

F. Richard Guo

CURRENT POSITION	Assistant Professor Department of Statistics College of Literature, Science and the Arts University of Michigan, Ann Arbor, USA	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 Ph.D., Statistics Thesis: Likelihood analysis of causal models Advisor: Thomas S. Richardson	Seattle, USA 2021
	Duke University M.S., Computer Science	Durham, USA 2016
	University of Electronic Science and Technology of China B.Eng., Computer Science	Chengdu, China 2013
RESEARCH INTERESTS	Statistical foundation of causal inference: graphical models, partial identification, nonparametric and semiparametric methods, model selection and elicitation. Replicable data analysis: randomized procedures and derandomization, “hunt and test”, data splitting. Honest inference in data science: model selection, irregularity, finite sample guarantees, empirical Bayes.	
RESEARCH GRANTS	PI: NSF DMS Grant 2515385 <i>Hunt-and-Test Procedures: Design and Derandomization</i>	2025 – 2028 (\$175k in total cost)
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: May, 2026

PUBLICATIONS

- [1] [F. R. Guo](#) and Qingyuan Zhao. Confounder selection via iterative graph expansion. *Annals of Statistics*, 54(1), 516-541, 2026. [DOI:10.1214/25-AOS2577](https://doi.org/10.1214/25-AOS2577).
- [2] [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*, 87(1):256–286, 2025. [DOI:10.1093/jrssb/qkae091](https://doi.org/10.1093/jrssb/qkae091).
- [3] [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*, 86(3):572-574, 2024. [DOI:10.1093/jrssb/qkae018](https://doi.org/10.1093/jrssb/qkae018).
- [4] [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).
- [5] Mengqi Zhang and [F. R. Guo](#). BSDE: Barycenter single-cell differential expression for case-control studies. *Bioinformatics*, 38(10):2765-2772, 2022. [DOI:10.1093/bioinformatics/btac171](https://doi.org/10.1093/bioinformatics/btac171)
- [6] [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)
- [7] [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)
- [8] [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.
- [9] [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)
- [10] [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)
- [11] 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)

- [12] 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
- [13] F. Guo, Xiangyu Wang, Kai Fan, Tamara Broderick and David B. Dunson. Boosting variational inference. *NeurIPS Workshop on Advances in Approximate Bayesian Inference*, 2016.
- [14] 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.
- [15] F. Guo and David B. Dunson. Uncovering systematic bias in ratings across categories: a Bayesian approach. *ACM Conference on Recommender Systems (RecSys)*, 2015. DOI:10.1145/2792838.2799683
- [16] 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] Armeen Taeb*, F. R. Guo* and Leonard Henckel*. Model-oriented graph distances via partially ordered sets. [arXiv:2511.10625](https://arxiv.org/abs/2511.10625), 2025. (*equal contribution)
- [2] Parijat Chakraborty, F. R. Guo, Kerby Shedden and Stilian Stoev. On the universal calibration of heavy-tailed combination tests. [arXiv:2509.12066](https://arxiv.org/abs/2509.12066), 2025.
- [3] Yilin Song, F. R. Guo, K. C. Gray Chan and Thomas S. Richardson. The categorical instrumental variable model: characterization, partial identification, and statistical inference. [arXiv:2405.09510](https://arxiv.org/abs/2405.09510), 2025.
- [4] F. R. Guo, Anton Rask Lundborg and Qingyuan Zhao. Confounder selection: objectives and approaches. [arXiv:2208.13871](https://arxiv.org/abs/2208.13871), 2022.
- [5] 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-and-test strategies for ML-powered hypothesis testing
Statistics Department, Oxford, UK May 2026
- [2] Model-oriented graph distances via partially ordered sets
Issac Newton Institute, Cambridge, UK Mar 2026

- [3] Categorical instrumental variable model: Characterization, partial identification and inference.
 Online Causal Inference Seminar, Virtual Jan 2026
 Statistics Seminar, University College Dublin Mar 2026
- [4] Hunt and test with generalized scores.
 IMS International Conf. on Stat. and Data Sci., Nice, France Dec 2024
- [5] Hunt, test and aggregate: A flexible framework for testing complex hypotheses.
 Statistics Seminar, Peking University, Beijing, China Aug 2025
 Seminar, Shanghai Jiao Tong University, Shanghai, China Aug 2025
 Statistics Seminar, Wuhan University, Wuhan, China June 2025
 Statistics Seminar, New Jersey Institute of Technology April 2025
 Workshop on Robustness Meets Causality, Shanghai Qi Zhi Institute July 2024
 INFORMS Annual Meeting, Seattle Oct 2024
- [6] Design a powerful test in three steps: Hunt, test and aggregate.
 ATME Seminar, Fred Hutchinson Cancer Center, Seattle June 2024
- [7] Hunt, test and aggregate for detecting heterogeneity.
 WUSTL Workshop on Translational Research on Data Heterogeneity April 2024
- [8] Confounder selection via iterative graph expansion.
 Online causal inference seminar Oct 2023
 Conf. on Statistical Learning and Data Science, Newport Beach Nov 2024
 American Causal Inference Conference, Detroit May 2025
- [9] Harnessing extra randomness: Reproducibility, flexibility and causality.
 Statistics and Data Science Seminar, Technical U of Munich Dec 2023
 IMS Young Mathematical Scientist Forum, National U of Singapore Nov 2023
 Seminar in Applied Math, Computer Science and Statistics, UGhent 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
- [10] 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
[11]	Latent variable justifies the stronger IV bounds. Causal inference & quantum foundations, Perimeter Institute Quantum physics and statistical causal models workshop, Simons Institute	April 2023 April 2022
[12]	Automated analysis of discrete IV with finite-sample guarantees. Future of Mendelian randomization studies, Lorentz Center, Leiden	Dec 2021
[13]	Causal effects in MPDAGs: identification and efficient estimation. Machine learning virtual retreat and open house, U. Washington	Nov 2020
[14]	Efficient least squares for estimating total causal effects. Pacific Causal Inference Conference (PCIC)	Sept 2020
[15]	Possible causal effects: enumeration and estimation. Statistics Seminar, University of Washington	May 2020
[16]	Empirical Bayes for A/B testing and meta-analysis: a spectral approach. CSSS Seminar, University of Washington	May 2020
[17]	On testing marginal versus conditional independence. Causal inference working group, University of Washington	Oct 2019
[18]	Boosting variational inference. Workshop on adaptive and scalable nonparametric methods, NeurIPS	Dec 2016
SOFTWARE	InteractiveConfSel : Interactive confounder selection. R Shiny MultiSplit : Hypothesis test with multiple data splits and exchangeable p-vals. R multChernoff : Finite-sample critical value for multinomial likelihood-ratio test. R DOI:10.32614/CRAN.package.multChernoff R reduceDAG : Graph reduction and efficient g-formula. R eff2 : Estimating causal effects efficiently under linearity. R DOI:10.32614/CRAN.package.eff2 R InvariantCausal.jl : Invariant causal prediction with improved search. Julia	
TEACHING	University of Michigan, Ann Arbor, USA <i>Instructor</i> <ul style="list-style-type: none"> • STATS 500 Regression analysis: 3 credits, 30 students W 2026 • STATS 412 Introduction to prob. and stat.: 3 credits, 89 students F 2025 • STATS 412 Introduction to prob. and stat.: 3 credits, 80 students W 2025 University of Washington, Seattle, USA <i>Instructor</i> <ul style="list-style-type: none"> • BIOST/STAT 533 Theory of linear models: 3 credits, 15 students Sp 2024 • STAT/MATH 394 Probability I: 3 credits, 48 students Su 2020 • STAT/MATH 395 Probability II: 3 credits, 50 students Su 2020 <i>Guest Lecturer</i> <ul style="list-style-type: none"> • BIOST 578: <i>Causal DAGs and their variants</i> Sp 2024 	

Mentor

- [Directed Reading Program](#): Making probability rigorous Sp 2021

University of Cambridge, Cambridge, UK

- Supervisor, Statistical Modelling (Part II): 16 students 2021-2023

Short courses and tutorials

- Causal Inference with Observational Data, Summer Institute in Statistics for Clinical & Epidemiological Research (SISCER) University of Washington, July 2024

STUDENT
MENTORING

PhD Committees Served

- Yilin Song PhD in Biostatistics, Washington (2025)
- Parijat Chakraborty PhD Candidate in Statistics, Michigan
- Hanbin Lee PhD Candidate in Statistics, Michigan

UMICH SERVICE

MaCSS Scholars Program

[Mentor](#), 2025-present

Committees Served

- Admission, Master of Applied Statistics 2025-2026
- Statistics undergraduate curriculum 2024-2026
- Statistics seminar 2025

PROFESSIONAL
SERVICE

Journal Referee *Annals of Statistics* (11 manuscripts), *Biometrika* (6), *Journal of American Statistical Association* (7), *Journal of the Royal Statistical Society: Series B* (5), *Statistical Science* (4), *Journal of Machine Learning Research* (4), *Electronic Journal of Statistics* (1), *Statistics and Computing* (1), *INFORMS Journal on Computing* (1)

Conference Referee *UAI* (2020-2022), *NeurIPS* (2021-2023), *CLearR* (2022), *ICML* (2021)

External grant referee

- National Agency for Research and Development, Chile 2025

Organizer

- Reading Group on Algebraic Aspects of Graphical Models, Simons Institute 2022

Committee member

- ASA SLDS Student Paper Competition 2025-2026

Session chair

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

Publication chair

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