Maedbh **King**

· ICoN Postdoctoral Fellow · MIT ·
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Summary

Integrative Computational Neuroscience (ICoN) Fellow at MIT developing biologically-driven risk predictors and monitors of neurodevelopmental disorders. 6+ years experience conducting hypothesis- and data-driven research, and using machine learning and statistics to build models of brain function. Strong record of publishing in scientific journals (>500 citations), and presenting at research conferences (>10 proceedings). Passionate about using my experience as an educator and academic mentor to communicate complex ideas to non-expert audiences. Strongly believe in using data-driven solutions to formulate and recommend policy.

Education

University of California, Berkeley
Berkeley, California

PH.D. IN COGNITIVE NEUROSCIENCE (GPA: 3.96/4.00)
Sep. 2017 - Expected: May. 2022
- **Advisor: Richard Ivry, Ph.D.** Awards: Presidential Management Fellowship Finalist (2022) [*link*]; Mark R. Rosenzweig Fellowship (2021) [*link*]; Cognitive and Computational Neuroscience Travel Award (2020) [*link*]
- Graduate Certificate in Applied Data Science, School of Information [*link*]

Trinity College Dublin
Dublin, Ireland

B.A. IN PSYCHOLOGY AND FRENCH (DOUBLE MAJOR; GPA: 4.0)
Sep. 2010 - May. 2014
- **Advisor: Redmond O'Connell, Ph.D.** Awards: US Fulbright Program (2014; shortlisted) [*link*]; Wellcome Trust Biomedical Scholarship (2014) [*link*]; Entrance Scholarship, Trinity College Dublin (2010) [*link*]; Government of Ireland Postgraduate Scholarship (Full-Ride; 2010) [*link*]

Experience

ICoN Postdoctoral Fellow at MIT
MIT Projects [link]

USING MACHINE LEARNING TO IDENTIFY RISK PREDICTORS OF NEUROPSYCHIATRIC DISORDERS
2022-
- Adopted a transdiagnostic approach to establish how brain differences relate to cognitive difficulties in childhood. Trained an artificial neural network on a sample of 4,000 participants to capture non-linear relationships in cognitive profiles and cortical morphology data.
- Identified risk predictors for self-harm and suicide attempt in an adolescent population. Used natural language processing (NLP) to decode unstructured electronic health records and predictive modeling to identify critical features from structured clinical profiles. Overall goal is to use models to inform clinical outcomes.

PhD Researcher at UC Berkeley
Paper [link]

PH.D. THESIS: MAPPING CEREBRO-CEREBELLAR NETWORKS OF THE HUMAN BRAIN DURING LEARNING
2017-2022
- Created a novel map of the human cerebellum by applying matrix factorization to high-dimensional neural data [*link*].
- Developed machine learning pipelines to predict cognitive function in the human cerebellum during learning, tested patients with spinocerebellar ataxia on a series of cognitive tasks to assess cerebellar deficits, analyzed post-mortem human brain data to create a transcriptomic map of the human cerebellum, and led a team of 5 to collect 300 experimental hours of functional magnetic resonance imaging (fMRI) data (during COVID-19 pandemic).
- Co-wrote an R35 grant that received 5-year funding from the NIH. Managed an institutional review board (IRB) protocol for fMRI experiments.
- Created a widely adopted mentorship agreement for research assistants to ensure transparency and accountability in mentoring practices. Co-led a journal club for undergraduate research assistants, instructing them on the scientific method, data analysis, and statistics.

Selected Projects

SUITPy: Open-source package for the visualization of cerebellum imaging data
Library [link]

WESTERN UNIVERSITY; UNIVERSITY OF CALIFORNIA, BERKELEY
2021
- Core developer of *SUITPy*, an open-source Python toolbox to visualize cerebellum data. Identified best programming practices for improving core functionality, resulting in novel implementation of 2D surface mapping and incorporation of brain atlases from open-source repositories.

Low dimensional embedding of genetic gradients in the human cerebellum
Paper [link]

HELEN WILLS NEUROSCIENCE INSTITUTE, UNIVERSITY OF CALIFORNIA, BERKELEY
2021
- Investigated genetic gradients in the human cerebellum using postmortem brain data from the Allen Human Brain Atlas [*link*].

Evaluating functional boundaries of the brain using a novel distance coefficient
Paper [link]

WESTERN UNIVERSITY; UNIVERSITY OF CALIFORNIA, BERKELEY
2021
- Co-developed a novel statistical metric to evaluate the validity of brain parcellations, an advancement on Homogeneity and Silhouette coefficients.

Predicting brain activation maps for arbitrary tasks with cognitive encoding models
Poster [link]

STANFORD UNIVERSITY; UNIVERSITY OF CALIFORNIA, BERKELEY
2021
- Used natural language processing to extract features from a cognitive ontology and built machine learning models to predict novel brain data.

Predicting penalty shots using markerless pose estimation
Github [link]

DEPARTMENT OF PSYCHOLOGY, UNIVERSITY OF CALIFORNIA, BERKELEY
2020
- Implemented markerless labeling of soccer players and built computer vision models to understand human performance in predicting penalty shots.

Cross Platform Integration of Clinical Data
Team Leader

DEPARTMENT OF PSYCHOLOGY, UNIVERSITY OF CALIFORNIA, BERKELEY
2020
- Implemented and maintained data warehousing for clinical projects that contained sensitive patient information (e.g., disease etiology).

Skills & Interests

Programming Languages	Python, SQL, R, MATLAB, HTML, Bash
Frameworks and Tools	Keras, Nipype, Scikit-learn, Pandas, NumPy, Scipy, OpenCV, Deeplabcut, Git, Vim, Blender, High Performance Computing
Hobbies	Road Biking, Yoga, Running, Mountain Climbing, Fiddle Playing (traditional Irish music), Crosswords