

Matthew Logan Reimherr

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Professional Preparation

University of Utah	Mathematics	B.S. Honors 2006	Advisor: L. Horváth
University of Utah	Statistics Emph. Math	M.S. 2008	Advisor: L. Horváth
University of Chicago	Statistics	Ph.D. 2013	Advisor: D.L. Nicolae

Appointments

Principal Research Scientist, Amazon, 2022-Present.
Professor of Statistics (Affiliate), Pennsylvania State University, 2023-Present.
Associate Professor of Statistics (w/ Tenure), Pennsylvania State University, 2019-2023.
Visiting Scholar, University of California, Berkeley, 2019.
Simons Institute for Theory of Computing
Assistant Professor of Statistics, Pennsylvania State University, 2013-2019.

Books

P. Kokoszka and M. Reimherr (2017). *Introduction to Functional Data Analysis*. Chapman & Hall/CRC.

Publications

1. D. Liebl and M. Reimherr. Fast and fair simultaneous confidence bands for functional parameters. *Journal of the Royal Statistical Society: Series B*, (Accepted), 2023.
2. A. R. Rao and M. Reimherr. Non-linear functional modeling using neural networks. *Journal of Computational and Graphical Statistics*, (Accepted), 2023.
3. M. Reimherr, B. Sriperumbudur, and H. B. Kang. Optimal function-on-scalar regression over complex domains. *Electronic Journal of Statistics*, 17(1):156–197, 2023.
4. I. D. Wright, M. Reimherr, and J. Liechty. A machine learning approach to classification for traders in financial markets. *Stat*, 11(1):e465, 2022.
5. C. J. Soto, K. Bharath, M. Reimherr, and A. Slavkovic. Shape and structure preserving differential privacy. *Advances in Neural Information Processing Systems*, 35, 2022.
6. F. W. Reimherr, T. E. Gift, T. A. Steans, M. L. Reimherr, L. I. Rosenberg, M. Wilson, and B. K. Marchant. The use of brexpiprazole combined with a stimulant in adults with treatment-resistant attention-deficit/hyperactivity disorder. *Journal of Clinical Psychopharmacology*, 42(5):445–453, 2022.

7. D. Nandy, S. J. Craig, J. Cai, Y. Tian, I. M. Paul, J. S. Savage, M. E. Marini, E. E. Hohman, M. L. Reimherr, A. D. Patterson, K. D. Makova, and F. Chiaromonte. Metabolomic profiling of stool of two-year old children from the insight study reveals links between butyrate and child weight outcomes. *Pediatric obesity*, 17(1):e12833, 2022.
8. G. Bopp, J. Ensley, P. Kokoszka, and M. Reimherr. Spatio-temporal functional data analysis. *Geostatistical Functional Data Analysis*, pages 351–374, 2022.
9. M. Reimherr, K. Bharath, and C. Soto. Differential privacy over Riemannian manifolds. *Advances in Neural Information Processing Systems*, 34, 2021b.
10. J. Seeman, M. Reimherr, and A. Slavković. Exact privacy guarantees for markov chain implementations of the exponential mechanism with artificial atoms. *Advances in Neural Information Processing Systems*, 34, 2021.
11. M. Reimherr, X.-L. Meng, and D. L. Nicolae. Prior sample size extensions for assessing prior impact and prior-likelihood discordance. *Journal of the Royal Statistical Society: Series B*, 83:413–437, 2021c.
12. T. E. Gift, M. L. Reimherr, B. K. Marchant, T. A. Steans, and F. W. Reimherr. Wender utah rating scale: Psychometrics, clinical utility and implications regarding the elements of adhd. *Journal of Psychiatric Research*, Accepted, 2021.
13. A. R. Rao and M. Reimherr. Modern multiple imputation with functional data. *Stat*, page e331, 2021.
14. S. J. Craig, A. M. Kenney, J. Lin, I. M. Paul, L. L. Birch, J. S. Savage, M. E. Marini, F. Chiaromonte, M. L. Reimherr, and K. D. Makova. Constructing a polygenic risk score for childhood obesity using functional data analysis. *Econometrics and Statistics*, 2021.
15. A. Mirshani and M. Reimherr. Adaptive function-on-scalar regression with a smoothing elastic net. *Journal of Multivariate Analysis*, 185:104765, 2021.
16. F. W. Reimherr, B. K. Marchant, T. E. Gift, T. A. Steans, and M. L. Reimherr. Psychometric data and versions of the wender utah rating scale including the wurs-25 & wurs-45. *Data in Brief*, page 107232, 2021a.
17. T. Boschi, M. Reimherr, and F. Chiaromonte. A highly-efficient group elastic net algorithm with an application to function-on-scalar regression. *Advances in Neural Information Processing Systems*, 34, 2021.
18. W. Chu, R. Li, J. Liu, and M. Reimherr. Feature selection for generalized varying coefficient mixed-effect models with application to obesity gwas. *Annals of Applied Statistics*, 14(1): 276–298, 2020.
19. J. Seeman, A. Slavkovic, and M. Reimherr. Private posterior inference consistent with public information: A case study in small area estimation from synthetic census data. In *International Conference on Privacy in Statistical Databases*, pages 323–336. Springer, 2020.

20. J. Awan, M. Reimherr, and A. Slavković. Formal privacy for modern nonparametric statistics. *CHANCE*, 33(4):43–49, 2020.
21. F. W. Reimherr, M. Roesler, B. K. Marchant, T. E. Gift, W. Retz, F. Philipp-Wiegmann, and M. L. Reimherr. Types of adult attention-deficit/hyperactivity disorder: a replication analysis. *The Journal of clinical psychiatry*, 81(2):0–0, 2020.
22. J. J. Dziak, D. L. Coffman, M. Reimherr, J. Petrovich, R. Li, S. Shiffman, and M. P. Shiyko. Scalar-on-function regression for predicting distal outcomes from intensively gathered longitudinal data: Interpretability for applied scientists. *Statistics surveys*, 13:150–180, 2019.
23. M. Reimherr and J. Awan. Elliptical perturbations for differential privacy. In *Advances in Neural Information Processing Systems*, pages 10185–10196, 2019a.
24. M. Reimherr and J. Awan. Kng: The k-norm gradient mechanism. In *Advances in Neural Information Processing Systems*, pages 10208–10219, 2019b.
25. A. Mirshani and M. Reimherr. Formal privacy for functional data with Gaussian perturbations. In *Proceedings of the 36th International Conference on Machine Learning*, 2019.
26. J. Awan, A. Kenney, M. Reimherr, and A. Slavković. Benefits and pitfalls of the exponential mechanism with applications to hilbert spaces and functional pca. In *International Conference on Machine Learning*, pages 374–384, 2019.
27. M. Reimherr, B. Sriperumbudur, and B. Taoufik. Optimal prediction for additive function-on-function regression. *Electronic Journal of Statistics*, 12(2):4571–4601, 2018.
28. A. Parodi and M. Reimherr. Simultaneous variable selection and smoothing for high-dimensional function-on-scalar regression. *Electronic Journal of Statistics*, 12(2):4602–4639, 2018.
29. S. Craig, D. Blankenberg, A. Parodi, I. Paul, L. Birch, J. Savage, M. Marini, J. Stokes, A. Nekrutenko, M. Reimherr, F. Chiaromonte, and K. Makova. Infant weight gain trajectories linked to oral microbiome composition. *Scientific Reports*, 8(1), 2018.
30. P. Constantinou, P. Kokoszka, and M. Reimherr. Testing separability of functional time series. *Journal of Time Series Analysis*, 39(5):731–747, 2018.
31. P. Kokoszka, H. Miao, M. Reimherr, and B. Taoufik. Dynamic functional regression with application to the cross-section of returns. *Journal of Financial Econometrics*, 16(3):461–485, 2018.
32. H. Choi and M. Reimherr. A geometric approach to confidence regions and bands for functional parameters. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, 80(1):239–260, 2018.
33. J. R. Lasky, B. R. Forester, and M. Reimherr. Coherent synthesis of genomic associations with phenotypes and home environments. *Molecular Ecology Resources*, 18(1):91–106, 2018.

34. R. F. Barber, M. Reimherr, and T. Schill. The function-on-scalar lasso with applications to longitudinal gwas. *Electronic Journal of Statistics*, 11(1):1351–1389, 2017.
35. P. Constantinou, P. Kokoszka, and M. Reimherr. Testing separability of space-time functional processes. *Biometrika*, 104(2):425–437, 2017.
36. Z. Fan and M. Reimherr. High-dimensional adaptive function-on-scalar regression. *Econometrics and statistics*, 1:167–183, 2017.
37. O. Gromenko, P. Kokoszka, and M. Reimherr. Detection of change in the spatiotemporal mean function. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, 79(1):29–50, 2017.
38. J. Petrovich and M. Reimherr. Asymptotic properties of principal component projections with repeated eigenvalues. *Statistics & Probability Letters*, 130:42–48, 2017.
39. W. Chu, R. Li, and M. Reimherr. Feature screening for time-varying coefficient models with ultrahigh dimensional longitudinal data. *The Annals of Applied Statistics*, 10(2):596, 2016.
40. P. Kokoszka, M. Reimherr, and N. Wölfing. A randomness test for functional panels. *Journal of Multivariate Analysis*, 151:37–53, 2016.
41. M. Reimherr and D. Nicolae. Estimating variance components in functional linear models with applications to genetic heritability. *Journal of the American Statistical Association*, 111(513):407–422, 2016.
42. M. Reimherr. Functional regression with repeated eigenvalues. *Statistics & Probability Letters*, 107:62–70, 2015.
43. M. Reimherr and D. Nicolae. A functional data analysis approach for genetic association studies. *The Annals of Applied Statistics*, 8(1):406–429, 2014.
44. P. Kokoszka and M. Reimherr. Asymptotic normality of the principal components of functional time series. *Stochastic Processes and their Applications*, 123(5):1546–1562, 2013a.
45. P. Kokoszka and M. Reimherr. Determining the order of the functional autoregressive model. *Journal of Time Series Analysis*, 34(1):116–129, 2013b.
46. P. Kokoszka and M. Reimherr. Predictability of shapes of intraday price curves. *The Econometrics Journal*, 16(3):285–308, 2013c.
47. M. Reimherr and D. L. Nicolae. On quantifying dependence: A framework for developing interpretable measures. *Statistical Science*, 28(1):116–130, 2013.
48. M. Reimherr and D. L. Nicolae. You’ve gotta be lucky: Coverage and the elusive gene–gene interaction. *Annals of human genetics*, 75(1):105–111, 2011.
49. A. Aue, S. Hörmann, L. Horváth, and M. Reimherr. Break detection in the covariance structure of multivariate time series models. *The Annals of Statistics*, 37(6B):4046–4087, 2009a.

50. A. Aue, L. Horváth, and M. L. Reimherr. Delay times of sequential procedures for multiple time series regression models. *Journal of Econometrics*, 149(2):174–190, 2009b.
51. L. Horváth, P. Kokoszka, and M. Reimherr. Two sample inference in functional linear models. *Canadian Journal of Statistics*, 37(4):571–591, 2009.

Reviews, Discussions, and Miscellaneous

1. J. Awan, M. Reimherr, and A. Slavković. Formal privacy for modern nonparametric statistics. *CHANCE*, 33(4):43–49, 2020
2. D. Liebl and M. Reimherr. Simultaneous inference for function-valued parameters: a fast and fair approach. In *International Workshop on Functional and Operatorial Statistics*, pages 153–159. Springer, 2020
3. M. A. Cremona, H. Xu, K. D. Makova, M. Reimherr, F. Chiaromonte, and P. Madrigal. Functional data analysis for computational biology. *Bioinformatics (Oxford, England)*, 35(17):3211, 2019.
4. M. Reimherr. Comments on: Modular regression—a lego system for building structured additive distributional regression models with tensor product interactions. *TEST*, pages 43–45, 2019.
5. P. Kokoszka and M. Reimherr. Some recent developments in inference for geostatistical functional data. *Revista Colombiana de Estadística*, 42(1):101–122, 2019.
6. H. B. Kang and M. Reimherr. Comments on: The statistical analysis of acoustic phonetic data: exploring differences between spoken romance languages. *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, 67(5):1136, 2018.
7. P. Kokoszka and M. Reimherr. Discussion of “A General Framework for Regression Modelling.” *Statistical Modelling*, **17**, 45–49, 2017.
8. Z. Fan and M. Reimherr. High-dimensional function-on-scale regression via the alternating direction method of multipliers. In *2016 3rd International Conference on Information Science and Control Engineering (ICISCE)*, pages 397–399. IEEE, 2016.

Awards and Accomplishments

2019	Simons-Berkeley Research Fellow Noether Young Scholar Award, American Statistical Association
2016	ISNPS Travel Grant
2012–2013	University of Chicago William Rainey Harper Fellow
2009	Canadian Journal of Statistics Award for Best Paper of the Year
2007	VIGRE Graduate Fellow, University of Utah
2006	University of Utah Departmental Honors Degree

Past Funding

2021–2023, US Census & NSF, Statistics Friendly Formal Privacy for Establishment Data: \$484,525. Co-Principal Investigator (PI: D. Kifer).

2019–2023, NSF SES 1853209, Formal Privacy for Complex Data Objects: \$680,000. Principal Investigator (Co-PI: A. Slavkovic and M. Shriver).

2019–2022, Penn State Strategic Planning Award: Enhancing Health, New Statistics for Longitudinal “Omics” Data: Childhood Obesity Signatures and Early Intervention: \$250,000. Principal Investigator (Co-PI: F. Chiaromonte, K. Makova, S. Craig)

2017–2020, NSF DMS 1712826, Developing New Frontiers in Functional Data Analysis: \$190,347. Principal Investigator.

2018–2020, Penn State Fund for Innovation: \$75,000 (Joint PI with John Liechty and Jeremiah Green).

2018–2019, FRIAS Penn State Collaborative Development Program: \$30,000. Penn State Champion/PI (Freiburg Champion/PI: Philipp Harms; Co-PIs: B. Li, M. Shriver, T. Schmidt, S. Schlager, B. Sriperumbuder).

2017-2019, NIDA P50 DA039838-03, Center for Complex Data To Knowledge in Drug Abuse and HIV Behavioral Science: \$13,513,452. Co-Investigator (PI Linda Collins), 5% credit.

2016–2017, PSU Methodology Center Seed Grant, Developing Tools for Functional Generalized Linear Models for Analysis of Intensive Longitudinal Data: \$20,000. Principal Investigator.

2016–2017, NSF 1625473, MRI: Acquisition of a Nikon SIM & STORM capable super-resolution fluorescent microscope as a shared instrument for the Penn State research community: \$649,261. Faculty (PI: Charlie Anderson), 4% credit.

Advising

Advisor

- T. Schill, MS Statistics, 2014
- W. Chu, PhD Statistics, 2016 (with R. Li)
- B. Taoufik, PhD Statistics, 2016
- H. Choi, PhD Statistics, 2017
- P. Constantinou, PhD Statistics, 2017
- H.B. Kang, PhD Statistics, 2018
- J. Petrovich, PhD Statistics, 2018
- E. Sheen, MS Statistics, 2019
- A. Mirshani, PhD Statistics, 2019
- M. Acharjee, MS Statistics, 2020

- J. Awan, PhD Statistics, 2020 (with A. Slavkovic)
- A. Kenney, PhD Statistics, 2021 (with F. Chiaromonte)
- A. Rao, PhD Statistics, 2021
- T. Boschi, PhD Statistics, 2022 (with F. Chiaromonte)
- C. Lou, BS Honors Mathematics, 2022
- I. Wright, PhD Statistics, 2022
- J. Seeman, PhD Statistics, 2023
- H. Lin, PhD Statistics
- T. Tran, PhD Statistics (with A. Slavkovic)

Post-doc Advisor

- P. Constantinou (Joint with J. Liechty and J. Green), 2017-2018
- J. Li (Joint with F. Chiaromonte and K. Makova), 2017-2018
- M. Cremona (Joint with F. Chiaromonte), 2017-2019
- C. Soto (Joint with S. Slavkovic), 2020-2023.

Presentations

- 2022 UC Berkeley, Simons Institute, Data Privacy Reunion Workshop
Data-Centric Engineering Seminar, Alan Turing Institute, London, England (Virtual)
- 2021 CMStatistics Conference (Invited, Virtual)
Statistics Canada Conference (Invited, Virtual)
Temple, Statistics Seminar (Virtual)
Binghamton, Data Science Seminar (Virtual)
Weierstrass Institute, Berlin, Mathematical Statistics Seminar (Virtual)
- 2020 LSE, Statistics Seminar, London, England (Virtual)
EPFL, Statistics Seminar, Lausanne, Switzerland (Virtual)
JSM, (Invited, Virtual)
Rutgers, Department of Statistics Seminar
- 2019 Conference on Neural Information Processing Systems (NeurIPS), Vancouver, Canada (Poster)
JSM, Denver, CO USA (Invited – Noether Award)
International Conference on Machine Learning (ICML), Long Beach, CA
ICSA Applied Statistics Symposium, Raleigh, NC USA (Invited)
UC Santa Barbara, Department of Statistics and Applied Probability Seminar
UC Davis, Department of Statistics Seminar
UC Berkeley, Simons Institute, Data Privacy Seminar
UC Berkeley, Simons Institute, Simons-Berkeley Fellows Seminar
UC Berkeley, Simons Institute, Workshop on Privacy and Data Analysis
- 2018 CMStatistics, Pisa, Italy (Invited)
Matrix Institute FDA Workshop, Melbourne, Australia (Invited)
MD Anderson, Department of Biostatistics Seminar
Rice University, Department of Statistics Seminar
JSM, Vancouver, Canada (Topic Contributed)

- 5th International Biostatistics Symposium, Guangzhou, China (Invited)
 IMS-APRM, Singapore (Invited)
 4th ISNPS Conference, Salerno, Italy (Invited)
 SLDS/Nonparametric Statistics Conference, Columbia University, New York (Invited)
 SDSS, Reston, Virginia USA (Invited)
 Center for Medical Genomics Retreat, Penn State Hershey Medical School
 Banff Research Station, Workshop on *Mathematical Foundations of Data Privacy*, Banff, Canada (Invited)
 Duke, Department of Statistics Seminar
 ENAR, Atlanta, GA USA (Invited)
 Workshop on *Statistics of geometric features*, Issac Newton Institute, Cambridge, UK (Invited)
 University of Washington, Department of Statistics Seminar
- 2017 10th CMStatistics Conference, London, UK (Invited)
 Johns Hopkins, Department of Biostatistics Seminar
 North Carolina State University, Department of Statistics Seminar
 Columbia University, Department of Biostatistics Seminar
 Workshop on Applications-Driven Geometric Functional Data Analysis, FSU (Invited)
 Penn State Bioinformatics and Genomics Retreat (Invited)
 Michigan State, Department of Statistics Seminar
 International Seminar on Stability Problems for Stochastic Models, Debrecen, Hungary (Invited)
 JSM, Baltimore, MD USA (Topic Contributed)
- 2016 9th CMStatistics Conference, Seville, Spain (Invited)
 Graz University Conference in Honor of Lajos Horváth, Graz, Austria (Invited)
 3rd ISNPS Conference, Avignon, France (Invited)
 Politecnico di Milano, MOX Seminar, Milan, Italy
 IASI Seminar, Rome, Italy
- 2015 Université libre de Bruxelles, Department of Mathematics Seminar, Brussels, Belgium
 Newcastle University, School of Mathematics and Statistics Seminar, Tyne, England
 WNAR Conference, Boise State University (Invited)
 BIRS Workshop on Functional Data Analysis, Banff, Canada
 Penn State, Genomics Seminar
- 2014 University of Waterloo, Statistics Department Seminar, Waterloo, Canada
 Penn State, Stochastic Modeling and Computing Seminar (Fall)
 Tulane University, Mathematics Department Seminar
 Penn State, Methodology Center Seminar Series
 International Indian Statistical Association Conference, Riverside, CA
- 2013 Pennsylvania State University, Department of Statistics Seminar
 University of Florida, Department of Statistics Seminar
 University of North Carolina – Chapel Hill, Department of Statistics Seminar
 Colorado State University, Department of Statistics Seminar
 University of Washington, Department of Biostatistics Seminar
 Yale University, Department of Statistics Seminar
 University of Pennsylvania, Department of Statistics Seminar
 Texas A&M University, Department of Statistics Seminar
 University of Minnesota – Twin Cities, Department of Statistics Seminar
 Boston University, Department of Mathematics and Statistics Seminar

- Ohio State University, Department of Statistics Seminar
- Harvard University, Department of Statistics Seminar
- Penn State, Stochastic Modeling and Computing Seminar
- Penn State, Comp and Stat Approaches for Integration of Genomic Variation Workshop
- 2012 Purdue, 8th International Symposium on Statistics
- Yale, NSF Workshop for High-Dimensional Data; (Poster)
- UC Davis, Workshop on Analysis of High-Dimensional and Functional Data; (Poster)
- 2011 University of Chicago, Department of Statistics Student Seminar
- 2007 Second International Conference on Statistical Models for Financial Data; (Poster) Graz, Austria.
- 2006 Presentation of Honors Thesis at University of Utah Math Awards Ceremony.

Service

- 2020–2022 Associate Editor *Journal of the Royal Statistical Society: Series B*
- 2019–2022 Associate Editor *Annals of Applied Statistics*
- 2017–2022 Associate Editor *Journal of Multivariate Analysis*
- 2016–2022 Associate Editor *Statistical Modeling*

- 2019–2022 PSU Graduate Admissions Chair

- 2021 Invited Session Organizer CMStatistics (*Recent Advances in Data Privacy*)
- 2019 National Science Foundation, Grant Panel Member
- 2013–2018 PSU Graduate Admissions Committee
- 2016–2018 Associate Editor *Computational Statistics and Data Analysis*
- 2018 Co-organized PSU-Freiburg workshop on *Statistics for geometric data and applications to anthropology*.
- 2018 Invited Session Organizer CMStatistics (*Data Privacy and Statistical Disclosure Control*)
- Invited Session Organizer ISNPS (*Recent Advances in Functional Time Series*)
- ENAR Session Chair
- 2017 Invited Session Organizer CMStatistics (*High-Dimensional Functional Data Analysis*)
- JSM Session Chair
- 2014–2015 PSU Colloquium Chair
- PSU PhD Exam Chair
- 2013–2014 PSU Clogg Memorial Lecturship Committee
- PSU PhD Exam Committee

Teaching Experience

Penn State University, Department of Statistics

- Stat 200: Elementary Statistics
- Stat 416: Stochastic Modeling
- Stat 440: Statistical Computing
- Stat 462: Applied Linear Regression
- Stat 505: Applied Multivariate Statistical Analysis
- Stat 515: Stochastic Processes and Monte Carlo Methods
- Stat 565: Multivariate Analysis
- Stat 597: Functional Data Analysis

Univeristy of Chicago, Department of Statistics

- Stat 200: Elementary Statistics
- Stat 234: Statistical Models and Methods 1

Univeristy of Utah, Department of Mathematics

- Math 1070: Intro to Statistical Inference
- Math 3070: Applied Statistics I