Alexandra Fischbach

NEUROSCIENCE PHD CANDIDATE

Computational neuroscientist focusing on measurement precision

Department of Psychology & Center for Cognitive and Brain Health
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Education

2020-PRESENT
Boston, MA

Ph.D. Candidate, Neuroscience

Northeastern University

Dissertation: *Characterizing Subcortical fMRI Signal: the Impact of Local Cerebrospinal Fluid Noise Correction*
Advisor: Stephanie Noble, Ph.D

M.S., Neuroscience

Northeastern University

Thesis: *Columnar Periaqueductal Gray Activity in Human Working Memory*
Advisor: Lisa Feldman Barrett, Ph.D, Karen Quigley, Ph.D

2013-2017
Providence, RI

B.A., Psychology, B.A., Biology, Neuroscience Certificate

Providence College

Honors: *Magna Cum Laude*
Awards: Selected as 1 of 8 Neuroscience students annually for academic excellence & commitment to research; conducted research at Brown University's Department of Neuroscience as part of this program

Experience

2023-PRESENT
Boston, MA

Graduate Research Assistant

Northeastern University

Neuroscience Precision Research & Idiographic Statistical Methods (NeuroPRISM) Laboratory

- Designed and optimized **scalable data pipelines** for processing large-scale, high-dimensional biomedical datasets, enabling efficient, reproducible, and analysis-ready outputs for downstream modeling.
- **Built modular Python workflows** to support statistical modeling and reproducible analysis across complex time-series data.
- Developed and deployed novel **data-driven models** for noise correction, significantly improving signal reliability, generalizability, and statistical power.
- Applied **machine learning techniques**, including unsupervised clustering and dimensionality reduction, to assess spatial and temporal variability in large-scale datasets.
- **Presented data-driven insights** at national and international conferences (CNS, OHBM); awarded 3 competitive travel grants.
- Awarded the 2025 National Institute of Neurological Disorders and Stroke (NINDS) **Early-Career Rigor Champions Prize** ($10,000) for advancing rigorous research practices and community outreach.

2020-2023
Boston, MA

Graduate Research Assistant

Northeastern University

Interdisciplinary Affective Science Laboratory (IASL)

- Skilled in **data wrangling**, including cleaning, transforming, analyzing, and visualizing complex time-series and multimodal datasets using Python and R.
- Leveraged **high-performance computing** (HPC) and high-throughput I/O strategies to manage large data volumes and support computationally intensive workflows.
- **Built a custom preprocessing pipeline** to support the analysis of ultra-high-resolution neuroimaging data, improving data quality and downstream signal modeling.
- Integrated **multimodal physiological signals** (e.g., skin conductance, heart rate, respiration) with behavioral data to support modeling of brain-body dynamics.

- Published a **first-author peer-reviewed article** (see *selected publications*), which was recognized with distinction as Featured Article and received international recognition through coverage in Scientific American.

FEB-SEPT 2020
Boston, MA

Clinical Trial Program Manager
Boston Medical Center, Division of Medicine
- Managed clinical trial documentation and data collection across multiple studies, ensuring regulatory compliance, data integrity, and effective communication with investigators, regulatory agencies, and sponsors.

2018-2020
Boston, MA

Clinical Research Coordinator II
Massachusetts General Hospital, Department of Neurology
J. Philip Kistler Stroke Research Center
- Led recruitment, regulatory compliance, and data collection for the Biorepository of Neurological Injury (Neuro ICU).

JULY-NOV 2018
Boston, MA

Neuropathology Research Assistant
Beth Israel Deaconess Medical Center, Department of Neuropathology
- Managed 500+ transgenic mouse colony (e.g., genetic integrity, breeding strategies), collected and analyzed weekly assays (e.g., DNA sequencing, protein purification, PCR), and analyzed genotypic data.

2017-2018
Copenhagen, Denmark

Program Assistant
Danish Institute for Study (DIS) Abroad, Department of Psychology and Cognitive Neuroscience
- Managed budgets and operations for 15+ courses & 200+ students per semester for the largest department in DIS and maintained international partnerships for seminars and field visits.

Leadership

2020-2025 **Invited Speaker:** Delivered annual invited talks for senior undergraduates at Providence College; served as career panelist, providing mentorship on research and academic pathways.
Open Science Event Organizer: Led open science initiatives, organizing journal clubs and coordinating hackathon events, including Boston Brainhack.
Reviewer: Engaged in peer review for a variety of journals spanning basic and translational neuroscience.

2024-2025 **Mentorship:** Provided mentorship to undergraduate and graduate students at Northeastern University on graduate school preparation and career development.

2021-2025 **Mentorship:** Trained and mentored 5 undergraduate, Ph.D, and postdoctoral lab members in fMRI processing, statistical modeling, and reproducible workflows.

2021 **Teaching:** Designed and delivered lectures as the student instructor for an undergraduate neuroscience methodology course. Facilitated 1:1 office hours to help students build confidence and competence in programming and method development.

Selected Publications

- Xu, T., **Fischbach, A.K.,** Bridgeford, E.W., Bayrak, R.G., Vogelstein, J., Noble, S., & Anteraper, S. “Current limitations in functional connectivity assessment: Suggestions for analysis improvements” (Chapter 14). *Elsevier.* (accepted, expected 2025).
- **Fischbach A.K.,** Satpute A.B., Quigley K.S., Kragel P.A., Chen D., Bianciardi M., Wald L.L., Wager T.D., Choi J.K., Zhang J., Barrett L.F., Theriault J.E. “Seven Tesla Evidence for Columnar and Rostral-Caudal Organization of the Human Periaqueductal Gray Response in the Absence of Threat: A Working Memory Study” *J Neuroscience.* 2024 June 26;44.
    - **Published with distinction: selected as a featured article**

Skills

Computational Neuroscience:
Functional Neuroimaging:
Resting-State & Task-Based fMRI, Ultra-high Field (7T) Imaging, Physiological Artifact Estimation & Correction, Method Development, In-Scanner Peripheral Physiology Integration
Pipeline Development:
Scalable Preprocessing Pipelines

Programming:
Python, R, Bash Scripting, High-performance Computing, Parallel Computing, MATLAB (for fMRI toolboxes)

Data Analysis & Machine Learning:
Statistical Modeling:
Time-series Analysis, General Linear Modeling, Mixed-Effects Modeling, Reliability Metrics, Predictive Modeling
Dimensionality Reduction:
PCA & ICA,
Machine Learning:
Regularized Regression (Lasso & Ridge), Nested Cross-Validation, Model Evaluation & Validation
Unsupervised Learning:
Clustering

Data Handling:
Data Preprocessing, Cleaning, Manipulation, Visualization, High-Dimensional Data Analysis

Project Management:
Project Development, Study Execution, Scientific Communication & Reporting, Cross-Functional Collaboration
(highly endorsed by supervisors)

Software:
Visual Studio Code, Jupyter Notebook, FSLEyes, REDCap, Keynote, Photoshop

Relevant Coursework

Computational:
Machine Learning, Quantitative Methods I & II, Neuroeconomics

Conceptual & Applied:
Neuroimaging Applications for Clinical Neuroscience, Behavioral Pharmacology

Workshops & Summer Schools:
Psychology, Engineering, and Neuroscience (PEN) Working Group, Neurohackademy (2-week summer intensive)