RUCHIRA RAY CURRICULUM VITAE

Department of Statistics
Columbia University
New York, NY 10027

Email: ruchira.ray@columbia.edu
Mobile: (847) 323-9436
Google Scholar

EDUCATION

Columbia University, New York, NY — September 2021 — May 2026 (Expected)
PhD, Statistics

Columbia University, New York, NY — December 2023
MPhil, Statistics
Proposed Dissertation: "Asymptotics for power posteriors: towards data-dependent posterior tempering"
Committee: Cynthia Rush, Marco Avella Medina (co-advisors), David Blei, Sumit Mukherjee

Yale University, New Haven, CT — August 2017 — May 2021
MA, Statistics & Data Science

Yale University, New Haven, CT — August 2017 — May 2021
BS, Statistics & Data Science (with distinction in major)
Thesis: "A Bayesian Mixed Model of Longitudinal Development of Attention in Infants"
Advised by: Joseph Chang

RESEARCH POSITIONS HELD

Yale University, Autism Center of Excellence — New Haven, CT
Research Assistant — May 2020 – August 2021

- Developed a new statistical imputation algorithm to improve the classification of autism spectrum disorders using inter-region brain connectivity data from fMRI brain scans.
- Developed longitudinal statistical models to examine the relationship between brain connectivity and attention to face among newborns during the first year of life.

Yale University, Department of Statistics and Data Science — New Haven, CT
Student Researcher — May 2019 – May 2021

- Assessed the statistical properties of a new estimator for Gaussian mixture cluster means of high dimensional data. It has potential applications in image processing and pattern recognition.

Yale University, Nanobiology Institute, Berro Lab — West Haven, CT
Student Researcher — May 2018 – December 2019

- Developed a mathematical model of the dynamic biomechanical pathways of protein reactions during endocytosis – the model reasonably explains the response observed in vitro in yeast cells.

AWARDS

- International Society of Bayesian Analysis (ISBA) Student Travel Award — July 2024
- Columbia University Graduate School of Arts and Sciences (GSAS) Student Travel Award — July 2024
- Columbia University Arts and Sciences Graduate Council (ASGC) Student Travel Award — June 2023
- Yale Institute for Foundations of Data Science, Travel Award — April 2024
- Simons Institute, Travel Award — May 2023
- Columbia University Graduate Fellowship — September 2021 –
- Yale University Dean's Research Fellowship — May – August 2020
- Yale University Trumbull College Richter Fellowship — May – August 2020
- Yale University First-Year Summer Research Fellowship — May – August 2018
- National Honor Society member (Warren Township High School chapter) — August 2016 – May 2017
- National Merit Scholarship — August 2013 - May 2017

RESEARCH INTERESTS

- Generalized Bayesian inference
- Frequentist analysis of Bayesian methods
- Probabilistic machine learning

- Differential privacy
- Data valuation
- Quantitative cellular biology
- fMRI image analysis

PUBLICATIONS

- **R. Ray**, M. Avella Medina, and C. Rush, "Asymptotics for power posterior mean estimation," 59th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL, September 2023
  Available online: `https://ieeexplore.ieee.org/document/10313460` or at `https://arxiv.org/abs/2310.07900`

WORKING PAPERS

- **R. Ray**, M. Avella Medina, and C. Rush, "Statistical guarantees for data dependent posterior tempering"

PRESENTATIONS (*Invited)

- **R. Ray**, M. Avella Medina, and C. Rush, "Theoretical Guarantees for Data Dependent Posterior Tempering"
  - International Society for Bayesian Analysis (ISBA) World Meeting, Venice, Italy, July 2024
  - *Forty Years at the Interplay of Information Theory, Probability and Statistical Learning, Yale Institute for Foundations of Data Science, New Haven, CT, April 2024
  - Columbia University Data Science Day, New York, NY, March 2024
  - *Workshop on Information-Theoretic Methods for Trustworthy Machine Learning, Simons Institute, Berkeley, CA, May 2023
  - Minghui Conference, Columbia University Department of Statistics, May 2023
- **R. Ray**, M. Avella Medina, and C. Rush, "Asymptotics for power posterior mean estimation"
  - Minghui Conference, Columbia University Department of Statistics, April 2024
  - *59th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL, September 2023
- W.D. Brinda and **R. Ray**, "The Third Moment Tensor Method with Principal Components and Basis Expansion," American Statistical Association Joint Statistical Meeting, Washington DC, August 2022
- A. Vernetti, **R. Ray**, et al., "Predictive Links between Salience Network Connectivity and Attention to Social Partners in Neonates with Familial History of Autism"
  - International Society for Autism Research, Annual Meeting, Austin, TX, May 2022
    Available online: `https://cdn.ymaws.com/www.autism-insar.org/resource/resmgr/files/insar_2022/2022_Abstract_Book.pdf` (pp. 274)
  - International Congress of Infant Studies, Ottawa, Canada, July, 2022
    Available online: `https://infantstudies.org/wp-content/uploads/2022/07/ICIS-2022-Abstract-ProceedingsJuly07.pdf` (pp. 200 – 201)
- **R. Ray** and J. Berro, "A New Biomechanical Mathematical Model of Force Effects on Actin Dynamics During Clathrin-mediated Endocytosis"
  - American Society for Cell Biology Annual Meeting, Washington DC, December 2019
    Available online: `https://www.molbiolcell.org/doi/10.1091/mbc.E19-11-0617` (Abstract P89/B91)
  - *Annual Conference on Quantitative Biology, Northwestern University, Evanston, IL, October 2019
    Received first place for Undergraduate Research

ACADEMIC SERVICE

Reviewer 2024 –

- Journal of Machine Learning Research (JMLR)
- Symposium on Foundations of Responsible Computing (FORC)

Conference/Seminar Organizer

- Co-organizer of Columbia Statistics PhD Student Seminar June 2024 – May 2025

Panels

- Panelist at GROW Columbia 2024 September 2024

TEACHING EXPERIENCE

Columbia University, Department of Statistics New York, NY
Recitation Leader and Graduate Teaching Assistant

- Statistical Inference and Modeling (Masters) Spring 2025
- Probability and Statistics for Data Science (Masters) Fall 2024
- Probability (Masters) Fall 2021

Graduate Teaching Assistant

- Machine Learning (Masters) Spring 2024
- Exploratory Data Analysis and Visualization (Masters) Fall 2023, Fall 2022
- Interpretable Machine Learning (Masters) Spring 2023
- Machine Learning (Undergrad) Spring 2022

Yale University, Department of Statistics and Data Science New Haven, CT
Undergraduate Teaching Assistant

- Theory of Statistics (Masters, Undergrad): Spring 2020, Spring 2019
- Probability and (Bayesian) Statistics (Masters, Undergrad): Fall 2019

SKILLS

- **Programming:** R, Python, Stan, MATLAB, Java
- **Analytical:** Data Visualization, Machine Learning/AI, Econometrics, Causal Inference
- **Relevant Coursework:** Linear Algebra, Real Analysis, Statistical Inference, Measure-Theoretic Probability, Machine Learning, Optimization, Econometrics