

# RUCHIRA RAY

# CURRICULUM VITAE

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Department of Statistics  
Columbia University  
New York, NY 10027

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**Google Scholar**

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## EDUCATION

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**Columbia University**, New York, NY  
PhD, Statistics

September 2021 — May 2026 (Expected)

**Columbia University**, New York, NY  
MPhil, Statistics

December 2023

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  
MA, Statistics & Data Science

August 2017 — May 2021

**Yale University**, New Haven, CT  
BS, Statistics & Data Science (with distinction in major)

August 2017 — May 2021

Thesis: “A Bayesian Mixed Model of Longitudinal Development of Attention in Infants”

Advised by: Joseph Chang

## RESEARCH POSITIONS HELD

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**Yale University, Autism Center of Excellence**  
*Research Assistant*

New Haven, CT  
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**  
*Student Researcher*

New Haven, CT  
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**  
*Student Researcher*

West Haven, CT  
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

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- 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

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

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

## PUBLICATIONS

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- **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

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- **R. Ray**, M. Avella Medina, and C. Rush, “Statistical guarantees for data-driven posterior tempering”

## PRESENTATIONS (\*Invited)

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- **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. Verneti, **R. Ray**, et al., “Predictive Links between Saliency 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](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

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**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

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### 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

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- **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