Maedbh **King**

· Ph.D. Candidate ·

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Summary

Cognitive and computational neuroscientist with leadership experience in academia and non-profit work. 7+ 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 (>300 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. Motivated to apply my quantitative and communication expertise to high-impact projects that serve the American public.

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.** [Link] (email: ivry@berkeley.edu)
- Graduate Certificate in Applied Data Science [Link]

Western University — *London, Ontario*

M.Sc. in Neuroscience (GPA: 4.0) — *Sep. 2015 - May. 2017*

- **Advisor: Joern Diedrichsen, Ph.D.** [Link] (email: jdiedric@uwo.ca)

Trinity College Dublin — *Dublin, Ireland*

B.A. with Honors in Psychology and French (Double Major; GPA: 4.0) — *Sep. 2010 - May. 2014*

- **Advisor: Redmond O'Connell, Ph.D.** [Link] (email: reoconne@tcd.ie)

Recognition

Scholarships

2021	**Mark R. Rosenzweig Graduate Fellowship**, Department of Psychology, University of California, Berkeley	*Link*
2015	**Government of Ireland Postgraduate Scholarship**, Irish Research Council	*Link*
2015	**Ussher Fellowship**, Trinity College Dublin	*Link*
2013	**Biomedical Vacation Scholarship**, Wellcome Trust, UK	*Link*
2010	**Government of Ireland Scholarship (Full-Ride)**, Department of Education and Skills	*Link*

Awards

2020	**Cognitive Computational Neuroscience Travel Award**, CCN Conference	*Link*
2017	**Gordon Cerebellum Student Travel Award**, Gordon Research Conferences	*Link*
2014	**US Fulbright (Shortlisted)**, Fulbright Program	*Link*
2010	**Entrance Exhibition Award**, Trinity College Dublin	*Link*

Research Impact

2020	**The mysterious, multifaceted cerebellum**, Knowable Magazine	*Link*
2019	**Scientists map our underappreciated "little brain"**, University of California, Berkeley	*Link*
2019	**New maps of the cerebellum show how our "little brain" works**, Psychology Today	*Link*

Research Experience

Ph.D. Thesis: Mapping cerebro-cerebellar networks of the human brain during learning — *Github [Link]*

Graduate Student Researcher (2017-) — *University of California, Berkeley*

- Developed machine learning pipelines to predict cognitive function in the human cerebellum during learning, and tested patients with spinocerebellar ataxia on a series of cognitive tasks to assess cerebellar deficits. My work requires knowledge of both advanced statistics and computer programming (e.g., Python) to analyze high-dimensional and complex neural data.
- Led a team of 8 to design and 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 and appropriate methods and statistics.
- Mentored two undergraduate students in designing and writing up honors thesis projects. One student was awarded a Swan prize [link] for their work, and presented at a national conference. Prioritized recruitment of students from marginalized demographics.

M.Sc. Thesis: Understanding the functional organization of the human cerebellum

Paper [Link]

Graduate Student Researcher (2015-2017) — *Western University*

- Created a novel and highly downloaded map of the human cerebellum using machine learning and advanced statistics.
- Led a team of 2 to design and collect a 26-task, 6-session fMRI and behavioral experiment, totaling 250 hours of data collection.
- Initiated a collaboration with scientists from Stanford University to use natural language processing to assign cognitive labels (*cognitiveatlas.org*) to the human cerebellum. Developed pipeline for other researchers to replicate my novel approach.
- Invested in open-source science. My data, which are publicly available on *openneuro.org [Link]*, have been downloaded >200 times.

Selected Projects

Leadership & Management

Graduate Mentoring Policies

Co-Chair [Link]

Jan. 2020 - Sep. 2021

- Recognized need for formal mentor-mentee agreements in Berkeley psychology department. Assembled and co-led working committee to create policy to improve lab culture and mentor-mentee relationships. Recruited panelists from diverse backgrounds.
- Authored 10-page policy document on mentorship and lab policy agreements. Advised leadership on implementation of new departmental policies during quarterly climate and equity meetings. Since Sep. 2021, 35/42 faculty have created lab policy documents.

State of the Department Initiative

Leader [Link]

Apr. 2019 - Apr. 2021

- Team leader for faculty accountability initiative. Developed survey for Berkeley Psychology state of the department annual meeting, and conducted data analytics and statistics to translate graduate student concerns into policy recommendations. Used data and statistics to highlight funding discrepancy between neuroscience and clinical psychology students, resulting in a 20% yearly increase in graduate student stipends.

Prison University Project at San Quentin

Lecturer [Link]

Jan. - May 2019

- Designed and lectured a new curriculum in General Psychology for incarcerated students. I brought human brains into the classroom to teach neuroanatomy, mirroring the UC Berkeley student experience. Provided executive board with formal analysis of organizational operations.

Ethics Protocol for MRI projects

Manager [Link]

Jan. 2018 -

- Drafted guidelines and maintained ethics protocol for institutional review board (IRB) magnetic resonance imaging (MRI) projects. Completed CITI program course on "Human Research: Biomedical Research Investigators", and trained 3 research assistants on the protocol.

Technical

SUITPy: Open-source package for the visualization of cerebellum imaging data

Developer [Link]

Jan. - Sep. 2021

- Core developer of SUITPy, an open-source Python library to visualize brain data. Subsequently worked as project manager to identify best programming practices for improving core functionality, resulting in record monthly installations (4-fold increase).

Predicting COVID-19 mortality rates across the U.S. using mobility and census data

Author [Link]

Sep. - Dec. 2020

- Built a statistical model predicting COVID-19 deaths in the U.S. from May - Aug. 2020 using data from the U.S. Census and Google Maps mobility reports. Increased optimization of algorithm by 20-fold. Presented findings in a poster presentation to faculty in the School of Information.

Low dimensional embedding of genetic gradients in the human cerebellum

Author [Link]

May 2019 - Sep. 2021

- Initiated collaboration with incoming faculty at Berkeley to investigate genetic gradients in the human cerebellum. Learned new statistical tools to analyze postmortem human brain data, and developed pipelines to streamline data preprocessing, later adopted by >5 students.

Universal transform or multiple functionality? A novel perspective on the cerebellum

Author [Link]

May 2018 - Sep. 2019

- Reviewed and analyzed 30 years of research to propose new theory of cerebellar function. Co-authored subsequent paper (>70 citations).

Public Service & Outreach

Committees & Policy

Graduate Assembly Students of Psychology

Member and RSO Signatory

University of California, Berkeley — *Sep. 2018 - Mar. 2020*

- Provided data analytics to improve efficiency of phone banking for Psychology "Big Give". Contacted 10-fold more donors than previous year.
- Liaison officer between Berkeley development office and external donors. Organized faculty fundraisers in Silicon Valley, fundraising $15,000.

European Federation of Psychology Students' Association

Editor [Link]

European Union — *Jan. 2016 - May 2016*

- Spearheaded initiative to pre-register scientific results in the Journal of European Psychology Students, a first for student journals worldwide.
- Advised organization leadership on best practices for successful implementation of pre-registration and authored journal article (>3500 views).

Schulich School of Medicine Graduate Council

Secretary

Western University — *Sep. 2015 - Sep. 2016*

- Provided budget evaluation of graduate student insurance plan to council. Served as student liaison officer, and oversaw a budget of $5000

Niteline (Student Helpline)

Publicity Officer

Trinity College, Dublin — *Sep. 2011 - May 2014*

- Provided practical program consultation to student helpline, and wrote proposal to increase the yearly budget from $5,000 to $10,000.

Science Communication

Graduate Assembly Students of Psychology

Writer/Contributor [Link]

University of California, Berkeley — *Sep. 2019 - May 2021*

- Created, managed, and edited Berkeley Psychology blog to spotlight graduate student research. Increased monthly viewers 5-fold.
- Co-founded and operated Twitter account for Berkeley Psychology. Increased follower count to 2,000 after 2 years.
- Writer of Berkeley Psychology newsletter, circulated to >2000 people. Included profiles on graduates to strengthen ties with alumni community.

Bay Area Scientists in Schools (BASIS)

Team Leader

University of California, Berkeley — *Jan. 2018 - Jan. 2020*

- Developed and deployed neuroscience curriculum that has been presented to elementary students in >20 Bay Area public schools.

Journal of European Psychology Students

Editor/Contributor [Link]

European Union — *Jan. 2014 - May 2016*

- Managed peer review process for 30 papers including paper submission, reviewer recruitment, copy editing, and publication.
- Contributor to popular psychology and neuroscience blog post, aimed at engaging aspiring psychology students (>500 monthly views).

Women in STEM

Inspiring Young Women in STEM Inaugural Conference

Organizing Member

Western University — *May 2016*

- Co-organized first conference to encourage female students in STEM (>150 attendees), recruited keynote speakers, and evaluated research.

Western Women Neuroscientists in Schools

Team Leader

Western University — *Oct. 2015 - May 2017*

- Developed curriculum to explore neuroscience misinformation ("Myths and the Brain"). Presented to >2000 highschoolers in Ontario schools.

Mentorship

Honors Thesis Students [Link][Link]

Cognitive Science; Psychology

Sep. 2019 - May 2021 — ***Shannon Lee; Sienna Bruinsma***

- Shannon Lee tested *50* participants (during COVID-19 pandemic) and wrote her thesis on eye-tracking models that inform social learning.
- Sienna Bruinsma tested *25* patients with ataxia (during COVID-19 pandemic) and wrote her thesis on cerebellar function in language.

Undergraduate Research Assistants

Psychology; Computer Science

Jan. - May 2021; Sep. 2019 - May 2020 — ***Zanib Naaem; Yiling Kao***

- Zanib Naaem tested *30* college-aged students on a multi-session eye-tracking and behavioral learning project.
- Yiling Kao tested *50* participants and used machine learning to study speech envelopes.

Ph.D. Rotation Students

Neuroscience

Sep. - Dec. 2020; Jan. - May 2020; Sep. - Dec. 2018 — ***Amanda LeBel; Jacob Ziontz; Mark Gorenstein***

- Amanda LeBel developed encoding models using speech features to study task-evoked cerebellar activity.
- Jacob Ziontz set up fMRI preprocessing scripts on multi-session cerebellar data using high performance computing.
- Mark Gorenstein did a meta-analysis of quantitative models for understanding brain connectivity.

Teaching

General Psychology [Link]

Mount Tamalpais College

Lecturer — *Sep. - Dec. 2019*

- Designed and lectured course on general psychology to incarcerated students. Topics included "the brain and nervous system", "classical conditioning", and "mood disorders". Devised trauma-informed learning objectives, catering to students with diverse educational needs.

Biological Psychology, PSYCH 110; Cognitive Neuroscience, PSYCH 127 — *University of California, Berkeley*

Graduate Student Instructor — *Aug. - Dec. 2018 and Aug. - Dec. 2017*

- Instructed weekly seminars for 120+ students on topics including "memory and learning" and "ethics of artificial intelligence", under the supervision of UC Berkeley professors. Evaluated and supervised student research and wrote professional references for promising students.

Introduction to Statistics, STAT 1024; Probability and Statistics, STAT 2857 — *Western University*

Graduate Student Instructor — *Jan. - May. 2017; Sep. - Dec. 2016*

- Instructed undergraduate students in a statistics and data science laboratory using the programming language "R". Topics included "central limits theorem", "hypothesis testing" and "conditional probability". Wrote and administered exams and evaluated student work.

Selected Communication

Papers

Evaluating brain parcellations using the distance controlled boundary coefficient — *bioRxiv [Link]*

D Zhi, M King, J Diedrichsen — *2021*

Transcriptomic Gradients Of The Human Cerebellum — *bioRxiv [Link]*

M King, Z Zhen, RB Ivry, KS Weiner — *2020*

Functional boundaries in the human cerebellum revealed by a multi-domain task battery — *Nature Neuroscience [Link]*

M King, CR Hernandez-Castillo, RA Poldrack, RB Ivry, J Diedrichsen — *2019*

Universal transform or multiple functionality? Understanding the contribution of the human cerebellum across task domains — *Neuron [Link]*

J Diedrichsen, M King, C Hernandez-Castillo, M Sereno, RB Ivry — *2019*

Towards a multi-function mapping of the cerebellar cortex — *Brain [Link]*

M King, C Hernandez-Castillo, J Diedrichsen — *2017*

Conferences

Cerebro-cerebellar connectivity is dominated by divergent mapping — *Society for Neuroscience*

M King, L Shahshahani, Ivry, J Diedrichsen — *Virtual Conference*

2021

Predicting brain activation maps for arbitrary tasks with ontology-based encoding models — *Organization for Human Brain Mapping Conference*

J Walters, M King, P Bissett, Ivry, J Diedrichsen, R Poldrack — *Virtual Conference*

2021

Evaluating Brain Parcellations using the Multi-Domain Task Battery — *Organization for Human Brain Mapping*

J Diedrichsen, M King, C Hernandez-Castillo, D Zhi, R Ivry — *Rome, Italy*

2019

Transcriptomic Gradients of the Human Cerebellum — *Cerebellum Gordon Research*

M King, R Ivry, K Weiner — *Les Diablerets, Switzerland*

2019

A multi-domain task battery reveals the functional topography of the human cerebellum — *Society for Neuroscience*

M King, C Hernandez-Castillo, R Poldrack, R Ivry, J Diedrichsen — *San Diego, California*

2018

A multi-domain task battery reveals the functional topography of the human cerebellum — *Computational and Cognitive Neuroscience*

M King, C Hernandez-Castillo, R Poldrack, R Ivry, J Diedrichsen — *Philadelphia, Pennsylvania*

2018

Navigating the "Little Brain": Comprehensive mapping of cognitive function in the human cerebellum — *Organization for Human Brain Mapping Conference*

M King, R Ivry, J Diedrichsen — *Vancouver, British Colombia*

2017

Invited Talks

Cerebro-cerebellar connectivity across motor and cognitive circuits — *Neurologische Uniklinik Essen*
Neurophysiologisches Seminar — *Virtual Conference*
2021

Bringing a systems level perspective to neuroimaging analyses — *Organization for Human Brain Mapping*
Educational Symposium: Neuroanatomy for neuroimaging — ***Virtual Conference [Link]***
2021

Transcriptomic gradients of the human cerebellum — *University of California, Berkeley*
Cognitive Neuroscience Colloquium — *Berkeley, California*
2020

Mapping the Human Cerebellum Using a Multi-Domain Task Battery — *Society for Neuroscience*
Symposium: New Perspectives on Cerebellar Function: Implications for Mental Health — *Chicago, Illinois*
2019

A multi-domain task battery reveals the functional topography of the human cerebellum — *Helen Wills Neuroscience Institute*
UCB Neuroscience Retreat — *Richmond, California*
2018

Developing a parcellation of the cognitive cerebellum — *Cerebellum Gordon Research*
Seminar: Theories and Models of Cerebellar Function — *Lewiston, Maine*
2017

Selected Coursework

Fall 2020	**Principles and Techniques of Data Science**, Dept. of Computer Science, University of California, Berkeley	*DATA C200*
Spr. 2020	**Research Design**, School of Information, University of California, Berkeley	*INFO 201*
Fall 2019	**Seminar in cognition, brain, and behavior**, Department of Psychology, University of California, Berkeley	*PSYCH 210B*
Spr. 2019	**Professional Development**, Department of Psychology, University of California, Berkeley	*PSYCH 293*
Fall 2018	**Neural Computation**, Department of Vision Science, University of California, Berkeley	*VISSCI 265*
Spr. 2018	**Data Analysis**, Department of Psychology, University of California, Berkeley	*PSYCH 205*
Fall 2017	**Clinical Neuropsychology**, Department of Psychology, University of California, Berkeley	*PSYCH 290B*
Fall 2017	**Teaching Psychology**, Department of Psychology, University of California, Berkeley	*PSYCH 375*
Spr. 2017	**Perspectives in Neuroscience**, Department of Neuroscience, Western University	*NEUROSCI 9511*
Fall 2016	**Clinical Neuroanatomy**, Department of Anatomy, Western University	*ANATCELL 9569*
Fall 2016	**Principles of Neuroscience**, Department of Neuroscience, Western University	*NEUROSCI 9500*
Fall 2016	**Analysis of Brain Imaging Data**, Department of Statistics, Western University	*STATS 9833*
Fall 2016	**Scientific Computing**, Department of Psychology, Western University	*PSYCH 9040*

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), Grant Writing and IRB Ethics Protocols, MRI technician certificate
Interpersonal	Project management, Organizational leadership, Resourcefulness, Problem solving, Conflict resolution
Languages	English (Native), Irish (Native), French (Proficient), German (Basic)