Megan deBettencourt

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About Me

I am a quantitative scientist and researcher with a background in computational cognitive neuroscience and over a decade of experience building AI and ML tools to model human behavior and analyze multimodal physiological data. I develop real-time, closed-loop systems, ranging from brain-computer interfaces to human-AI interactions, to enhance human behavior.

Education

Princeton University, Princeton Neuroscience Institute
PhD, Neuroscience — Sept. 2016
MA, Neuroscience — Aug. 2012

Columbia University, School of Engineering and Applied Science
BS, Applied Mathematics *magna cum laude* — May 2010

Experience

Senior Quantitative UX Researcher, Google — Oct. 2025 – Present

- Apply quantitative, data-driven methods to analyze user behavior and guide product decisions for Search Ads

Senior Research Scientist, Ruby Neurotech — Feb. 2023 – Sept. 2025

- Developed and deployed AI-powered scalable and individualized digital intervention for mental health and PTSD, improving user outcomes (50% reduction in memory intrusions)
- Engineered LLM–based system to deliver and assess multi-turn human–AI conversations, achieving alignment with human ratings (Spearman $\rho = 0.5$)
- Conducted multimodal logs analysis of behavioral and physiological signals (pupil, gaze, heart-rate, webcam) to identify biomarkers of engagement via advanced statistics, machine learning, and multivariate modeling
- **Skills:** Experimental Design, Data Analysis, Statistics, Machine Learning, AI LLMs & Prompt Engineering, Python

Consultant, Stanford University, Wu Tsai Human Performance Alliance — 2023 - 2024

- Advised on experimental design & data analysis pipeline to advance real-time eye-tracking research studies
- **Skills:** Experimental Design, Statistics, Eye-tracking, Python, Research, Mentorship

NIH K99 and F32 Post-doctoral fellow (NIH BRAIN Initiative K99/R00), University of Chicago — 2016 – 2023

- Conducted multimodal user research studies (500+ participants) and applied machine learning to classify brain states and predict memory (from EEG, eye-tracking, behavioral, and patient data)
- Developed personalized, adaptive closed-loop systems using real-time behavioral data to forecast attention lapses
- Mentored a team of 10+ researchers, authored scientific publications, and secured NIH funding
- **Skills:** Machine learning, Multivariate Modeling, Experiment Design, EEG, Eye-tracking, Statistics, Python, R, MATLAB

NSF Graduate Research Fellow PhD Student, Princeton University, Princeton Neuroscience Institute — 2010 – 2016

- Engineered closed-loop fMRI neurofeedback system to decode and improve human visual attention in real time from high-dimensional whole brain data (~100k voxels)
- Launched partnership with **Intel Labs** to build cloud-based neuroimaging analysis software platform Brainiak
- Developed brain–computer interfaces for clinical applications in depression and anxiety through collaborations with multiple institutions
- Led multimodal user studies (500+ participants) collecting behavior, neuroimaging, and eye-tracking data
- **Skills:** Machine learning, High-performance computing, Brain-computer interfaces, Neuroimaging, Python, MATLAB

Undergraduate Researcher, Columbia University, Biomedical & Electrical Engineering Departments — 2008 – 2010

- Built signal processing pipelines and used ML tools to decode single-trial neural data from EEG and fMRI

Selected publications and presentations

Over 100 presentations for academic and industry audiences (e.g., CMU, Intel, Microsoft, UCSF, Stanford)
Over 1000 citations for 20+ publications in top journals. For a full list of publications, see Google Scholar or Pubmed

- **MT deBettencourt** et al. (arXiv) AI-guided digital intervention with physiological monitoring reduces intrusive memories after experimental trauma.
- Invited panelist for **NeurIPS 2022** workshop (All Things Attention)
- **MT deBettencourt** et al. (2019) Real-time triggering reveals concurrent lapses of attention and working memory. *Nat. Hum. Behav.* Article | Github
- **MT deBettencourt** et al. (2015) Closed-loop training of attention with real-time brain imaging. *Nat. Neurosci.* Article

General Skills

- Programming & Data Analysis: Python (numpy, pandas, scipy, scikit-learn, statsmodels, pytorch), R, MATLAB, High-performance computing (Slurm)
- AI & ML: LLM prompt engineering, few/zero-shot learning, supervised & unsupervised learning, regression & classification
- Statistics & Experimental Design: Hypothesis testing, regression modeling, mixed-effects models, multivariate analysis, parametric and non-parametric statistical tests (e.g., permutation tests), power analysis, A/B testing
- Data Visualization: matplotlib, seaborn, streamlit dashboards, Adobe Illustrator, Canva
- Neuroscience & Physiology: gaze-tracking, pupillometry, PPG, face/pose tracking via webcam, EEG, fMRI, fNIRS

Languages

English native; **French** fluent