Maedbh **King**

· Ph.D. Candidate in Cognitive Neuroscience · UC Berkeley ·

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Summary

Current Ph.D. candidate in Cognitive Neuroscience at the University of California, Berkeley. 5+ years experience in designing and testing multi-task fMRI experiments and applying machine learning tools in python to fMRI, eye-tracking, and behavioral data. Motivated to advance predictive models of brain function with a keen interest in utilizing big data to map the cognitive and transcriptomic domains of the human cerebellum ("little brain").

Education

University of California, Berkeley — *Berkeley, California*
Ph.D. in Cognitive Neuroscience (GPA: 3.96/4.00) — *Sep. 2017 - Expected: Dec. 2022*
- **Advisor: Richard Ivry, Ph.D.**
- Applied Data Science Certificate, School of Information. *Awards: Mark R. Rosenzweig Graduate Fellowship (2021); Cognitive Computational Neuroscience Travel Award (2020)*

Western University — *London, Ontario*
M.Sc. in Neuroscience (GPA: 4.0) — *Sep. 2015 - May. 2017*
- **Advisor: Joern Diedrichsen, Ph.D.** *Awards: Gordon Cerebellum Student Travel Award (2017)*

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: Irish Research Council Postgraduate Scholarship (2015); Ussher Fellowship, Trinity College Dublin (2015); US Fulbright Program (shortlisted); Wellcome Trust Biomedical Scholarship (2014); Entrance Scholarship, Trinity College Dublin*

Experience

Thesis: Mapping cerebro-cerebellar networks of the human brain during learning — *Github [Link]*
University of California, Berkeley — *Graduate Researcher (2017-)*
- *Led a team of 9* (3 Ph.D. students, 5 research assistants, 1 postbac student) to design and collect *300* hours of *fMRI* and *eye-tracking* data.
- Used *machine learning* to predict *cerebro-cerebellar connectivity* across learning, features were *extracted* by parcellating the human cerebral cortex and *feature selection* was performed with *L1 regularization*.
- Used *dimensionality reduction* (PCA, ICA), *clustering*, *regression*, *permutation tests* and other machine learning techniques to analyze *behavioral* and *eye-tracking* data to predict human *learning* performance on *movie-based* action prediction tasks.

Thesis: Understanding the functional organization of the human cerebellum — *Paper [Link]*
Western University — *Graduate Researcher (2015-2017)*
- *Led a team of 2* (1 research assistant and one post-doctoral fellow) to design and collect a 26-task *fMRI* experiment and used *machine learning* (*semi non-negative matrix factorization*) to generate a *novel functional map* of the human cerebellum.
- *Initiated* a *collaboration* with scientists from Stanford University to use *natural language processing and regularized regression* to assign cognitive labels (*cognitiveatlas.org*) to the human cerebellum.
- Invested in *open-source science*. My data, which are publicly available on *openneuro.org*, have been downloaded by *hundreds of researchers*.

Selected Projects

SUITPy: Open-source package for the visualization of cerebellum imaging data — *Github [Link]*
2021
- Core developer of *SUITPy*, an open-source *python* toolbox based on a highly popular *MATLAB* toolbox. I implemented *mapping* of brain data to 2D surface space and incorporated *brain atlases* from *open-source* repositories.

Evaluating functional boundaries of the brain using a novel distance coefficient — *Paper [Link]*
2021
- Co-developed a novel *statistical metric* to evaluate the validity of *brain parcellations*, an advancement on *Homogeneity and Silhouette coefficients*. Evaluated metric on *open-source* brain data from *Human Connectome Project*.

Low dimensional embedding of genetic gradients in the human cerebellum — *Paper [Link]*
2021
- Investigated *genetic gradients* in the *human cerebellum* using postmortem data from the *Allen Human Brain Atlas*. Used feature-based encoding to locate gene samples in the cerebellum, and *hierarchical clustering and PCA* to determine *organizational structure* of genetic gradients

Predicting brain activation maps for arbitrary tasks with cognitive encoding models — *Poster [Link]*
2021
- Evaluated cognitive *encoding models* on brain data and used *natural language processing* to extract features from a formal *cognitive ontology*.

Predicting penalty shots using markerless pose estimation — *Github [Link]*
2020
- Implemented *markerless labeling* of video data (>12 hours of soccer players taking penalty shots) and feature-based encoding to *compare model and human performance* in predicting penalty outcomes.

Skills

Programming Languages	Python, SQL, R, MATLAB, HTML, Bash
Frameworks and Tools	Keras, OpenCV, Git, Vim, Blender, Nipype, Deeplabcut, PsychoPy, Pandas, NumPy, Scikit-learn, Scipy
Conceptual	High performance computing (Savio), MRI certificate from Henry H. Wheeler Jr. Brain Imaging Center