BETTINA BUSTOS | 340 Iowa Ave. Iowa City, IA. 52242
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EDUCATION

2021 – present | Ph.D., in progress: Psychological and Brain Sciences, University of Iowa
Advisor: Jiefeng Jiang, Ph.D.

2018 | B.A., Psychology & Health and Society, Minor in Philosophy, University of Texas at Austin
Advisor: Jarrod Lewis-Peacock, Ph.D.
The Interaction of Depression and Cognitive Control on Prospective Memory

RESEARCH EMPLOYMENT

2019 – 2021 | Lab Manager, Washington University in St. Louis
Control and Decision-Making Lab, PI: Wouter Kool, Ph.D.

2018 – 2019 | Research Assistant, University of Pittsburgh & Carnegie Mellon
Adult Health, Aging and Behavior longitudinal study
PIs: Stephen Manuck, Ph.D., Anna Marsland, Ph.D. & Peter Gianaros, Ph.D.

Research Assistant, University of Texas at Austin
2016 – 2018 | Lewis-Peacock Lab, PI: Jarrod Lewis-Peacock, Ph.D.
2015 – 2016 | Categorization and Decision-Making Lab, PI: W. Todd Maddox, Ph.D.

AWARDS

Dec. 2025 | Neuroscience Scholars Program (Society for Neuroscience)
Sept. 2025 | Ballard and Seashore Dissertation Fellowship
May 2024 | J. Richard Simon Award - Recognizes graduate student excellence early in graduate training
Nov. 2022 | Mental Effort Workshop at Brown University - Travel award
April 2022 | CNS (Cognitive Neuroscience Society) Graduate student award
March 2018 | COSYNE (Computational & Systems Neuroscience Conference) Undergrad travel award

PUBLICATIONS

Bustos, B., Jiang, J. & Kool, W. Reward masks the learning of cognitive control demand. *Cogn Neurodyn* **19**, 114 (2025). https://doi.org/10.1007/s11571-025-10307-0

Bustos, B., Mordkoff, J.T., Hazeltine, E., Jiang, J., (2024) Task switch costs scale with dissimilarity between task rules. *Journal of Experimental Psychology: General.* https://doi.org/10.1037/xge0001598

Bustos, B.*, Colvett, J. S.*, Bugg, J. M., & Kool, W. (2024). Humans do not avoid reactively implementing cognitive control. *Journal of Experimental Psychology: Human Perception and Performance, 50*(6), 587–604. https://doi.org/10.1037/xhp0001207

In prep.

Bustos, B.,* Dolgin, J.,* Wilson, R.C., and Kool, W. (2026) Directed exploration involves deciding not just whether, but also, when to explore. *In prep* (draft available upon request; Preregistered on OSF: https://osf.io/fq5z2, code and data to be published).

CODE

Bustos, B., Zalabak, T., Kool, W. (2020) Four sequential decision-making tasks to distinguish between multiple reinforcement-learning systems (OSF: https://osf.io/g2suz/)

PRESENTATIONS

Bustos, B., Hazeltine, E., Jiang, J. (2026) EEG Decoding of Goal Representations During Multistep Actions. Poster to be presented by B.B. at the Cognitive Neuroscience Society.
Bustos, B., Jiang, J. (2025) Hippocampo-cortical contributions to the structured organization of tasks. Poster presented by B.B. at the Society for Neuroscience.

Bustos, B., Mordkoff, J.T., Hazeltine, E., Jiang, J. (2024) Temporal Dynamics of Parametric Task Switching. Poster presented by B.B. at the Cognitive Neuroscience Society.

Bustos, B., Mordkoff, J.T., Hazeltine, E., Jiang, J. (2023) Multimodal Evidence for the Reorganization of Task Rules. Poster presented by B.B. at the Society for Neuroscience.

Bustos, B., Jiang, J., and Kool, W. (2022) Reward masks the learning of cognitive control demand. Talk delivered by B.B at the University of Iowa Annual Departmental Data Blitz & at the UIowa Cognitive Control Collaborative.

Bustos, B., Mordkoff, J.T., Hazeltine, E., Jiang, J. (2022) Task switch costs scale with dissimilarity between task-rules in a cognitive map-like manner. Talk delivered by B.B. at the 3rd Annual Meeting of the Virtual Working Memory Conference. Blitz talk given at the Mental Effort Workshop at Brown University. Talk delivered by B.B at the University of Iowa Annual Departmental Data Blitz and talk given at the UIowa Cognitive Control Collaborative. Poster presented by B.B. at the 29th Annual Meeting of the Cognitive Neuroscience Society.

CONFERENCE REVIEWS

2023: Cognitive Computational Neuroscience Conference Reviewer.

TEACHING

Probabilistic Machine Learning
Research Methods I

MENTORING

Arsha Vaddadi, Caleb Greene, Jackson Han, William Cheng

PROGRAMS, LANGUAGES & SKILLS

Programming: Python, JavaScript/HTML/CSS

Analysis: FSL, SPM, R, SPSS, JASP

Qualifications: MRI, EEG, e-Mini International Neuropsychiatric Interview, Low-Level Light Therapy Technique, Heart Rate Variability (HRV), administration of Neuropsychiatric battery, fluent in verbal and written Spanish.

LEADERSHIP & VOLUNTEER POSITIONS

2023 - present Co-founded Girls Who Code segment in collaboration with the Iowa City Public Library occurring weekly during Fall and Spring.

2022 Vice president of Bridging the Gap in Psyience initiative aiming to improve retention and well-being of underrepresented graduate students at the University of Iowa.

2019 Assisted in creating and updating large database of BIPOC owned businesses in St. Louis area as a part of March for Reparations.

2017 Volunteer for the Texas Tribune covering politics and a range of policy issues that affect all Texans.

2016 Dell Medical School Health Sciences Summer Camp (Austin, TX) - Taught neuroscience lesson plans for middle and high school students.

SUPPLEMENTAL

Detailed Research Summary:

EEG Decoding of Goal Representations During Multistep Actions:

Aim: Action selection is guided not only by the immediate outcomes of actions but also by their contribution toward overarching goals. Traditional one-step tasks conflate goals with expected outcomes, making it difficult to dissociate these processes. Currently collecting and analyzing data.

- Developed and coded a novel multi-step construction task in which participants sequentially selected between line segments to build target shapes. This design allowed us to examine how people maintain goal representations while tracking intermediate outcomes. Behaviorally, participants (N = 27) selected actions that advanced the construction toward the intended goal, showing sensitivity to both goal progress and the current state of the shape options.
- Neurally, line decoder in a separate oddball task can reliably distinguish between individual line segments at above-chance accuracy. This decoder will be used to test whether representations of specific lines—and by extension, evolving goal states—can be tracked during multi-step construction behavior.
- Computationally, I am currently working on implementing a linear state-space model (lSSM), following the approach of Ritz et al. (2023), to characterize low-dimensional neural trajectories underlying task control.
    - *Motivation*: Uncover how inferred EEG task trajectories differs across stimulus switches, response switches, and goal switches, testing whether goal maintenance corresponds to stable latent subspaces while action-related updates drive state transitions.

Neurocognitive evidence of structured organization of task knowledge:

Aim: Examine the interplay between the organization of task knowledge and task switching to advance our understanding of how costs for control drive adaptive, flexible behavior in the brain.

- Designed, coded, acquired, and analyzed data for a series of five well-powered experiments that leverage behavioral switch costs in a novel experimental design that **extends beyond binary switch-repeat.** *Motivation*: to examine multiple levels of task switching to test the hypothesis that the task knowledge is coded into a relational cognitive map-like structure that reflects the conceptual difference between tasks (**Bustos et al.,** 2024. https://doi.org/10.1037/xge0001598).
- Leveraged 7T fMRI to examine whether and how such map-like structures are represented neurally. Performed preprocessing, univariate and multivariate analyses to uncover regions that track the similarity between tasks. RSA results uncovered regions (eg., mPFC, pCC & dACC) that displayed a **negative relationship between pattern similarity and task similarity** such that the larger the difference between tasks the smaller the neural similarity.

Probing interplay between effort, control, and decision making:

Aim: Assess how costs for control influence choice behavior, updating of control policies and information sampling across three studies.

Study 1: **Bustos et al.,** 2024. https://doi.org/10.1037/xhp0001207

- Motivation: Determine whether reactive control registers as costly. Conclusion: When given the choice in a demand selection task (DST), participants did not prefer choice options that yielded items that triggered less attentional focus

Study 2: **Bustos et al.,** 2025. https://doi.org/10.1007/s11571-025-10307-0

- Motivation: Examine whether reward facilitates the updating of reactive control policies. Conclusion: Participants who received reward actually held on to outdated control policies for longer. Our computational results support our behavioral findings and demonstrate that reward prediction errors

interfere with congruency prediction errors leading participants to hold on to outdated control policies.

Study 3: **Bustos et al.,** 2026 *In prep* (Preregistered: https://osf.io/fq5z2)

- Investigate how individuals build models of the effort costs associated with environments and whether the use of such models predicts how conducive individuals are to exploring or exploiting given environments. Conclusion: Behavioral and model-based results demonstrate that individuals implement adaptive planning mechanisms to explore at opportunistic moments in which effort costs are at a minimum.

Examining brain aging via psychological, biological, and behavioral factors.

University of Pittsburgh & Carnegie Mellon

- Recruit, enroll, schedule, and retain study subjects for second round of longitudinal study.
- Conducted extensive neuropsychological batteries as well as psychiatric and emotional health assessments.
- Served as the primary liaison between our collaborators in the Biomedical Engineering and Psychiatry departments providing data quality updates on 7T MRI data and ensuring consistency of data collection. Developed preprocessing pipeline for 7T MRI data.
- Collaborated with engineering department to automate segmentation of hippocampal subfields with 7T MRI data.
- Conducted project with Carnegie Mellon to examine the brain systems underlying reappraisal under emotion regulation employing simultaneous collection of in-scanner ECG and pulse oximeter metrics.