Joshua Loftus

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About

I am a statistician working to improve practices in data science and reduce the impact of bias, particularly biases associated with social harms and scientific reproducibility. My groundbreaking research on algorithms and causality helped co-found the field of causal fairness. I also do research in high-dimensional inference and interpretable machine learning, and I teach ethical and responsible data science, machine learning, and causal inference.

Current Positions

Jan. 2021- **London School of Economics** Assistant Professor of Statistics (London, UK)

Jan. 2021- **LSE Data Science Institute** Affiliate Faculty (London, UK)

Education

2016 **Stanford University** PhD in Statistics (Stanford, CA)
Dissertation: *Post-selection inference for models characterized by quadratic constraints*
Committee: Jonathan Taylor (advisor), Emmanuel Candes, Joseph Romano, Robert Tibshirani

2011 **Rutgers University** M.S. in Mathematics (New Brunswick, NJ)
Thesis: *Logarithmic norms and applications to differential equations*
Supervisor: Eduardo Sontag

2009 **Western Michigan University** B.S. in Mathematics (Kalamazoo, MI)
Summa cum laude
Elected to Phi Beta Kappa

2007 **Kalamazoo Valley Community College** A.A. in General Studies (Kalamazoo, MI)

Experience

2017-2020 **New York University** Assistant Professor of Statistics (New York, NY)

2019-2020 **NYU Center for Data Science** Affiliate Faculty (New York, NY)

2016- **Statistical Consultant** Freelance (Various)

2016-2017 **University of Cambridge** Research Fellow (Cambridge, UK)

2016-2017 **Alan Turing Institute** Research Fellow (London, UK)

2014-2015 **Stanford University** Statistical Consulting Lab Manager (Stanford, CA)

Selected Publications

Journals

2018 Selective inference with unknown variance via the square-root lasso. Tian, X., **Loftus, J. R.**, Taylor, J. E
Biometrika. (arXiv, link)

2016 Inference in adaptive regression via the Kac–Rice formula. Taylor, J. E., **Loftus, J. R.**, Tibshirani, R. J.
Annals of Statistics. (arXiv, link)

Conferences

2024 Causal Dependence Plots. **Loftus, J. R.**, Bynum, L. E., Hansen, S.
Accepted to Advances in Neural Information Processing Systems. (arXiv, link)

2024 Position: The Causal Revolution Needs Scientific Pragmatism. **Loftus, J. R.**
International Conference on Machine Learning. (arXiv, link)

2024 A New Paradigm for Counterfactual Reasoning in Fairness and Recourse. Bynum, L. E., **Loftus, J. R.**, Stoyanovich, J.
International Joint Conference on Artificial Intelligence. (arXiv, link)

2023 Epistemic Parity: Reproducibility as an Evaluation Metric for Differential Privacy. Rosenblatt et al.
Proceedings of the VLDB Endowment. (arXiv, link)

2023 Counterfactuals for the future. Bynum, L. E., **Loftus, J. R.**, Stoyanovich, J.
Proceedings of the AAAI Conference on Artificial Intelligence. (arXiv, link)

2021 Causal Intersectionality and Fair Ranking. Yang, K., **Loftus, J. R.**, Stoyanovich, J.
2nd Symposium on Foundations of Responsible Computing. (arXiv, link)

2021 Disaggregated interventions to reduce inequality. Bynum, L., **Loftus, J. R.**, Stoyanovich, J.
Equity and Access in Algorithms, Mechanisms, and Optimization. (arXiv, link)

2019 Making decisions that reduce discriminatory impacts. Kusner, M., Russell, C., **Loftus, J. R.**, Silva, R.
International Conference on Machine Learning. (arXiv, link)

2017 When worlds collide: Integrating different counterfactual assumptions in fairness. Russell et al.
Advances in Neural Information Processing Systems. (arXiv, link)

2017 Counterfactual fairness. Kusner, M. J., **Loftus, J. R.**, Russell, C., Silva, R.
Advances in Neural Information Processing Systems. (arXiv, link)

Software

2022 unbiasedgoodness: Goodness-of-Fit Tests After Model Selection. **Loftus, J. R.**
R Package. (arXiv, link)

2015 selectiveInference: Tools for selective inference. Tibshirani et al.
CRAN R Package. (arXiv, link)

Preprints, Misc.

2024 Fairness: plurality, causality, and insurability. Fahrenwaldt et al.
European Actuarial Journal. (arXiv, link)

2022 An Interactive Introduction to Causal Inference. Bynum et al.
IEEE VISxAI: Workshop on Visualization for AI Explainability. (arXiv, link)

2020 The long road to fairer algorithms. Kusner, M. J., **Loftus, J. R.**.
Nature Comment. (arXiv, link)

2018 Causal reasoning for algorithmic fairness. **Loftus, J. R.**, Russell, C., Kusner, M. J., Silva, R.
Preprint. (arXiv, link)

2015 Selective inference after cross-validation. **Loftus, J. R.**
Preprint. (arXiv, link)

Awards and Honors

2015 NIH Grant Trainee in Biostatistics for Personalized Medicine (Stanford University)

2015 Alan M. Abrams Memorial Fellowship (Stanford University)

2014 Statistics Department Teaching Award (Stanford University)

2013 Best Potential Prize (Stanford-Columbia DataFest)

2012 NSF VIGRE Fellowship (Stanford University)

2010 GAANN Fellowship (Rutgers University)

Selected Talks

2024 Plenary at Scandinavian Actuarial Conference (University of Copenhagen)

2024 Bridging Prediction and Intervention Problems in Social Systems (BIRS Banff)

2024 Dagstuhl Seminar on Trustworthiness and Responsibility in AI (Wadern, DE)

2023 NeurIPS Workshop on Algorithmic Fairness (New Orleans, LA)

2023 Workshop on Fairness in Insurance (University of Copenhagen)

2023 European Workshop on Algorithmic Fairness (Winterthur, Switzerland)

2023 Tutorial on Algorithmic Fairness and Causal Interpretability (University of Seoul)

2023 Statistical Methods for Health Equity Webinar (Online)

2022 IMS International Conference on Statistics and Data Science (Florence, IT)

2022 Panelist at NeurIPS Workshop on Algorithmic Fairness (New Orleans, LA)

2022 Keynote at International Meeting of Psychometric Society (Bologna, IT)

2021 Bernoulli-IMS 10th World Congress in Probability and Statistics (Seoul (virtual))

2021 NYU Workshop on Race and Racism in Science (New York (virtual))

2021 Conference on Machine Learning and Economic Inequality (Oxford (virtual))

2019 International Indian Statistical Association Conference (Mumbai, India)

2019 DataEngConf (New York, NY)

2019 INFORMS Annual Meeting. Session on Fairness in Machine Learning (Seattle, WA)

2019 Joint Statistical Meetings (Denver, CO)

2019 Econometrics and Statistics Conference (Taichung, Taiwan)

2019 International Conference on Machine Learning (Long Beach, CA)

2019 International Chinese Statistical Association Conference (Raleigh, NC)

2018 Data for Good Seminar (Columbia University)

2018 Workshop on Higher-Order Asymptotics and Post-Selection Inference (WUSTL)

2018 Conference on Statistical Learning and Data Science (Columbia University)

2015 IMS session on Post-Selection Inference. Joint Statistical Meetings (Seattle, WA)

2014 Joint Statistical Meetings (Boston, MA)

Research Experience

2021- **London School of Economics** Assistant Professor of Statistics (London, UK)
Data science research group
Supervising PhD students and serving on dissertation committees

2017-2020 **New York University** Assistant Professor of Statistics (New York, NY)
Organizing journal club
Supervising PhD students and serving on dissertation committees

2016-2017 **University of Cambridge / Alan Turing Institute** Research Fellow (Cambridge / London, UK)
Started research on counterfactual fairness
Co-supervised summer internship project on privacy

2012-2016 **Stanford University** Research Assistant (Stanford, CA)
Started research on post-selection inference
Participated in Tibshirani, Hastie, Taylor research group
Organized statistical consulting lab

2013-2015 **Stanford University** Biostatistics Trainee (Stanford, CA)
Funded by NIH training grant
Collaborated with Howard Chang lab on ATAC-seq data

2014 **Stanford University** Data Lab Team Member (Stanford, CA)
Poverty alleviation project using survey data for small-area poverty estimation

2013 **Stanford University** Bi-coastal DataFest Team Leader (Stanford, CA)
Led prize winning team with project analyzing election campaign finance data

2013 **Google, Inc** Decision Support Analyst Intern (Mountain View, CA)
Conducted literature review and experiments on crowd-sourcing

Teaching Experience

2021- **London School of Economics** Instructor: Machine learning (undergraduate) (London, UK)
Designed course based on *An Introduction to Statistical Learning*
Taught course in Winter 2021, Fall 2021, Fall 2022, Fall 2023

2021- **London School of Economics** Co-instructor: Foundations of Machine learning (graduate) (LSE)
Lectured on support vector machines, high-dimensional regression, neural networks
Co-taught in Winter terms 2021, 2022, 2023

2022- **London School of Economics** Instructor: Ethics for data science

(undergraduate) (LSE)
Designed course using professional guidelines and research experience
Taught course in Fall 2022, Fall 2023

2021- **London School of Economics** Supervisor: Capstone project (graduate) (LSE)
Supervising projects for MSc students in Data Science

2018-2020 **New York University** Instructor: Regression and forecasting (undergraduate) (New York, NY)
Redesigned course to use R instead of Minitab
Taught course twice per year

2020 **New York University** Instructor: Modern statistics and causal inference for data science (graduate) (NYU)
Designed course based on *Computer Age Statistical Inference* and *Statistical Learning with Sparsity*

2014-2015 **Stanford University** Workshop Instructor (graduate) (Stanford, CA)
Organized statistical consulting lab, taught applied statistics for consulting
Taught qualifying exams workshop

2012-2016 **Stanford University** Teaching Assistant (Stanford)
PhD: Modern Applied Statistical Learning, Theory of Statistics, Theory of Probability
Masters: Introduction to Statistical Inference, Data Mining and Analysis
Undergraduate: Theory of Probability

2010-2011 **Rutgers University** Teaching Assistant (New Brunswick, NJ)
Undergraduate: Multivariate Calculus, Single Variable Calculus

2008-2009 **Western Michigan University** Teaching Assistant (Kalamazoo, MI)
Undergraduate: Mathematics for Liberal Arts

2007-2008 **Western Michigan University** Mathematics Tutor (WMU)
General mathematics tutoring, mostly for calculus

Professional Service

2024 Reviewer (AAAI Conference on AI, Ethics, and Society)
2023 Program Committee (ICML Workshop Counterfactuals in Minds and Machines)
2023 Area Chair (ACM Conference on Fairness, Accountability, and Transparency)
2023- Ethics Reviewer (Neural Information Processing Systems)
2022 Reviewer (Philosophy and Technology)
2021- Reviewer (Annals of Statistics)
2021- Reviewer (Journal of Machine Learning Research)
2020- Reviewer (Proceedings of the National Academy of Sciences)
2020- Reviewer (International Conference on Learning Representations)
2020- Reviewer (Journal of the Royal Statistical Society, Series B)
2019- Reviewer (Harvard Data Science Review)

2019-	Reviewer (Biometrics)
2019-	Reviewer (International Conference on Machine Learning)
2019-	Reviewer (Annals of Applied Statistics)
2019-	Program Committee (ACM Conference on Fairness, Accountability, and Transparency)
2018	Reviewer (Applied and Computational Harmonic Analysis)
2017-	Reviewer (Neural Information Processing Systems)
2016	Reviewer (Bernoulli)
2015-	Reviewer (Biometrika)

University Service

2021-	Statistics Seminar organizer (London School of Economics)
2021-	Faculty Search Committee member (London School of Economics)
2018-2020	Statistics Seminar co-organizer (New York University)
2018-2020	Data Science Reading Group organizer (New York University)
2017-2018	Faculty Search Committee member (New York University)

Students

PhD Co-advisor

2022-	Sakina Hansen (London School of Economics)
2020-	Lucius Bynum (New York University)

PhD Committee

2024	Jose Alvarez (Scuola Normale Superiore)
2024	Vishwali Mhasawade (New York University)

MS Supervisor

2022-2023	J. Hoekstra, M. Solomon, C. Mosk, Z. Liu (London School of Economics)
2021-2022	E. Goel, A. Kansal, L. Wagner (London School of Economics)

Mentoring

2021-	Statistics Programme Advisor (London School of Economics)
2021-	General Course Mentor (London School of Economics)
2019-2020	First-Gen Students Mentor (New York University)