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

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