MICHAEL C. FREUND

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EDUCATION

Ph.D. in Cognitive Neuroscience, Washington University in St. Louis (WUSTL) **2017–2023**

- Cognitive, Computational, and Systems Neuroscience and Quantitative Data Analysis tracks

B.A.s in Psychology and Zoology, University of Wisconsin–Madison (UW–Madison) **2013**

RESEARCH EXPERIENCE

Post-Doctoral Associate, Brown University, *Cogn., Ling. & Psych. Sciences (PI: Dr. David Badre)* **2023–Present**

Graduate Student Researcher, WUSTL, *Psychological & Brain Sciences (PI: Dr. Todd Braver)* **2017–2023**

Research Assistant, Johns Hopkins University, *Neurology (PI: Dr. Nazbanou Nozari)* **2014–2017**

Undergraduate Research Assistant, UW–Madison, *Psychology (PI: Dr. Bradley Postle)* **2011–2013**

Undergraduate Research Assistant, UW–Madison, *Harlow Primate Laboratory* **2012**

PUBLICATIONS

2024 **Freund, MC**, Chen, R, Chen, G, and Braver, TS *bioRXiv*
Complementary benefits of multivariate and hierarchical models for identifying individual differences in cognitive control

Freund, MC and Braver, TS *The SAGE Handbook of Cognitive and Systems Neuroscience*
Neurocomputational Models of Task Representation (Ch. 29)

2022 Etzel, JA, Brough, RE, **Freund, MC**, ..., Braver, TS *Scientific Data*
The Dual Mechanisms of Cognitive Control dataset, a theoretically-guided within-subject task fMRI battery

2021 Braver, TS, Kizner, A, Tang, R, **Freund, MC**, Etzel, JA *Journal of Cognitive Neuroscience*
The Dual Mechanisms of Cognitive Control Project

Freund, MC, Etzel, JA, Braver, TS *Trends in Cognitive Sciences*
Neural coding of cognitive control: The representational similarity analysis approach

Freund, MC, Bugg, JM, Braver, TS *Journal of Neuroscience*
A Representational Similarity Analysis of Cognitive Control during Color-Word Stroop

2018 **Freund, MC** and Nozari, N *Cognition*
Is adaptive control in language production mediated by learning?

2016 Nozari, N, **Freund MC**, Breining, B, Rapp, B & Gordon, B. *Language, Cognition, and Neuroscience*
Cognitive control during selection and repair in word production

TALKS

2022 **Freund, MC** and Braver, TS *Society for Neuroscience (San Diego, CA)*
[Nanosymposium talk] Searching for the neural correlates of history-driven control with EEG decoding

Freund, MC and Braver, TS *Control Processes (remote conference)*
[Datablitz] Examining the psychometrics of control-related fMRI activity in frontoparietal cortex

Freund, MC *Arizona State University Psych. Dept. (remote)*
[Invited tutorial] An Introduction to Representational Similarity Analysis (with Examples in Cognitive Control)

2019 **Freund, MC**, Braver, TS *Cognitive Neuroscience Society (San Francisco, CA)*
[Accepted datablitz] A pattern-similarity analysis approach to cognitive control in color-word Stroop

2016 **Freund, MC** and Nozari, N *Psychonomics (Boston, MA)*
[Accepted talk] Online regulation of language production

Freund, MC and Nozari, N *Cognitive Science Society (Philadelphia, PA)*
[Accepted talk] Conflict-based regulation of control in language production

SELECTED POSTERS

2022 Org. Human Brain Mapping (Glasgow, UK): *Studying neural representations that support flexible distractor resistance*

2020 Org. Human Brain Mapping (remote): *A pattern-similarity analysis approach to cognitive control in color-word Stroop*

2016 International Workshop on Language Production (La Jolla, CA): *Domain-specific control in language production*

AWARDS AND HONORS

Winner of BRAINSTORM Challenge **2024**
$1.5k cash prize awarded to my team for our project examining correlates of associative memory encoding in sEEG data, by the Center for Computational Brain Science at Brown Univ.

Dissertation Research Award Winner **2021**
$1k awarded towards dissertation project by WUSTL Psychological & Brain Sciences Department

T32 Fellow **2021–2022**
Graduate stipend funded by NIH T32 Award to WUSTL Psychological & Brain Sciences

Cognitive, Computational, and Systems Neuroscience Pathway Fellow **2018–2019, 2020–2021**
Graduate stipend funded by the McDonnell Center for Systems Neuroscience at WUSTL

SERVICE AND MENTORSHIP

Undergraduate Student Mentorship

- Kate Scanlan (Soph., Neuroscience & Sociology, Brown) *2023–Present*
- Rowen Lee (Soph., Cognitive Neuroscience & Lit. Arts, Brown) *2023–Present*
- Avery Schwartz (Sr., Psychology, Neuroscience, & Philosophy, WUSTL) *2021–2022*
- Kevin Kotzbauer (Soph., Comp. Eng., WUSTL) *2022*
- John Hanrahan (Jr., Psych., Neuro., & Philos.) *2022*
- Robert Kimelman (Jr., Math, WUSTL) *2020*
- Nicole Costales (Soph., Comp. Eng., WUSTL) *2020*
- Matt Witzerman (Jr., Comp. Eng., WUSTL) *2019-2020*

Peer Reviewer **2019–Present**

- National Science Foundation Proposals (1, 2024); eLife (3); Journal of Neuroscience (2); Cognitive, Affective, & Behavioral Neuroscience (1); Neuroimage (1, pre-2023); Cerebral Cortex (1); Psychological Review (2); Frontiers in Neuroimaging (1); Human Brain Mapping (2); Psychonomic Bulletin & Review (2); Perspectives on Psychological Science (1)

Cognitive, Computational, and Systems Neuroscience Pathway **2020–2022**
Retreat Planning Committee Member *WUSTL*

- Invited speakers for and led activities during a yearly research retreat.

Amazing Brain Carnival **Fall 2017–2023**
'Cadaver brain' exhibit leader *STL, MO*

- Lead members of public (all ages) through hands-on tours of gross human neuroanatomy.

Peer-Mentor Program **Fall 2013**
Mentor *UW–Madison Psychology*

- Assisted nine freshman in designing curricula, pursuing research opportunities, and exploring interests in psychology and neuroscience through regular individual and group meetings.

TEACHING

Hierarchical Linear Models **Fall 2019**
Teaching Assistant *WUSTL*

- On hierarchical (i.e., mixed-effect, multi-level) modeling; theory and implementation in R

Select Topics in Statistics **Spring 2019**
Teaching Assistant *WUSTL*

- On generalized linear models, resampling (permutation, bootstrap) methods, imputation, G-theory, item-response theory

COMPUTATIONAL AND PROGRAMMING SKILLS

Math and statistics	**advanced** Linear & Hierarchical Models, Modern Multivariate Statistics **intermediate** Linear Algebra, Calculus **introductory** Topology, Dynamical Systems, Recurrent Neural Networks
Languages, development	**advanced** R (base, tidyverse, data.table), **intermediate** Python (NumPy, Scikit-learn, pandas), MATLAB, shell, git, **novice** Julia, C++
Neural data analysis	**tools** AFNI, fMRIprep, Nipy (nipype, nibabel, nilearn), BrainIAK, MNE, **techniques** multivariate analysis of EEG and fMRI (decoding, encoding, RSA), fMRI timeseries models, ERP and EEG time-frequency analysis
Report generation	knitr/Sweave/RMarkdown, Jupyter, LaTeX