

F. Richard Guo

CURRENT POSITION	Assistant Professor Department of Statistics College of Literature, Science and the Arts University of Michigan, Ann Arbor	Aug 2024 – present ricguo@umich.edu https://unbiased.co.in
PREVIOUS POSITIONS	Assistant Professor Department of Biostatistics University of Washington, Seattle, USA	Feb 2024 – Aug 2024
	Research Associate Statistical Laboratory, University of Cambridge, UK Host: Rajen D. Shah	Sept 2021 – Jan 2022, June 2022 – Jan 2024
	Richard M. Karp Research Fellow Causality program, Simons Institute for the Theory of Computing University of California, Berkeley, USA	Jan – May 2022
EDUCATION	University of Washington, Seattle, USA Ph.D., Statistics Thesis: Likelihood analysis of causal models Duke University, Durham, USA M.S., Computer Science University of Electronic Science and Technology of China, Chengdu, China B.Eng., Computer Science	June 2021 Advisor: Thomas S. Richardson 2016 2013
RESEARCH INTERESTS	Replicable data analysis: Randomized procedures and derandomization, “hunt and test”, data splitting. Statistical foundation of causal inference: Graphical models, nonparametric and semiparametric methods, model selection and elicitation. Honest inference in data science: model selection, irregularity, finite sample guarantees, empirical Bayes.	
AWARDS	Simons Institute for the Theory of Computing • Richard M. Karp Research Fellowship , Jan – May 2022 Department of Statistics, University of Washington • Z.W. Birnbaum award for outstanding candidacy exam, 2019 – 2020	

Last update: November 26, 2024

PUBLICATIONS

- [1] [F. R. Guo](#) and Rajen D. Shah. Rank-transformed subsampling: inference for multiple data splitting and exchangeable p-values. *Journal of the Royal Statistical Society: Series B*, 2024+. DOI:[10.1093/jrsssb/qkae091](https://doi.org/10.1093/jrsssb/qkae091).
- [2] [F. R. Guo](#). Richard Guo's Contribution to the Discussion Paper "Parameterizing and Simulating from Causal Models" by Evans and Didelez. *Journal of the Royal Statistical Society: Series B*, 2024. DOI:[10.1093/jrsssb/qkae018](https://doi.org/10.1093/jrsssb/qkae018).
- [3] [F. R. Guo](#), Emilija Perković and Andrea Rotnitzky. Variable elimination, graph reduction and efficient g-formula. *Biometrika*, 110(3):739–761, 2023. DOI:[10.1093/biomet/asac062](https://doi.org/10.1093/biomet/asac062).
- [4] Mengqi Zhang and [F. R. Guo](#). BSDE: Barycenter single-cell differential expression for case-control studies. *Bioinformatics*, 2022. DOI:[10.1093/bioinformatics/btac171](https://doi.org/10.1093/bioinformatics/btac171)
- [5] [F. R. Guo](#) and Emilija Perković. Efficient least squares for estimating total effects under linearity and causal sufficiency. *Journal of Machine Learning Research*, 23(104):1-41, 2022. [arXiv:2008.03481](https://arxiv.org/abs/2008.03481)
- [6] [F. R. Guo](#), Thomas S. Richardson, James M. Robins. Discussion of 'Estimating time-varying causal excursion effects in mobile health with binary outcomes'. *Biometrika*, 108(3):541-550, 2021. DOI:[10.1093/biomet/asab029](https://doi.org/10.1093/biomet/asab029)
- [7] [F. R. Guo](#) and Emilija Perković. Minimal enumeration of all possible total effects in a Markov equivalence class. *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2021.
- [8] [F. R. Guo](#) and Thomas S. Richardson. Chernoff-type concentration of empirical probabilities in relative entropy. *IEEE Transactions on Information Theory*, 67(1):549-558, 2021. DOI:[10.1109/TIT.2020.3034539](https://doi.org/10.1109/TIT.2020.3034539)
- [9] [F. R. Guo](#) and Thomas S. Richardson. On testing marginal versus conditional independence. *Biometrika*, 107(4):771-790, 2020. DOI:[10.1093/biomet/asaa040](https://doi.org/10.1093/biomet/asaa040)
- [10] Song Qi, Demis Hassabis, Jiayin Sun, [F. Guo](#), Nathaniel Daw and Dean Mobbs. How cognitive and reactive fear circuits optimize escape decisions in humans. *Proceedings of the National Academy of Sciences*, **115** (12) 3186-3191, 2018. DOI:[10.1073/pnas.1712314115](https://doi.org/10.1073/pnas.1712314115)
- [11] [F. Guo](#), Dan Yang, Zimo Yang, Zhi-Dan Zhao and Tao Zhou. Bounds of memory strength for power-law series. *Physical Review E*, **95**, 052314, 2017. DOI:[10.1103/PhysRevE.95.052314](https://doi.org/10.1103/PhysRevE.95.052314)
- [12] [F. Guo](#), Xiangyu Wang, Kai Fan, Tamara Broderick and David B. Dunson. Boosting variational inference. *NeurIPS Workshop on Advances in Approximate Bayesian Inference*, 2016.

- [13] F. Guo, Charles Blundell, Hanna Wallach and Katherine Heller. The Bayesian Echo Chamber: modeling social influence via linguistic accommodation. *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2015.
- [14] F. Guo and David B. Dunson. Uncovering systematic bias in ratings across categories: a Bayesian approach. *ACM Conference on Recommender Systems (RecSys)*, 2015.
- [15] Xiangyu Wang, F. Guo, Katherine Heller and David B. Dunson. Parallelizing MCMC with random partition trees. *International Conference on Neural Information Processing Systems (NeurIPS)*, 2015.
- WORKING PAPERS AND PREPRINTS
- [1] F. R. Guo and Qingyuan Zhao. Confounder selection via iterative graph expansion. [arXiv:2309.06053](https://arxiv.org/abs/2309.06053), 2023.
- [2] F. R. Guo, Anton Rask Lundborg and Qingyuan Zhao. Confounder selection: objectives and approaches. [arXiv:2208.13871](https://arxiv.org/abs/2208.13871), 2022.
- [3] F. R. Guo, James McQueen and Thomas S. Richardson. Empirical Bayes for large-scale randomized experiments: a spectral approach. [arXiv:2002.02564](https://arxiv.org/abs/2002.02564), 2020.
- CONTRIBUTED TALKS
- [1] Two factorizations and a density ratio, on ‘Parameterizing and simulating from causal models’ by Evans and Didelez.
Discussion meeting, Royal Statistical Society, London, Oct 2023
- [2] Inference for multiple data splitting and exchangeable p-values.
CMStatistics, King’s College London, Dec 2022
- INVITED TALKS
- [1] Hunt, test and aggregate: a flexible framework for testing complex hypotheses.
Workshop on Robustness Meets Causality, Shanghai Qi Zhi Institute, July 2024
INFORMS Annual Meeting, Seattle, 2024
- [2] Design a powerful test in three steps: Hunt, test and aggregate.
ATME Seminar, Fred Hutchinson Cancer Center, June 2024
- [3] Hunt, test and aggregate for detecting heterogeneity.
Workshop on Translational Research on Data Heterogeneity, WUSTL, April 2024
- [4] Confounder selection via iterative graph expansion.
Online causal inference seminar, Oct 2023
Conf. on Statistical Learning and Data Science, Newport Beach, Nov 2024
- [5] Harnessing Extra Randomness: Reproducibility, Flexibility and Causality.
Statistics and Data Science Seminar, Technical University of Munich, Dec 2023
IMS Young Mathematical Scientist Forum, National U of Singapore, Nov 2023
Seminar in Applied Math, Computer Science and Statistics, UGent, Nov 2023
MRC Biostat Seminar, Cambridge, Nov 2023
Statistics Seminar, EPFL, Oct 2023
Pacific Causal Inference Conference, Beijing, Sept 2023

ACMS, University of Notre Dame, Jan 2023
Department of Statistics, UC Riverside, Jan 2023
Data Sciences and Operations, Marshall School, USC, Jan 2023
Department of Statistics, University of Michigan, Jan 2023
Statistics & Operations Research, University of North Carolina, Jan 2023
Department of Statistics, Iowa State University, Jan 2023
Department of Biostatistics, University of Washington, Jan 2023
Department of Statistics, University of Connecticut, Feb 2023
Department of Statistics, University of Pittsburgh, Feb 2023
Department of Statistics, University of Wisconsin–Madison, Feb 2023

- [6] Variable elimination, graph reduction and efficient g-formula.
Fellows Seminar, Simons Institute, Berkeley, May 2022
Berkeley causal inference research group, Feb 2022
Young data science researcher seminar, ETH Zurich, Feb 2022
CMStatistics, King's College London, Dec 2021
Statistics Seminar, University of Cambridge, Nov 2021
- [7] Latent variable justifies the stronger IV bounds.
Causal inference & quantum foundations, Perimeter Institute, April 2023
Quantum physics and statistical causal models workshop, Simons Institute, Berkeley, April 2022
- [8] Automated analysis of discrete IV with finite-sample guarantees.
Future of Mendelian randomization studies, Lorentz Center, Leiden, Dec 2021
- [9] Causal effects in MPDAGs: identification and efficient estimation.
Machine learning virtual retreat and open house, University of Washington, Nov 2020
- [10] Efficient least squares for estimating total causal effects.
Pacific Causal Inference Conference, Sept 2020
- [11] Possible causal effects: enumeration and estimation.
Statistics Seminar, University of Washington, May 2020
- [12] Empirical Bayes for A/B testing and meta-analysis: a spectral approach.
CSSS Seminar, University of Washington, May 2020
- [13] On testing marginal versus conditional independence.
Causal inference working group, University of Washington, Oct 2019
- [14] Boosting variational inference.
Workshop on adaptive and scalable nonparametric methods in machine learning, NeurIPS, Dec 2016

SOFTWARE

InteractiveConfSel: Shiny WebApp for interactive confounder selection.
MultiSplit: R package for hypothesis testing with multiple data splits and exchangeable p-values.
reduceDAG: R package for graph reduction and deriving the simplest, efficient g-formula for estimating causal effects on a DAG.

[eff2](#): R package for efficiently estimating linear causal effects from observational data.

[InvariantCausal.jl](#): Julia package for invariant causal prediction.

TEACHING

University of Washington, Seattle, USA

Instructor

- BIOST/STAT 533 (Theory of linear models): 3 credits, 15 students Sp 2024
- STAT/MATH 394 (undergraduate Probability I): 3 credits, 48 students Su 2020
- STAT/MATH 395 (undergraduate Probability II): 3 credits, 50 students Su 2020

Guest Lecturer

- BIOST 578: *Causal DAGs and their variants* Sp 2024

Mentor

Winter 2021

- [Directed Reading Program](#): Making probability rigorous

University of Cambridge, Cambridge, UK

Instructor

Michaelmas 2021

- Practical sessions, [Statistical Modelling](#) (Part II): 8 lectures

Supervisor

- Statistical Modelling (Part II), 2022: 8 students
- Statistical Modelling (Part II), 2021: 3 students

Short courses and tutorials

Instructor

- Causal Inference with Observational Data: Common Designs and Statistical Methods. Summer Institute in Statistics for Clinical & Epidemiological Research (SISCER), University of Washington. July 2024

STUDENT MENTORING

PhD Committees Served

- Committee member for Yilin Song, PhD candidate in Biostatistics, University of Washington (Chair: Thomas Richardson and Gary Chan)

UMICH SERVICE

Committees Served

- Undergraduate curriculum 2024

PROFESSIONAL SERVICE

Referee *Annals of Statistics* (6), *Biometrika* (6), *JASA* (3), *JRSS-B* (3), *Statistical Science* (2), *JMLR* (3), *EJS* (1), *Statistics and Computing* (1), *INFORMS Journal on Computing* (1), *UAI*(2020-2022), *NeurIPS* (2021-2023), *CLearR* (2022), *ICML* (2021)

Organizer

- [Reading Group on Algebraic Aspects of Graphical Models](#), Causality Program 2022, Simons Institute.

Session chair

- Variable Selection in Causal Inference, CMStatistics 2021, King's College London.

Publication chair

- Conference on Uncertainty in Artificial Intelligence (UAI) 2023.