Demand Forecasting," with Kari Torkkola, Leo Razoumov, Dhruv Madeka and Ruofeng Wen, *TADGM 2018* (an *ICML* workshop) also in *MileTS 2018* (a *KDD* workshop).

"Smooth calibration, leaky forecasts, finite recall, and Nash dynamics," with Sergiu Hart, *Games and Economic Behavior*, 271-283, 2018.

"Invariances and Data Augmentation for Supervised Music Transcription," with John Thickstun, Zaid Harchaoui, and Sham M. Kakade, *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP).*, 2018, pp. 2241–2245.

"Coupled Recurrent Models for Polyphonic Music Composition," with John Thickstun, Zaid Harchaoui and Sham Kakade, *ISMIR*, 2019.

"Semantic Word Clusters Using Signed Spectral Clustering," with Lyle Ungar, Joao Sedoc, and Jean Gallier, in *ACL 2017*.

"Kernel methods and regularization for nonparametric regression problems: Optimality and adaptation," with Daniel Hsu, and Lee Dicker, *Electronic Journal of Statistics*, 2017.

"Online Sparse Linear Regression," with Satyen Kale, Howard Karloff, *COLT*, 2016.

"Eigenwords: Spectral Word Embeddings," with Parmaveer Dhillion and Lyle Ungar, *JMLR*, 3035-3078, 2015.

"How Well Do the Standard Body-Mass Index or Variations With A Different Exponent Predict Human Lifespan?," with H. Karloff and K. Shirley, *Obesity*, 2015.

"Finding Linear Structure in Large Datasets with Scalable Canonical Correlation Analysis," with Yichao Lu and Zhuang Ma, *ICML* 2015.

"Variable Selection is Hard," with Howard Karloff and Justin Thaler, *COLT* 2015.

"Risk Inflation of Sequential Tests Controlled by Alpha Investing," *Journal of Statistical Computation and Simulation*, **85**, 2015.

"Estimating Stock Covariance Using Factorial Hidden Markov Models," with J. Sedoc, J Rodu, and L. Ungar, *PGMO-COPI* 2014.

"Large Scale Canonical Correlation Analysis with Iterative Least Squares," with Yichao Lu, *NeurIPS*, 2014.

"Adaptive Monotone Shrinkage for Regression," with Zhuang Ma, and Robert Stine, *UAI* 2014.

"Fast Ridge Regression with Randomized Principal Component Analysis and Gradient Descent," with Yichao Lu. *UAI* 2014.

"A Spectral Algorithm for Latent Dirichlet Allocation," with Daniel Hsu, Sham Kakade, Yi-Kai Liu, and Anandkumar Anima, *Algorithmica*, 193-214, 2015.

"Partial Monitoring—Classification, Regret Bounds, and Algorithms," with Gabor Bartok, David Pal, Alexander Rakhlin, Csaba Szepesvari, to appear in *Mathematics of Operations Research*, 2014.

"Spectral Learning of Latent-Variable PCFGs: Algorithms and Sample Complexity," with Shay Cohen, Karl Stratos, Michael Collins, and Lyle Ungar, *JMLR*, 2399-2449, 2014.

"Combining Multiple Probability Predictions Using a Simple Logit Model" with Ville Satopaa, Jonathan Baron, Barbara cMellers, Phil Tetlock, and Lyle Ungar, *International Journal of Forecasting*, **30**, 2014, 344-456.

"A Level-Set Hit-and-Run Sampler for Quasi-Concave Distributions," Shane T. Jensen, *AISTATS*, 2014.

"A Risk Comparison of Ordinary Least Squares vs Ridge," with P. Dhillon, S. Kakade, L. Ungar, *JMLR* **14**, 2013, 1505-1511.

"New Subsampling Algorithms for Fast Least Squares Regression," with Y. Lu, P. Dhillion, and L. Ungar, *NeurIPS*, 2013.

"Faster Ridge Regression via Subsampled Randomized Hadamard Transform," with P. Dhillion, Y. Lu, and L. Ungar, *NeurIPS*, 2013.

"One-shot learning and big data with n=2," with Lee Dicker, *NeurIPS*, 2013.

"How to retire early," with Phillip Ernst and Larry Shepp, to appear in *Journal of/Advances in Applied Probability*, 2013.

"Estimating reading growth attributable to Accelerated Reader in one Caribbean international school," with David Foster, *Reading Psychology*, 2014.

"Stochastic convex optimization with bandit feedback," with Alekh Agarwal, Alexander Rakhlin, Daniel Hsu, Sham Kakade *SIAM Journal on Optimization*, 2013, 188-212.

"A Wealth-Requirement Axiomatization of Riskiness," with Sergiu Hart, *Theoretical Economics*, **8**, 2013, 591–620.

"Using Regression for Spectral Estimation of HMMs," with Jordan Rodu, Lyle Ungar and Weichen Wu, *Statistical Language and Speech Processing (SLSP 2013)*, 216-227.

"Experiments with Spectral Learning of Latent-Variable PCFGs," with S. Cohen, K. Stratos, M. Collins, and Lyle Ungar, *NAACL-HLT 2013*.

"Two Step CCA: A new spectral method for estimating vector models of words," with Paramveer Dhillon, Jordan Rodu and Lyle Ungar. ICML 2012. Acceptance Rate: 27%.

"Domain adaption: Overfitting and Small Sample Statistics," with Sham Kakade and Ruslan Salakhutdinov, *AI-STATS 2012*.

"No Internal Regret via Neighborhood Watch," with Alexander Rakhlin, *AI-STATS 2012*.

"New Insights from Coarse Word Sense Disambiguation in the Crowd," with Adam Kapelner, Krishna Kaliannan, Andy Schwartz, Lyle Ungar, *COLING* 2012.

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"A strategy-proof test of portfolio returns," with Peyton Young, *Quantitative Finance*, *2012*, **12**, 671-683.

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"Multi View Learning of Word Embeddings via Canonical Correlation Analysis," with Parmaveer Dhillon, and Lyle Ungar. *NeurIPS 2011.*

"Complexity-Based Approach to Calibration with Checking Rules," with Alexander Rakhlin, Karthik Sridharan and Ambuj Tewari, *COLT 2011.*

"Domain Adaptation with Coupled Subspaces," with S. Kakade, J. Blitzer, *AI-STAT, 2011*, 173-181.

"VIF Regression: A Fast Regression Algorithm for Large Data" with Dongyu Lin, and Lyle Ungar, *JASA*, 2011.

"The effect of winning an Oscar Award on survival: Correcting for healthy performer survivor bias with a rank preserving structural accelerated failure time model," with Xu Han, Dylan Small, and Vishal Patel *Annals of Applied Statistics*, 2011, 746-772.

"Minimum Description Length Penalization for Group and Multi-Task Sparse Learning," with Paramveer S. Dhillon, Lyle H. Ungar, *JMLR*, **12**, 525-564, 2011.

"A New Approach to Lexical Disambiguation of Arabic Text," EMNLP 2010, with Rushin Shah, Paramveer S. Dhillon, Mark Liberman, Mohamed Maamouri and Lyle Ungar.

"Feature Selection using Multiple Streams," with Paramveer Dhillon and Lyle Ungar. *AISTATS 2010.*

"Gaming Performance Fees by Portfolio Managers" with H. Peyton Young, *Quarterly Journal of Economics,* 2010, 1435-1458. (A lighter version was published in *The Economists' Voice* (MS #1311) 2010 which was then republished as the lead article in their special issue on *Financial Regulation, Financial crisis, and Bailouts.*)

"An operational measure of riskiness," with Sergiu Hart, *Journal of Political Economy*, 2009. (lead article)

"Brain imaging and brain privacy: a realistic concern?" with Martha J Farah, M Elizabeth Smith, Cyrena Gawuga, Dennis Lindsell 2009, *Journal of Cognitive Neuroscience*, **21**, 119-127.

"Transfer Learning, Feature Selection and Word Sense Disambiguation," with Paramveer Dhillon and Lyle Ungar. *Association of Computational Linguistics (ACL-IJCNLP 2009).*

"Multi-Task Feature Selection using the Multiple Inclusion Criterion (MIC)," with P. S. Dhillon, B. Tomasik, and L. Ungar, *ECML*, 2009.

"Efficient Feature Selection in the Presence of Multiple Feature Classes," with Paramveer Dhillon, Dean Foster and Lyle Ungar. IEEE- International Conference on Data Mining, (ICDM 2008).

"Information Consistency of Nonparametric Gaussian Process Methods" with Seeger, M. W., Kakade, S. M. *IEEE Transactions on Information Theory*, **54**, 2008, 2376 - 2382.

"Deterministic Calibration and Nash Equilibrium" with Sham M. Kakade, 2008, *Journal of Computer and System Sciences* (learning theory special issue) **74**, 2008, Pages 115-130.

"α-investing: A procedure for Sequential Control of Expected False Discoveries" with R. Stine, *JRSS-B*, **70**, 2008, pages 429-444.

"A dynamic model for the Forward Curve," with C. Chua, K. Ramaswamy, R. Stine, *Review of Financial Studies*, 21, 265-310, 2007.

"Streamwise Feature Selection" with Jing Zhou, Robert A. Stine and Lyle H. Ungar *JMLR* **7**, 2006, 1861-1885.

"Multi-View Regression via Canonical Correlation Analysis," with S Kakade, *COLT*, 2006.

"Worst-Case Bounds for Gaussian Process Models," with Sham Kakade, and Matthias Seeger, *NeurIPS*, 2006.

"Honest confidence intervals for the error variance in stepwise regression," with R. Stine, *Journal of Economic and Social Measurement*, 89 - 102, 2006.

"Regret Testing: learning to play Nash equilibrium without knowing you have an opponent," with H. P. Young, **1**, 2006, *Theoretical Economics*, 341-367.

"Being Warren Buffett: A Classroom Simulation of Risk and Wealth When Investing in the Stock Market," with Robert A. Stine, *The American Statistician*, **60**, 2006, 53-60.

"Streaming Feature Selection," L. Ungar and R. Stine, *AI and statistics*, 2005.

"Streaming Feature Selection using alpha investing," with J. Zhou, L. Ungar and R. Stine, in *KDD* 2005.

"Deterministic Calibration and Nash Equilibrium" S. Kakade, *COLT*, 2004.

"Streaming Feature Selection," with L. Ungar and R. Stine, in *AI and Stat* 2004.

"Variable selection in data mining: Building a predictive model for bankruptcy," with R. Stine, *JASA*, 2004, **99**, 303-313.

"Learning, Hypothesis Testing and Nash Equilibrium," with H. P. Young, *Games and Economic Behavior*, 2003, 73 - 96.

"Universal Codes for Finite Sequences of Integers Drawn from a Monotone Distribution," with R. Stine, and Adi Wyner, *IEEE Transactions on Information Theory*, 2002, **48**, 1713 - 1720.

"On the Impossibility of Predicting the Behavior of Rational Agents," with H. Peyton Young, *Proceedings of the National Academy of Sciences*, 2001, 12848-12853.

"Calibration and Empirical Bayes Variable Selection," with E. George, *Biometrika*, 2000, **87**, 731 - 747.

"Introduction to the Special Issue," (in honor of David Blackwell) with R. Vohra, D. Levine, *Games and Economic Behavior*, 1999, **29**, 1 - 7.

"Regret in the On-line Decision Problem," with R. Vohra, *Games and Economic Behavior*, 1999, **29**, 7 - 36.

"A proof of Calibration via Blackwell's Approachability Theorem," *Games and Economic Behavior*, 1999, **29**, 73 - 79.

"Local Asymptotic Coding and the MDL," with R. Stine, *IEEE Transaction on Information Theory*, 1999, **45**, 1289 - 1293.

"Competitive Algorithms for Layered Graph Traversal," with A. Fiat, H. Karloff, Y. Rabani, Y. Ravid, and S. Vishwanathan, *SIAM Journal on Computing*, 1999, **28** 448 - 463.

"Cost and trust issues in online auctions," with L. Ungar and D. Parkes, AMET-98.

"A formal statistical approach to collaborative filtering." with L.H. Ungar *CONALD98*, 1998.

"On the Non-convergence of Fictitious Play in Coordination Games," with H. P. Young, *Games and Economic Behavior.* 1998, 79 - 96.

"An Axiomatic Characterization of a Class of Location in Tree Networks," with R. Vohra *Operations Research*, 1998, **46**, 347 - 354.

"Asymptotic Calibration," with R. Vohra, *Biometrika*, **85**, 1998, 379 - 390.

"Characterizing the generalization performance of model selection strategies," with D. Schuurmans and L. Ungar, ICML proceedings, 1997.

"Calibrated Learning and Correlated Equilibrium," with R. Vohra *Games and Economic Behavior*, 1997, **21**, 40-55. Winner of *SIGECON / EC* "test of time award," 2020.

"Precision and Accuracy of Judgmental Estimation," with I. Yaniv, *Journal of Behavioral Decision Making* **10**, 1997, 21 - 32.

"Continuous Record Asymptotics for Rolling Sample Variance Estimators," with D. Nelson, *Econometrica,* **64**, 1996, 139 - 174. Reprinted in *Modeling Stock Market Volatility: Bridging the Gap to Continuous Time*, Editor P. Rossi, Academic Press 1996, 291 - 329.

"A Simple Ancillarity Paradox," with E. George, *Scandinavian Journal of Statistics*, **23**, 1996, 233 - 242.

"Filtering and Forecasting with Misspecified ARCH Models: Making the Right Forecast with the Wrong Model," with D. Nelson, *Journal of Econometrics*, **67**, 1995, 303 - 335. Reprinted in *Modeling Stock Market Volatility: Bridging the Gap to Continuous Time*, Editor P. Rossi, Academic Press, 1996, 157 - 191.

"Graininess of Judgment Under Uncertainty: An Accuracy - informativeness Tradeoff," with I. Yaniv, *Journal of Experimental Psychology: General*, **124**, 1995, 424 - 432.

"Asymptotic Filtering Theory for Univariate ARCH Models," with D. Nelson, *Econometrica*, **62**, (1994), 1 - 41. Reprinted in *Modeling Stock Market Volatility: Bridging the Gap to Continuous Time*, Editor P. Rossi, Academic Press, 1996, 193 - 240.

"The Risk Inflation Criterion for Multiple Regression," with E. George, *The Annals of Statistics*, **22**, 1994, 1947 - 1975.

"A Randomization Rule for Selecting Forecasts," with R. Vohra, *Operations Research*, **41**, 1993, 704 - 709, with discussion by R. Clemen.

"Estimation up to a Change Point," with E. George, *The Annals of Statistics*, **21**, 1993, 625 - 644.

"An Economic Argument for Affirmative Action," with R. Vohra, *Rationality and Society*, **4**, 1992, 176 - 188, with discussion by G. Loury, by D. Friedman, and by J. Heckman and T. Philipson.

"A Probabilistic Analysis of the K - location Problem," with R. Vohra, *American Journal of Mathematical and Management Sciences*, **12**, 1992, 75 - 87, winner of the 1993 Jacob Wolfowitz prize.

"Competitive Algorithms for Layered Graph Traversal," with A. Fiat, H. Karloff, Y. Rabani, Y. Ravid, and S. Vishwanathan, in *Proc. 32nd Symposium on Foundations of Computer Science*, Puerto Rico, 1991, 288 - 297.

"Prediction in the Worst Case," *The Annals of Statistics*, **19**, 1991, 1084 - 1090.

"Cooperation in the Short and in the Long Run," with H.P. Young, *Games and Economic Behavior*, **3**, 1991, 145 - 156.

"Stochastic Evolutionary Games Dynamics," with H.P. Young, *Theoretical Population Biology*, **38**, 1990, 219 - 232. Reprinted in *Complexity in Economics*, edited by J. B. Rosser, Jr, 2002.

"Probabilistic Analysis of a Heuristic for the Dual Bin Packing Problem," with R. Vohra, *Information Processing Letters*, **31**, 1989, 287 - 290.

Books, Patents and Products

Patent: "Deep factor models with random effects for forecasting," with Bernie Wang, Alex Smola, and Tim Januschowski, 16/101,118. (2020), #11,537,874.

Business Statistics (2010, 2012) with R. Stine.

Business Statistics: A Casebook, with R. Stine and R. Waterman, Springer-Verlag (1998).

Business Analysis using Regression: A Casebook, with R. Stine and R. Waterman, Springer-Verlag (1998).

Method and apparatus for publishing textual information to a web page, with Lyle Ungar, Patent filed 2007, denied 2010. filed under *Automatic construction of Wiki pages from emails US Application No. 11/770227 S&L File No. P 33091.*

The Wharton Course Auction, with Rakesh Vohra and Anjani Jain. This was the course auction that was used by Wharton from 1996 up to 2012.

BMI calculator, with Kenny Shirley 2017. A web calculator which models the death rate given covariates your BMI and other features.

Mortality calculator, with Lyle Ungar and Choong Tze Chua, 2001. The first web calculator which modeled death rate given covariates of a user.

Web and arxiv Publications

"BRIDGE: Building Representations In Domain Guided Program Verification," with R. George, C. Eisenach, U. Ghai, D. Perrault-Joncas, and A. Anandkumar. Arxiv: 2511.21104.

"A shared-revenue Bertrand game," with R. Pabari, U. Ghai, D. Perrault-Joncas, K. Torkkola, O. Ronen, D. Madeka, A. Rubinstein, and Omer Gottesman. submitted to *GEB* 2025.

"Learning an Inventory Control Policy with General Inventory Arrival Dynamics," with S. Andaz, C. Eisenach, D. Madeka, K. Torkkola, R. Jia, and S. Kakade, 2024. (2310.17168v2)

"On Submodular Contextual Bandits," with Alexander Rakhlin, 2022.

"Variance Reduction in Training Forecasting Models with Subgroup Sampling," with Lu, Yucheng, Youngsuk Park, Lifan Chen, Yuyang Wang, Christopher De Sa, CoRR (2021).

"Threshold martingales and the evolution of forecasts," with Robert Stine, 2021.

"A Risk Ratio Comparison of l_0 and l_1 Penalized Regression," with Dongyu Lin, Kory Johnson, Robert Stine.

"Revisiting Alpha-Investing: an algorithm for fast, principled, and greedy feature selection," with Kory Johnson and Robert Stine.

"Testing for excess returns in financial markets: A martingale Aproach" with Robert Stine and H. Peyton Young.

"Multi View Learning of State in Language via Canonical Correlation Analysis" with Lyle Ungar and Paramveer Dhillon.

"Spectral Dimension Reduction for HMMs," with Jordan Rodu and Lyle Ungar.

"Estimating factorial HMM," with Jordan Rodu.

"Finding Linear Structure in Large Datasets with Scalable Canonical Correlation Analysis," with Yichao Lu and Zhuang Ma, ICML 2015.

"Multi-View Dimensionality Reduction via Canonical Correlation Analysis" with Sham M. Kakade, & Tong Zhang. TTI-C Tech Report, TTI-TR-2008-4, 2008, (59 cites).

"Adaptive Variable Selection Competes with Bayes Experts," with R. Stine, (5 cites).

"On the lower limits of entropy estimation," with A. Wyner (29 cites).

Unrefereed Papers

"Distribution-Free Multi-Horizon Forecasting and Vending System," with Vincent Quenneville-Belair, Malcolm Wolff, Brady Willhelme, Dhruv Madeka, *MILETS workshop* at *KDD 2023*.

"Pact: Privacy sensitive protocols and mechanisms for mobile contact tracing," with Justin Chan, Shyam Gollakota, Eric Horvitz, Joseph Jaeger, Sham Kakade, Tadayoshi Kohno, John Langford, Jonathan Larson, Puneet Sharma, Sudheesh Singanamalla, Jacob Sunshine, Stefano Tessaro, 2020.

"Deep RL for supply chain," with Kari Torkkola and Dhruv Madeka, 2020, *CSS: An Internal Amazon conference*.

"Calibration: Respice, Adspice, Prospice," with Rakesh Vohra, *Advances in Economics and Econometrics: Theory and Applications, Tenth World Congress*, 2012.

"Spectral methods for estimating probabilistic language models," with Lyle Ungar, Paramaveer Dhillon, Jordan Rodu and Michael Collins, *Snowbird*, 2012.

"Hedge fund wizards," with H Peyton Young, *The Economists voice* 2009, *Washington Post on line*.

"In defense of L0," with Dongyu Lin, Emily Pitler, and Lyle H Ungar, Workshop on Feature Selection, (ICML 2008).

"Maximal feature sets," with L. Ungar, and A. Goldenberg, *Snowbird*, 2008.

"Calibration via Regression" with Sham M Kakade, *IEEE Theory Workshop*, 2006.

"The contribution of parameters to stochastic complexity," with R. Stine, 195 - 213, in *Advances in Minimum Description Length*, edited by P. Grünwald, I. Myung and M. Pitt, MIT Press, 2005.

"The Competitive Complexity ratio," with R. Stine, *Proceedings of the 2000 Conference on Information Sciences and Systems, Volumn I*, Princeton University, WP8 1-6.

"A Proposal for Learning by Ontological Leaps," with L. Ungar, Snowbird 2002.

"Discussion of Chipman, George and McCulloch," with R. Stine, IMS monograph, 2001, 124 - 131.

"Clustering Methods For Collaborative Filtering," with L. Ungar, Proceedings of the Workshop on Recommendation Systems. AAAI Press, Menlo Park California, 1998. (500+ google cites.)

Invited Discussion on Schervish, Seidenfeld, and Kadane, *Bayesian Statistics 7*, Oxford University Press, 2002, 400 - 402.

"Learning with Hazy Beliefs," with H. P. Young, Institute Vienna Circle proceedings, 1997.

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"Comment on Nozer Singpurwalla's Paper," Invited Discussion for the *Bayesian Statistics 5*, Oxford University Press, 1996, 384 - 385.

"Judgment, Graininess, and Categories," with I. Yaniv, *Cognitive Science Proceedings*, 1990, 133 - 140, Hillsdale, NJ: Lawrence Erlbaum.