Maedbh **King**

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

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Summary

Cognitive and computational neuroscientist with leadership experience in academia and non-profit work. 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 (>10 articles, >370 citations), presenting at research conferences (>10 proceedings), and making science accessible (2 open-source datasets and 1 Python module). Passionate about using my experience as an educator and academic mentor to communicate complex ideas to non-expert audiences. Strongly believe in leading with equity, and using data-driven solutions to formulate and recommend policy. Motivated to apply my quantitative and communication expertise to high-impact projects that promote egalitarian health-care solutions.

Education

2017-2022 **University of California, Berkeley**, Ph.D. in Cognitive Neuroscience (GPA: 3.96/4.00)

2017-2022 **University of California, Berkeley**, Graduate Certificate in Applied Data Science (GPA: 3.98/4.00)

2015-2017 **Western University**, M.Sc. in Neuroscience (GPA: 4.0/4.0)

2010-2014 **Trinity College Dublin**, B.A. with Honors in Psychology and French (Double Major; GPA: 4.0)

Recognition

Scholarships & Fellowships

2021 **Presidential Management Fellowship Finalist 2022**, U.S. Office of Personnel Management *Link*

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*

Experience

Ph.D. Graduate Student Researcher (2017-2022) *Github [Link]*

Mapping networks of the human brain during learning. Publications in *Nature Neuroscience*, *Neuron*, *Brain* *University of California, Berkeley*

- 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, and analyzed post-mortem brain data to create a transcriptomic map of the cerebellum.
- Prioritized taking classes in advanced statistics and computer science to analyze high-dimensional neural data.
- Led a team of 5 to design and collect 300 experimental hours of functional magnetic resonance imaging (fMRI) data (during COVID-19 pandemic).
- Reviewed and analyzed 30 years of research to propose new theory of cerebellar function. Co-authored subsequent paper *[link]* (>70 citations).
- 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.
- 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. Graduate Student Researcher (2015-2017) *Paper [Link]*

Developing novel brain maps of the human cerebellum. Publications in *Brain*, *NeuroImage*, *Frontiers* *Western University*

- Created a novel and highly downloaded *map [link]* 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 *[link]*.
- Initiated a collaboration with scientists from Stanford University to use natural language processing to assign cognitive labels to the human cerebellum *[link]*. Developed programming pipeline for other researchers to replicate my novel approach, and wrote supporting documentation.
- Invested in open-source science. My data, which are publicly available, have been downloaded >200 times *[link]*.

Selected Projects

Technical

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

Developer [Link]

University of California, Berkeley; Western University — *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).

Evaluating functional boundaries of the brain using a novel distance coefficient

Paper [Link]

Jan. - Sep. 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]

2021

- Evaluated cognitive encoding models on brain data and used natural language processing to extract features from a formal cognitive ontology.

Predicting human performance using computer vision models

Github [link]

Department of Psychology, University of California, Berkeley — *Jan. 2019 - Dec. 2021*

- Recorded >15 hours of varsity athletes, and implemented markerless labeling of videos to understand human performance in predicting action.

Low dimensional embedding of genetic gradients in the human cerebellum

Author [Link]

Helen Wills Neuroscience Institute, University of California, Berkeley — *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.

Public Health & Policy

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

Author [Link]

School of Information, University of California, Berkeley — *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.

Cross-Functional and Cross-Disciplinary Research Collaboration

Team Leader

University of California, Berkeley; Princeton University; Yale University — *Jan. 2019 - May. 2020*

- Implemented and maintained data warehousing for clinical research projects, established guidelines for cross-functional collaboration.

Ethics Protocol for MRI projects

Manager [Link]

Cognition and Action Lab, University of California, Berkeley — *Jan. 2018 - Dec. 2021*

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

Graduate Mentoring Policies

Co-Chair [Link]

Department of Psychology, University of California, Berkeley — *Jan. 2020 - Sep. 2021*

- Recognized need for formal mentor-mentee agreements in the UC 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]

Department of Psychology, University of California, Berkeley — *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.

Teaching

Mount Tamalpais College

Lecturer [Link]

General Psychology — *10 hrs/week; 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.

University of California, Berkeley

Instructor [Link]

Biological Psychology, PSYCH 110; Cognitive Neuroscience, PSYCH 127 — *15 hrs/week; Aug. 2017 - Dec. 2018*

- 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.

Western University

Instructor [Link]

Biology/Statistics, STAT 2244; Probability and Statistics, STAT 2857 — *15 hrs/week; Jan. 2016 - May. 2017*

- 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.

Mentorship

Honors Thesis Students

Shannon Lee; Sienna Bruinsma

Sep. 2019 - May 2021 — *Cognitive Science; Psychology*

- Shannon Lee's thesis developed eye-tracking and context models to inform social learning.
- Sienna Bruinsma's thesis evaluated the functional role of the cerebellum in linguistic processing using neuropsychology.

Undergraduate Research Assistants

Zanib Naaem; Yiling Kao

Jan. 2021 - May 2021; Sep. 2019 - May 2020 — *Psychology; Computer Science*

- Zanib Naaem tested healthy college-aged students on a multi-session eye-tracking and behavioral learning project.
- Yiling Kao developed a verb generation task and used machine learning to study speech envelopes.

Ph.D. Rotation Students

Amanda LeBel; Jacob Ziontz; Mark Gorenstein

Sep. - Dec. 2020; Jan. - May 2020; Sep. - Dec. 2018 — *Neuroscience*

- Amanda LeBel developed encoding models using speech features to study task-evoked cerebellar activity.
- Jacob Ziontz set up fMRI preprocessing scripts (BIDS and fMRIPrep) on multi-session cerebellar data.
- Mark Gorenstein worked on preprocessing pipelines for cerebro-cerebellar connectivity models.

Post-Baccalaureate Students

Dylan Benkley

Sep. - Dec. 2018 — *Psychology*

- Dylan Benkley conducted a literature review on the role of the cerebellum in social cognition.

Papers

In Prep

Putting the cerebellum to the test: introducing a falsifiable model of cerebro-cerebellar connectivity — *In Prep*

M King, L Shahshahani, R Ivry, J Diedrichsen — *2021*

Changes in cerebro-cerebellar connectivity across learning — *In Prep*

M King, J Diedrichsen, R Ivry — *2021*

30 years later: where are we in understanding the cerebellum's role in cognition? — *In Prep*

M King, A LeBel, R Ivry — *2021*

Published/Under Review

Continuous manipulation of mental representations is compromised in cerebellar degeneration — *Brain*

SD McDougle, J Tsay, B Pitt, M King, W Saban, JA Taylor, RB Ivry — *2022*

Evaluating brain parcellations using the distance controlled boundary coefficient — *Human Brain Mapping (Under Review)*

D Zhi, M King, J Diedrichsen — *2021*

Transcriptomic Gradients Of The Human Cerebellum — *Cell Reports (Under Review)*

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

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

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*

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

Visualizing Topographic Independent Component Analysis with Movies — *arXiv*

Z Chen, D Parvin, M King, S Hao — *2019*

Unique degeneration signatures in the cerebellar cortex for spinocerebellar ataxias 2, 3, and 7 — *NeuroImage: Clinical*

CR Hernandez-Castillo, M King, J Diedrichsen, J Fernandez-Ruiz — *2018*

Individual differences in resting corticospinal excitability are correlated with reaction time and GABA content in motor cortex

I Greenhouse, M King, S Noah, RJ Maddock, RB Ivry

Journal of Neuroscience

2017

Towards a multi-function mapping of the cerebellar cortex

M King, C Hernandez-Castillo, J Diedrichsen

Brain

2017

Neural adaptations associated with interlimb transfer in a ballistic wrist flexion task

KL Ruddy, AK Rudolf, B Kalkman, M King, A Daffertshofer, TJ Carroll, R Carson

Frontiers in Human Neuroscience

2016

Registered reports for student research

M King, F Dablander, L Jakob, M Agan, F Huber, J Haslbeck, K Brecht

Journal of European Psychology Students

2016

A critical evaluation of the essentialist debate: do fathers make a unique contribution to child development?

M King

Student Psychology Journal of Ireland

2015

The locus coeruleus-noradrenergic arousal function modulates perceptual decision-making in humans: evidence from pupillometry

M King, R O'Connell

Unpublished Undergraduate Honors Thesis

2014

Grants

Transformation of internal representations in multiple task domains.

NIH R35 (funded)

Graduate Co-Author

2020

Collaboration between University of California, Berkeley; Princeton University; Yale University

Evaluating a Novel Model of Cerebellar Function Using Harmonized Online-Testing of Patients with Cerebellar Degeneration in the Bay Area and Oslo Communities

Sather Grant (unfunded)

Graduate Co-Author

2019

Collaboration between University of California, Berkeley; University of Oslo

Understanding cortico-cerebellar contributions to cognition

NIH R01 (unfunded)

Graduate Co-Author

2018

Collaboration between University of California, Berkeley; Western University (Canada)

Poster Presentations

Cerebro-cerebellar connectivity is dominated by divergent mapping

M King, L Shahshahani, Ivry, J Diedrichsen

2021

Society for Neuroscience Conference

Virtual Conference

Predicting brain activation maps for arbitrary tasks with ontology-based encoding models

J Walters, M King, P Bissett, Ivry, J Diedrichsen, R Poldrack

2021

Organization for Human Brain Mapping Conference

Virtual Conference

Evaluating Brain Parcellations using the Multi-Domain Task Battery

J Diedrichsen, M King, C Hernandez-Castillo, D Zhi, R Ivry

2019

Organization for Human Brain Mapping Conference

Rome, Italy

Evaluating different functional parcellations of the basal ganglia

C Hernandez-Castillo, M King, I Harding, J Diedrichsen, R Ivry

2019

Organization for Human Brain Mapping Conference

Rome, Italy

Transcriptomic Gradients of the Human Cerebellum

M King, R Ivry, K Weiner

2019

Cerebellum Gordon Research Conference

Les Diablerets, Switzerland

A multi-domain task battery reveals the functional topography of the human cerebellum

The Society for Neuroscience Conference

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 Conference

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

Helen Wills Neuroscience Retreat

M King, R Ivry, J Diedrichsen

Lake Tahoe, California

2017

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

Mapping the Human Cerebellum

Cerebellum Gordon Conference

M King, R Ivry, J Diedrichsen

Lewiston, Maine

2017

Transcranial magnetic stimulation measures of intrinsic motor system excitability and task-based inhibition exhibit intra-subject stability across weeks

Society for Neuroscience Conference

I Greenhouse, M King, R Ivry

Chicago, Illinois

2015

Electroencephalography (EEG) signatures of impairment in cognitive, sensory and motor networks in Amyotrophic Lateral Sclerosis (ALS) disease

Annual ALS Irish Meeting

B Nasseroleslami, K Mohr, M King, O Hardiman

Dublin, Ireland

2015

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

Mapping the Human Cerebellum

Cerebellum Gordon Research Conference

Seminar: Theories and Models of Cerebellar Function

Lewiston, Maine

2017

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, fund-raising $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 *[link]*, and wrote proposal to increase the yearly budget from $5,000 to $10,000.

Communication & Administration

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 *[link]*. Increased follower count to >1500 after 2 years.
- Lead writer of Psychology newsletter *[link]* (>2000 circulation). Included profiles on graduates to strengthen ties with alumni community.

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).

Education & STEM Outreach

Prison University Project

Lecturer [Link]

San Quentin State Prison

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.

Bay Area Scientists in Schools (BASIS)

Team Member [Link]

University of California, Berkeley

Jan. 2018 - Jan. 2020

- Co-developed and deployed neuroscience curriculum, "Know Your Brain", that has been presented to students in >20 Bay Area public schools.

Inspiring Young Women in STEM Inaugural Conference

Organizing Member [Link]

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 [Link]

Western University

Oct. 2015 - May 2017

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

Skills & Interests

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)
Referees	PhD Advisor: Richard Ivry, PhD (email: ivry@berkeley.edu; phone: 510-326-6658)