

Giles Hooker

Assistant Professor

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Education

Ph.D. Statistics, Stanford University 2004.

M.Sc Statistics, Stanford University, 2002.

B.Sc. Mathematics Honours 1, Australian National University, 1999.

B.A. Political Science, Australian National University, 1998.

Honours and Awards

2004 TA of the Year, Department of Statistics, Stanford University.

2004 Laha Travel Award, Institute of Mathematical Statistics

2003 TA Award - Department of Statistics, Stanford University.

2000 Fulbright Tim Matthews Memorial Award

2000 Shandong Province Award for Excellence in Teaching

1999 University Medal in Mathematics, Australian National University

1999 Hana Neumann Prize for 4th Year Mathematics

1999 ANU Honours Scholarship

1997 UNSW Summer Research Scholarship

Professional Experience

August 2006 - Assistant Professor, Department of Biological Statistics and Computational Biology and Department of Statistical Science, Cornell University.

October 2004- August 2006 Post-Doctoral Fellow, McGill University.

June - September 2003 Intern, Robert Bosch Corp.

June 2002 - August 2002 Intern, AT&T Research.

Feb-July 2000 English Teacher, Chiang Chen Industrial Institute.

Dec 1999 - Feb 2000 Research Assistant, Research School of Information Sciences and Engineering.

Dec 1998 - Feb 1999 Intern, Commonwealth Bank of Australia.

Dec 1997 - Feb 1998 Research Scholar, University of New South Wales.

Books

Ramsay, James O., **Giles Hooker** and Spencer Graves, 2009, "Functional Data Analysis in R and Matlab", Springer.

Papers

Giles Hooker and Matthew Finkelman, 2009, "Paradoxical Results and Item Bundles". *Psychometrika*, in press.

Kelling, S., W. Hochachka, D. Fink, M. Riedewald, R. Caruana, G. Ballard and **G. Hooker**, 2009, "Data Intensive Science: A New Paradigm for Diversity Studies". *Biosciences*, 59:613-620.

Hooker, Giles, Matthew Finkelman and Armin Schwartzman, 2009, "Paradoxical Results in Multidimensional Item Response Theory". *Psychometrika*, 74:419-442.

Hooker, Giles, 2009, "Forcing Function Diagnostics for Nonlinear Dynamics". *Biometrics*, 65:928-936.

Gelzer, A., M. L. Koller, N. F. Otani, J. J. Fox, M. W. Enyeart, **G. Hooker**, M. L. Riccio, C. R. Bartoli and R. F. Gilmour, 2008, "Dynamic Mechanisms for Initiation of Ventricular Fibrillation in vivo", *Circulation*, 118:1123-1129.

Ramsay, J. O., **G. Hooker**, D. Campbell and J. Cao, 2007. "Parameter Estimation for Nonlinear Differential Equations: A Smoothing-Spline Approach". *Journal of the Royal Statistical Society, Series B*, Vol 69, No 5.

Hooker, Giles, 2007. “Generalized Functional ANOVA Diagnostics for High Dimensional Functions of Dependent Variables”. *Journal of Computational and Graphical Statistics*. Vol 16, No 3.

Norris, Robert, Jessica Ngo, Karen Nolan and **Giles Hooker**, 2005. “Volunteers are Unable to Properly Apply Pressure Immobilization in a Simulated Snakebite Scenario”. *Journal of Wilderness and Environmental Medicine*, Vol 16, No 1.

Hooker, Giles and Matthew Finkelman, 2004. “Sequential Analysis for Learning Modes of Browsing”. *WEBKDD 2004: Proceedings of the Sixth International Workshop on Knowledge Discovery from the Web*.

Hooker, Giles, 2004. “Diagnosing Extrapolation: Tree-Based Density Estimation”. *Proceedings of the Tenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*.

Hooker, Giles, 2004. “ANOVA Diagnostics for Black Box Functions”. *Proceedings of the Tenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*.

Shirts, Michael, Eric Bair, **Giles Hooker** and Vijay Pande, 2003. “Equilibrium Free Energies from Non-equilibrium Estimates Using Maximum Likelihood Methods”. *Physical Letters Review*. Vol 91, No 14.

Hegland, Markus, **Giles Hooker** and Stephen Roberts. 1999. “Finite Element Thin Plate Splines in Density Estimation”. In *Computational Techniques and Applications, Proceedings of the Ninth Biennial Conference: CTAC99*. *Journal of the Australian Mathematics Society*.

Technical Reports

Matthew Finkelman, **Giles Hooker** and Zhen Wang, 2009, “Unidentifiability and Lack of Monotonicity in the Multidimensional Three-Parameter Logistic Model”. Technical Report BU-1678-M, Department of Biological Statistics and Computational Biology, Cornell University.

Giles Hooker and Larry Biegler, 2007. “ILOPT and Neural Dynamics: Tips, Tricks and Diagnostics”, Technical Report BU-1676-M, Department of Biological Statistics and Computational Biology, Cornell University.

Giles Hooker, 2007. “Theorems and Calculations for Smoothing-Based Profiled Estimation of Differential Equations”. Technical Report BU-1671-M, Department of Biological Statistics and Computational Biology, Cornell University.

Giles Hooker and Fuliang Weng, 2004. “Subset Selection in Large, Sparse Systems: An application of the Forward Stagewise approach to Natural Language Processing”. Technical Report, Robert Bosch Corporation.

Giles Hooker, 1999. “Developing a Spline-Smoothed Density”. Technical Report, Research School of Information Sciences and Engineering, Australian National University.

Grants Funded

NSF CMG 09-520: “Functional modeling of climate-ecosystem dynamics”, \$350,000, S. Ray, PI.

NSF DEB-0813743, “Rapid Evolution and the Dynamics of Complex Ecological Communities”, \$539,957, S. Ellner, PI.

Hatch NYC-150446, “Experimental Design for Nonlinear Processes in Agriculture”, \$30,000, PI.

Software Development

Author: “Adaptive-Loss Boosting”, Matlab routines.

Author: “Collocation Inference in Nonlinear Stochastic Dynamics”, R functions and Manual.

Developer: `pomp` library in R for Partially Observed Markov Processes (working group in National Center for Ecological Analysis and Synthesis).

Developer: `fda` library in R and MATLAB for Functional Data Analysis.

Author: “Smoothing Methods for Nonlinear Dynamics”. Manual and MATLAB Software.

Manuscripts Under Review

David Campbell, **Giles Hooker** and Kim McAuley, “Parameter Estimation in Differential Equation Models with Constrained States.”

Marija Zeremski, **Giles Hooker**, Marla A. Shu, Emily Winkelstein, Queenie Brown, Don C. Des Jarlais, Leslie H. Tobler, Barbara Rehermann, Michael P. Busch, Brian R. Edlin, and Andrew H. Talal, “Induction of CXCR3- and CCR5-associated Chemokines during Acute Hepatitis C Virus Infection.”

Daniel Fink, Wesley M. Hochachka, Benjamin Zuckerberg, David W. Winkler, Ben Shaby, M. Arthur Munson, **Giles Hooker**, Mirek Riedewald, Daniel Sheldon and Steve Kelling, “Spatiotemoral Exploratory Models for Broad-scale Survey Data”.

Ercan Atam and **Giles Hooker**, “An Identification-based State Estimation Method for a Class of Nonlinear Systems”.

Giles Hooker, “On Separable Tests, Correlated Priors and Paradoxical Results in Multidimensional Item Response Theory”.

Matthew Finkelman, **Giles Hooker** and Zhen Wang, “Prevalence and Severity of Paradoxical Results in Multidimensional Item Response Theory”.

Giles Hooker and Saharon Rosset, “Prediction-Focused Regularization Using Data-Augmented Regression”.

Giles Hooker and James Ramsay, “Learned-Loss Boosting”.

Invited Talks

“Paradoxical Results in Multidimensional Item Response Theory”, International Workshop on Statistical Modeling, July 2009

“Modeling Measles Epidemics with Smoothed Trajectory Profiling”, Applied Statistics Symposium, International Chinese Statistical Association, June 2009.

“Data Analysis with Differential Equations”, Thomas Jefferson University, November 2008.

“Inference from Black Boxes”, BIRS Workshop on Understanding the New Statistics: Expanding Core Statistical Theory, September 2008.

“Testing for Latent Dynamical Components”, Invited Session on Mechanistic Models, Joint Statistical Meetings, August 2008.

“Discovering Missing Components in Nonlinear Dynamics”, Statistics Seminar, University of British Columbia, March 2008.

“Likelihood and Fairness in Multidimensional Item Response Theory”, Statistics Seminar, Cornell University, February 2008.

“Statistics for Nonlinear Dynamics”. Computational Biology Seminar, Cornell University, November 2007.

“Smoothing Methods for Nonlinear Differential Equations”, Seminar on High-Dimensional and Correlated Data, Harvard School of Public Health, November 2007.

“Diagnostics for Nonlinear Dynamics”, Statistics Seminar, Boston University, November 2007.

“Boosted Estimates of Conditional Densities and Quantiles”, International Symposium on Business and Industrial Statistics-2007, August 2007.

“Fitting Qualitative Features in Neural Models”, CRM Workshop on Statistics for Nonlinear Dynamics, July 2007.

“Maximum Likelihood Estimates of Conditional Distributions”, BIRS Workshop on Complex Data Structures in the Health, Social and Environmental Sciences. April 2007.

“Model Building and Diagnostics for Nonlinear Dynamics”, Department of Biostatistics and Computational Biology, University of Rochester. December, 2006.

“Generalized ANOVA Diagnostics and Data Exploration in Machine Learning”, National ICT Australia, November 2006.

“Forcing Function Diagnostics for Differential Equations”, Fields Institute Conference on Nonparametric Statistics and Related Topics, September, 2006.

“Robust Parameter Estimation in Differential Equations”, Invited Session, Symposium of the International Chinese Statistical Association, June 2006.

“Statistics for Differential Equations”, Statistics and Actuarial Science Seminar, University of Waterloo, April 27, 2006.

“An ODE to Statistics: Data Analysis for System Dynamics”, Statistical Society of Ottawa Symposium on New Frontiers in Statistics, April 20, 2006.

“Understanding High Dimensional Functions of Correlated Predictors”, Machine Learning Seminar, IBM Research, December 15, 2005.

“Diagnostics and Extrapolation in Machine Learning: Extending the Functional ANOVA”, Colloque de Statistique de Montréal, Centre de Recherches Mathématiques, Montreal. October 7, 2005.

“Spline-Based Parameter Estimation in Dynamical Systems”. UC Davis Focused Research Group Conference on Functional Data Analysis, August 16, 2005.

“Diagnostics for Machine Learning: Generalizing the Functional ANOVA”, Seminar, Department of Statistics, Australian National University. October 15, 2004.

“Sequential Analysis for Learning Modes of Browsing”, Sixth International Workshop on Knowledge Discovery from the Web, August 22, 2004.

“Diagnosing Extrapolation: Tree-Based Density Estimation”, Industrial Affiliates Symposium, Department of Statistics, Stanford University, March 23, 2004.

“Extrapolation-Resistant Diagnostics”, National Institute of Statistical Sciences Workshop of Data Mining, February 4, 2004.

Teaching

Spring 2009/2010 BTRY 6020: Statistical Methods II

Fall 2008 BTRY 6150: Applied Functional Data Analysis

Spring 2008 CSCU Workshop: Introduction to Functional Data Analysis

Spring 2008/Fall 2009 BSCB 694: Theory of Multivariate Statistics

Fall 2007 BSCB 694: Statistical Learning Theory

Spring 2007 BSCB 694: Functional Data Analysis

Spring/Fall 2006, 2007, 2008 BTRY 7950: Graduate Student Consulting Unit

Winter 2005 Math 204: Principles of Statistics II. Department of Mathematics and Statistics, McGill University.

2001 - 2004 Teaching Assistant, Statistics Dept, Stanford University.
Including:

Stat110: *Introduction to Statistics for Scientists and Engineers*

Stat201: *Introduction to Regression Models and the ANOVA*

Stat315a and Stat315b: *Statistical Learning Theory*

Stat202: *Introduction to Machine Learning*

Stat362: *Random Number Generation and Monte Carlo Methods.*

1999 Tutor, Math 100, Mathematics Dept, Australian National University.

1997 Mathematics and Philosophy Tutor, Burgmann College.

Professional Contributions

Program Committee member, International Workshop on Statistical Modeling, July 2009.

Organizer, Workshop on Statistical Methods for Dynamic Systems Models, Vancouver, June 2009.

Organizer, Topic Contributed Session on “Statistical Methods for Differential Equation Models with Scientific Applications”, Joint Statistical Meetings, August 2008.

Organizer, Invited Session on “Advances in Functional Data Analysis”, Joint Statistical Meetings, August 2008.

Organizer, Topic Contributed Session on “Statistics for Nonlinear Dynamics”, Joint Statistical Meetings, August 2007.

Organizer, Workshop on Statistical Methods for Modeling Dynamical Systems, Centre des Recherches Mathématiques, Montreal. July 2007.

Program Committee Member, International Conference on the Digital Society, January 2007.