Jacob Edwards, PhD

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I am a scientist with a PhD in psychology/neuroscience, specializing in the analysis of brain and sound data. I have 12+ years of experience in the analysis of complex datasets, machine learning and statistical modeling. My research and teaching work aimed at addressing issues in basic neuroscience, hearing health and public policy. I have proven success in leading interdisciplinary teams, mentoring the next generation of scientists, and securing competitive research funding. I am committed to ensuring that data science and AI are harnessed to enhance human decision-making in a way that is fair, transparent, and ethical, and that addresses issues of bias and inequality in a rapidly evolving technological landscape.

SKILLS

Tools	MATLAB, Python, R, Audacity, Adobe Illustrator
Analysis	Inferential statistics, machine learning, visualization, dimensionality reduction
Communication	Public speaking, technical writing, teaching

RELEVANT EXPERIENCE

PhD Researcher	**COLUMBIA UNIVERSITY**	**2019-2025**

Project: Neural coding of long-time-scale information in sound signals
- Collected, processed and analyzed ~3.2 TB of single-neuron auditory stimulus-response time series data using MATLAB and custom analysis pipelines; wrote thousands of lines of MATLAB code to test hypotheses and visualize results.
- Conducted 40+ stereotaxic brain surgeries in small birds for behavioral neuroscience experiments, demonstrating precision, focus under pressure, and troubleshooting in high-stakes environments.
- Automated a key data preprocessing step (noise detection and removal) by training a random forest model, reducing manual workload by roughly 20%.
- Developed a custom graphical user interface for visualizing multi-dimensional time series brain activity data, improving accessibility and team collaboration.
- Secured $140,256 in NIH research funding through competitive grant proposal process (NRSA F31DC020904).

Project: Genetic bias in behavioral sequence organization
- Analyzed vocal recording data of 24,000+ vocal elements recorded from 138 songbirds, including preprocessing (bandpass filtering, noise reduction) and element clustering (distance measures with principal components analysis).
- Developed NLP model for predicting vocal sequences, training the model on signal features rather than lexical data.
- Created custom effect size measures and bootstrapped confidence intervals for comparing differences among 3 groups.

Other Contributions
- Developed and taught original curriculum for "Laboratory in Justice Data Science" (20 hours of lecture, 7 homework assignments), teaching PhD and undergraduate students R programming, data tabulation, visualization, model training, network analysis, web scraping, regular expressions, meta-analysis, fairness & bias, and more. Led discussions on using data to influence policy.
- Mentored 4 postdoctoral researchers, 2 PhD students, and 5 undergraduate students in the lab in advanced experimental and analytical techniques.
- Guided 150+ students (3 semesters of Statistics) through classical and modern statistical theory, lab exercises, and office hours, fostering critical thinking and analytical skills. Received outstanding scores on teaching evaluations.

PEER-REVIEWED PUBLICATIONS

1. **Edwards JA**, Woolley SMN (2026) In review: *Nature Scientific Reports*.
2. **Edwards JA**, Rivera M, Woolley SMN (2025) *Journal of Neuroscience* 45: e0576242025
3. Rivera M, **Edwards JA**, Hauber ME, Woolley SMN (2022) *Nature Scientific Reports* 13: 7076
4. **Edwards JA**, Risch MN, Hoke KL (2021) *Journal of Comparative Neurology* 529: 1768-1778
5. So NLT, **Edwards JA**, Woolley SMN (2020) *Journal of Neuroscience* 40: 1015-1027
6. Williams JH, **Edwards JA**, Ramsey AJ (2016) *American Journal of Botany* 103: 471-483

EDUCATION

PhD	2025	Columbia University	Dept of Psychology
MSc	2018	Colorado State University	Dept of Biology
BSc	2013	University of Tennessee, Knoxville	Dept of Ecology & Evolutionary Biology