

Matthew J. Heiner

Department of Statistics
Brigham Young University
2169 WVB
Provo, UT 84602

Email: heiner@stat.byu.edu
Phone: (801) 422-3996
Web: heiner.byu.edu
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EDUCATION

University of California, Santa Cruz, Santa Cruz, CA

Ph.D., Statistical Science

August 2019

Thesis: Bayesian Mixture Modeling and Order Selection for Markovian Time Series

Committee: Athanasios Kottas (chair), Stephan Munch, Raquel Prado, and Abel Rodríguez

Brigham Young University, Provo, UT

M.S., Statistics

April 2014

Project: An Absorbing Markov Chain Model for Skill Importance in Women's Soccer

Committee: Gilbert Fellingham (chair), David Dahl, and Candace Berrett

B.S., Statistics: Actuarial Science Emphasis

April 2014

Minor in Mathematics

magna cum laude

EXPERIENCE

Assistant Professor, *Brigham Young University*

Aug. 2019 – Present

Graduate Pedagogy Mentor, *UC, Santa Cruz*

June – Aug. 2018

Online Course Developer/Instructor, *UC, Santa Cruz*

March 2016 – April 2017

Student Intern, *Lawrence Livermore National Laboratory*

June – Aug. 2015, 2016

Statistician Intern, *Savvysherpa Inc.*

May – Sept. 2014

R Programmer/Intern, *Axiom Corporation*

Dec. 2012 – Nov. 2013

Actuarial Intern, *Aon Hewitt*

May – Aug. 2011

PUBLICATIONS

PEER-REVIEWED ARTICLES

11. **Heiner, M.**, Page, G., and Quintana, F. (2024+), “A Projection Approach to Local Regression with Variable-Dimension Covariates,” *Journal of Computational and Graphical Statistics*, Advance Online Publication. [link](#)
10. Marcy, M. J., Carling, G. T., Thompson, A. N., Bickmore, B. R., Nelson, S. T., Rey, K. A., Fernandez, D. P., **Heiner, M.**, and Adams, B. (2024), “Trace element chemistry and strontium isotope ratios of atmospheric particulate matter reveal air quality impacts from mineral dust, urban pollution, and fireworks in the Wasatch Front, Utah, USA,” *Applied Geochemistry*, 162, 105906. [link](#)
9. Lamas, L., **Heiner, M.**, Ferreira, M., Moura, A., Rangel, W., Fellingham, G., and Lage, V., (2023+), “No-gi Brazilian jiu-jitsu: a Markovian analysis of elite-level combat dynamics,” *International Journal of Sports Science & Coaching*, Advance Online Publication. [link](#)

8. **Heiner, M.**, Grimm, T. ^{*}, Smith, H., Leavitt, S. D., Christensen, W. F., Carling, G. T., and St. Clair, L. L. (2023), “Multivariate receptor modeling with widely dispersed Lichens as bioindicators of air quality,” *Environmetrics*, 24(3), e2785. [link](#)
7. **Heiner, M.**, Heaton, M. J., Abbott, B., White, P., Minaudo, C., and Dupas, R. (2023), “Model-based Clustering of Trends and Cycles of Nitrate Concentrations in Rivers Across France,” *Journal of Agricultural, Biological and Environmental Statistics*, 28, 74–98. [link](#)
6. **Heiner, M.** and Kottas, A. (2022), “Bayesian Nonparametric Density Autoregression with Lag Selection,” *Bayesian Analysis*, 17(4), 1245–1273. [link](#)
5. **Heiner, M.** and Kottas, A. (2022), “Estimation and Selection for High-Order Markov Chains with Bayesian Mixture Transition Distribution Models,” *Journal of Computational and Graphical Statistics*, 31(1), 100–112. [link](#)
4. **Heiner, M.** and Kottas, A. (2021), “Autoregressive Density Modeling with the Gaussian Process Mixture Transition Distribution,” *Journal of Time Series Analysis*, 43, 157–177. [link](#)
3. **Heiner, M.**, Kottas, A., and Munch, S. (2019), “Structured priors for sparse probability vectors with application to model selection in Markov chains,” *Statistics and Computing*, 29, 1077–1093. [link](#)
2. Lamas, L., Santana, F., **Heiner, M.**, Ugrinowitsch, C., and Fellingham, G. (2015), “Modeling the Offensive-Defensive Interaction and Resulting Outcomes in Basketball,” *PloS one*, 10, e0144435. [link](#)
1. **Heiner, M.**, Fellingham, G. W., and Thomas, C. (2014), “Skill importance in women’s soccer,” *Journal of Quantitative Analysis in Sports*, 10, 287–302. [link](#)

UNDER REVIEW OR REVISION

WORKS IN PROGRESS

4. Gilman, J., Gill, R., **Heiner, M.**, and Hansen, N., “Trophic interactions, climate change and secondary wildfire interact to control soil water availability after wildfire.”
3. Datta, J., **Heiner, M.**, Ovaskainen, O., and Dunson, D., “Shrinkage on the Simplex: Bayesian Inference for Sparse and Structured Compositional Data.”
2. **Heiner, M.**, Johnson, S., Christensen, J., and Dahl, D., “Quantile Slice Sampling with Transformations to Approximate Targets.”
1. Halverson, B., **Heiner, M.**, Lamas, L., and Fellingham, G., “Hierarchical Absorbing Markov Chains with Application to Class-Specific Combat Dynamics.”

PRESENTATIONS

“Quantile Slice Sampling with Transformations to Approximate Targets”

- ISBA World Meeting, Venice, Italy, July 2024. (poster)
- Bayesian Nonparametrics Networking Workshop, Melbourne, Australia, December 2023. (poster)
- Bayes Comp, Levi, Finland, March 2023. (poster)

“Model-based Clustering of Trends and Cycles of Nitrate Concentrations in Rivers Across France”

- Classification Society Annual Meeting, Kelowna, BC, June 2024. (invited)
- 16th International Conference of the ERCIM WG on Computational and Methodological Statistics, virtual, December 2023. (invited)
- Joint Statistical Meetings, virtual, August 2021. (invited)

^{*}Mentored student co-authors are underlined.

- “Multivariate Receptor Modeling with Widely Dispersed Lichens as Bioindicators of Air Quality”
 - Joint Statistical Meetings, Toronto, Ontario, August 2023.
- “Shrinkage on the Simplex: Bayesian Inference with Sparse and Structured Compositional Data”
 - 36th New England Statistics Symposium, virtual, June 2023. (invited)
 - ISBA World Meeting, Montreal, QC, June 2022.
 - Seminar of LIFEPLAN Working Group at University of Helsinki, virtual, January 2022.
- “A Projection Approach to Local Regression with Variable-Dimension Covariates”
 - BNP-ISBA Webinar, February 2023. (invited; jointly presented with Fernando Quintana and Garritt Page)
- “Autoregressive Density Modeling with the Gaussian Process Mixture Transition Distribution”
 - 14th International Conference of the ERCIM WG on Computational and Methodological Statistics, virtual, December 2021. (invited)
- “Estimation and Selection for High-order Markov chains with Mixture Transition Distribution Models”
 - ISBA World Meeting, virtual, June 2021.
 - BYU/USU Applied Math Seminar, virtual, November 2020. (invited)
 - NBER-NSF SBIES Conference, virtual, August 2020.
- “Bayesian Nonparametric Density Autoregression with Lag Selection”
 - 13th International Conference of the ERCIM WG on Computational and Methodological Statistics, virtual, December 2020. (invited)
 - Joint Statistical Meetings, virtual, August 2020.
 - Statistics Department Seminar, Brigham Young University, Provo, UT, September 2019.
- “Bayesian Model Selection for Markov Chains Using Sparse Probability Vectors”
 - Joint Statistical Meetings, Vancouver, BC, July 2018.
 - Chapter Meeting, San Francisco Chapter of the American Statistical Association, San Francisco, CA, June 2018.
 - Poster at the Graduate Research Symposium, University of California, Santa Cruz, Santa Cruz, CA, April 2018.
- “The Interaction of Arctic Sea Ice and Global temperature, and Their Bias in Climate Simulation Experiments”
 - Engineering Summer Intern Seminar, Lawrence Livermore National Laboratory, Livermore, CA, August 2016.
- “Characterizing Natural Climate Variability of Mean Global Temperature in CMIP-5 Models”
 - Applied Statistics Group Seminar, Lawrence Livermore National Laboratory, Livermore, CA, September 2015.
- “Skill Importance in Women’s Soccer”
 - Student Research Conference, Brigham Young University, Provo, UT, March 2013.
- “Bayesian Analysis of Diet Intervention in Young Adults”
 - Student Research Conference, Brigham Young University, Provo, UT, March 2012.

RECOGNITIONS

Young Scholar Faculty Fellowship, BYU Department of Statistics, 2022–2024.

JSM Student Travel Award, San Francisco Chapter of the American Statistical Association (3rd place), 2018.

Chancellor’s Fellowship, Applied Mathematics and Statistics, UC Santa Cruz, 2014–2015.

Section Award, Student Research Conference, Brigham Young University, 2013.

TEACHING EXPERIENCE

Instructor, *Brigham Young University*

Stat 330 – Statistical Modeling 2 W 2024
 Stat 240 – Probability and Inference 1 F 2019, W 2021, W 2022, Sp 2023, F 2023
 Stat 201 – Statistics for Engineers and Scientists W 2020, F 2020, F 2021

Online Course Developer/Instructor, UC, Santa Cruz

March 2016 – April 2017

Coursera – Bayesian Statistics: Techniques and Models

Rated 4.8/5 (467 ratings); 53,000+ cumulative enrollment as of January 2024.

Coursera – Bayesian Statistics: From Concept to Data Analysis (assistant to Herbert Lee)

Rated 4.6/5 (3,111 ratings); 144,000+ cumulative enrollment as of January 2024.

Graduate Student Instructor, UC, Santa Cruz

AMS 7 – Statistical Methods for the Biological, Environmental, and Health Sciences

Su 2017, W 2018, Su 2018, W 2019

AMS 7L – Biostatistics Lab

F 2017, F 2018, Su 2019

Teaching Assistant, UC, Santa Cruz

AMS 131 – Introduction to Probability Theory

F 2015, Sp 2018

AMS 7 – Stat. Methods for the Bio., Env., and Health Sciences

Sp 2017

AMS 80A – Gambling and Gaming

W 2016

Teaching Assistant, Brigham Young University

Stat 497R – Introduction to Research: Sports Analytics

W 2014

Stat 340 – Statistical Inference

W 2012

Stat 301 – Statistics and Probability for Secondary Educators

Su 2012

Stat 240 – Discrete Probability

W 2012

Stat 230 – Analysis of Variance

F 2012

Stat 201 – Statistics for Engineers and Scientists

Su 2012

STUDENT ADVISING

Year	Student	Role	Position Following Graduation
2023-25	Thomas Witney	MS Committee Chair	
2023-24	Dallin Mason	Undergrad. Research Mentor	Statistics Intern at Pentara Corp.
2022-24	Brigham Halverson	MS Committee Chair	Ph.D. Student in Statistics at Texas A&M
2024	Spencer Kimball	MS Committee Member	Data Scientist at US Army
2023	Robert Sainsbury	Undergrad. Research (co-)Mentor	MS Student in Biomed. Informatics at U of Utah
2023	Bethany Day	MS Committee Member	At-home Mother
2022-23	Samuel Johnson	MS Committee Member	Statistician at Pentara Corp.
2021-23	Joshua Christensen	MS Committee Chair	Statistician at Pentara Corp.
2020-22	Hong Ni Mui	MS Committee Chair	Workflow Engineer at SimpleCitizen, Inc.
2022	Jared Clark	MS Committee Member	Ph.D. Student in Statistics at Virginia Tech
2021	Joseph Arnesen	Undergrad. Research Mentor	Project Manager at Premier Realty Investments
2021	Megan Louder	MS Committee Member	Statistician at Ancestry.com
2021	Angela Larkin	MS Committee Member	Biostatistician at U of Utah Health
2021	Thomas Jensen	MS Committee Member	Statistician at Berry Consultants
2020-21	Taylor Grimm	Undergrad. Research Mentor	Ph.D. Student in Statistics at Baylor U
2020-21	Hayden Smith	Undergrad. Research (co-)Mentor	Medical Student at Vanderbilt
2020	Brittany Russell	MS Committee Member	Freelance Online Tutor in Statistics
2020	Matthew Drewes	MS Committee Member	Medical Student at U of Miami

SERVICE

PROFESSION

Associate Editor, <i>Journal of Quantitative Analysis in Sports</i>	Jan. 2024 – Present
Web Administrator, Mu Sigma Rho National Honor Society	July 2023 – June 2026
Secretary, Utah Chapter of the American Statistical Association	Aug. 2020 – May 2022
Conference Sessions Organized	

“Bayesian methods for temporal dependence in complex structures”
- 16th International Conference of the ERCIM WG on Computational and Methodological Statistics, virtual, December 2023.

Journal Peer Review

Statistical Modelling (1 new manuscript / 0 revisions),
The American Statistician (1/1),
Journal of Quantitative Analysis in Sports (1/0),
Statistics in Medicine (1/2),
Spatial Statistics (1/1),
Stat (1/0),
Journal of Machine Learning Research (1/1),
Journal of Forecasting (1/1),
MA Journal of Management Mathematics (special issue on sports; 1/2)

UNIVERSITY

Member, Student Outreach / Recruiting Committee, Dept.	Aug. 2023 – Dec. 2023
Member, Peer Review of Teaching Committee, Dept.	W 2023
Course Coordinator, Stat 240 (and 2023 redesign), Dept.	Jan. 2023 – Present
Dept. Coordinator, Student Research Conference, College	Jan. 2023 – Apr. 2024
Faculty Advisor, Mu Sigma Rho Honor Society, BYU Chapter	July 2021 – Present
Member, Fulfillment Committee for Course Design, Dept.	May 2021 – Aug. 2021
Member, Strategic Planning Committee for Online Courses, Dept.	Sep. 2019 – Apr. 2021

STUDENT

President, Mu Sigma Rho Honor Society, Brigham Young University Chapter	2012 – 2013
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MEMBERSHIPS

International Society for Bayesian Analysis - Section on Bayesian Nonparametrics - Section on Environmental Sciences (EnviBayes) - Junior-ISBA Section	2014 – Present
American Statistical Association - Section on Bayesian Statistical Science (SBSS) - Section on Statistics and the Environment (ENVR) - Utah Chapter - San Francisco Bay Area Chapter	2011 – Present
Mu Sigma Rho - Brigham Young University Chapter	2010 – 2014