

## Neal W Morton, Ph.D.

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Research Fellow  
Center for Learning and Memory  
The University of Texas at Austin

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## Academic Appointments

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Research Fellow The University of Texas at Austin Center for Learning and Memory PI: Dr. Alison R. Preston	2020–present
Postdoctoral Fellow The University of Texas at Austin Center for Learning and Memory PI: Dr. Alison R. Preston	2014–2020
Ph.D. in Psychology – Cognition and Cognitive Neuroscience Vanderbilt University Advisor: Dr. Sean M. Polyn Committee: Dr. Gordon Logan, Dr. Geoff Woodman, Dr. Brandon Ally	2009–2014
Research Coordinator University of Pennsylvania Director: Dr. Michael J. Kahana	2007–2009
B.A. in Cognitive Science, minor in Chemistry University of Pennsylvania Advisor: Dr. Michael J. Kahana Cum laude with honors	2003–2007

## Fellowships, Awards, and Honors

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Postdoctoral National Research Service Award, NIMH	2017–2020
Center for Learning & Memory Postdoctoral Fellowship	2016
Center for Learning & Memory Travel Award	2015–2016
Context and Episodic Memory Symposium Student Travel Award	2013–2014
William F. Hodges Teaching Assistant Award	2011–2012
University Graduate Honor Fellowship, Vanderbilt University	2009–2014
Bachelor of Arts with Distinction, University of Pennsylvania	2007
Dean's List, University of Pennsylvania	2006–2007
Robert C. Byrd Honors Scholarship	2003–2007
Institutional Development and Undergraduate Education Service	

## Current Projects

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\* Authors contributed equally

Molitor RJ\*, **Morton NW\***, Schlichting ML, Mack ML, McKenzie S, Preston AR. In prep. Human hippocampus and medial prefrontal cortex represent hierarchical task schemas.

Pudhiyidath A\*, **Morton NW\***, Schapiro AC, Mommenejad I, Viveros R, Hinojosa-Rowland D, Molitor RJ, & Preston AR. In prep. How do neural representations of temporal statistics inform reasoning behaviors?

## Publications

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† Undergraduate advisee

\* Authors contributed equally

**Morton NW**, Zippi EL†, Preston AR. In revision. Memory reactivation and suppression modulate integration of the semantic features of related memories in hippocampus.

**Morton NW**, Polyn SM. In revision. A neurocognitive theory of episodic and semantic interactions during memory search.

**Morton NW\***, Zippi EL†\*, Noh SM, Preston AR. In press. Semantic knowledge of famous people and places is represented in hippocampus and distinct cortical networks. *Journal of Neuroscience*.

Varga NL, **Morton NW**, Preston AR. In press. Schema, Inference, and Memory. In: Kahana MJ, Wagner AD, editors. *Oxford Handbook of Human Memory*. Oxford University Press.

Molitor RJ, Sherrill KR, **Morton NW**, Miller, AA, Preston AR. 2021. Memory reactivation during learning simultaneously promotes dentate gyrus/CA<sub>2,3</sub> pattern differentiation and CA<sub>1</sub> memory integration. *Journal of Neuroscience*. 41(4) 726-738.

**Morton NW**, Preston AR. 2021. Concept formation as a computational cognitive process. *Current Opinion in Behavioral Sciences*. 38: 83-89.

**Morton NW**, Schlichting ML, Preston AR. 2020. Events with common structure become organized within a hierarchical cognitive map in hippocampus and frontoparietal cortex. *Proceedings of the National Academy of Sciences*. 117(47): 29338-29345.

**Morton NW**. 2020. Psifr: Analysis and visualization of free recall data. *Journal of Open Source Software*, 5(54):2669.

- Morton NW\***, Sherrill KR\*, Preston AR. 2017. Memory integration constructs maps of space, time, and concepts. *Current Opinion in Behavioral Sciences*. 17:161-168.
- Chan SCY, Applegate MC, **Morton NW**, Polyn SM, Norman KA. 2017. Lingering representations of stimuli influence recall organization. *Neuropsychologia*. 97:72-82.
- Morton NW**, Polyn SM. 2017. Beta-band activity represents the recent past during episodic encoding. *NeuroImage*. 147:692-702.
- Morton NW**, Polyn SM. 2016. A predictive framework for evaluating models of semantic organization in free recall. *Journal of Memory and Language*. 86:119–140.
- Polyn SM, McCluey JD, **Morton NW**, Woolard AA, Luksik AS, Heckers S. 2015. Temporal context and the organizational impairment of memory search in schizophrenia. *Cognitive Neuropsychiatry*. 20(4):296-310.
- Kragel JE, **Morton NW**, Polyn SM. 2015. Neural activity in the medial temporal lobe reveals the fidelity of mental time travel. *Journal of Neuroscience*. 35(7):2914-2926.
- Morton NW**. Developing a neurocognitive model of temporal and semantic organization of memory search. 2014. Vanderbilt University, PhD dissertation.
- Morton NW**, Kahana MJ, Rosenberg EA, Baltuch GH, Litt B, Sharan AD, Sperling MR, Polyn SM. 2013. Category-specific neural oscillations predict recall organization during memory search. *Cerebral Cortex*. 23(10):2407-2422.
- Polyn SM, Kragel JE, **Morton NW**, McCluey JD, Cohen ZD. 2012. The neural dynamics of task context in free recall. *Neuropsychologia*. 50(4):447-457.

## Scholarly Presentations

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### *Talks*

- Morton NW**, Schlichting ML, Preston AR. 2020. Representations of common event structure in medial temporal lobe and frontoparietal cortex support efficient inference. Dallas and Austin Area Memory Meeting. Online.
- Morton NW**, Schlichting ML, Preston AR. 2020. Representations of common event structure in medial temporal lobe and frontoparietal cortex support efficient inference. Context and Episodic Memory Symposium. Online.
- Morton NW**. 2019. Cognitive control of memory search. Context and Episodic Memory Symposium. Philadelphia, PA.

**Morton NW**, Schlichting ML, Preston AR. 2018. Events with common structure become organized within a hierarchical cognitive map in hippocampus and frontoparietal cortex. Program No. 633.14. 2018 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2018. Online.

**Morton NW**, Zippi EL, Preston AR. 2018. Tracking semantic item features during encoding reveals mechanisms for assimilating memories into existing schemas. Context and Episodic Memory Symposium. Philadelphia, PA.

**Morton NW**, Zippi EL, Preston AR. 2018. Merging memories: Reactivation of individual event elements during learning predicts memory integration. Department of Psychology, Texas A&M University. College Station, TX.

**Morton NW**, Zippi EL, Preston AR. 2018. Tracking semantic item features during memory integration. Cognitive Neuroscience and Imaging Research Center Seminar, The University of Texas at Austin. Austin, TX.

**Morton NW**, Preston AR. 2017. Reactivation of individual episodes supports memory integration. Dallas and Austin Area Memory Meeting. Austin, TX.

**Morton NW**, Preston AR. 2017. Medial prefrontal cortex supports flexible memory retrieval. Context and Episodic Memory Symposium. Philadelphia, PA.

**Morton NW**, Schlichting ML, Preston AR. 2016. A neurocognitive model of memory integration. Context and Episodic Memory Symposium. Philadelphia, PA.

**Morton NW**, Preston AR. 2016. Medial prefrontal cortex supports flexible memory retrieval. Center for Learning and Memory Seminar, The University of Texas at Austin. Austin, TX.

**Morton NW**, Schlichting ML, Preston AR. 2015. Developing a neurocognitive model of memory integration. Center for Learning and Memory Annual Retreat, The University of Texas at Austin. Austin, TX.

**Morton NW**, Polyn SM. 2015. A neurally constrained model of temporal and semantic context. Winter Conference on the Neurobiology of Learning and Memory. Park City, UT.

**Morton NW**, EEG Analysis Toolbox. 2011. University of Pennsylvania Computational Memory Lab. Philadelphia, PA.

### *Poster Presentations*

- Morton NW**, Zippi EL, Noh SM, Preston AR. 2021. Semantic knowledge of famous people and places is represented in hippocampus and distinct cortical networks. Program No. P320.08. SfN Global Connectome.
- Morton NW**, Molitor RJ, Schlichting ML, Mack, ML, McKenzie SA, Preston, AR. 2019. Human hippocampus and medial prefrontal cortex represent hierarchical task schemas. Program No. 170.07. 2019 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience.
- Morton NW**, Schlichting ML, Preston AR. 2019. Events with common structure become organized within a hierarchical cognitive map in hippocampus and frontoparietal cortex. Context and Episodic Memory Symposium. Philadelphia, PA.
- Morton NW**, Schlichting ML, Preston AR. 2019. Events with common structure become organized within a hierarchical cognitive map in hippocampus and frontoparietal cortex. UT Austin Conference on Learning & Memory. Austin, TX.
- Morton NW**, Preston AR. 2017. Memory reactivation modulates encoding and retrieval of relational memories. Program No. 339.15. 2017 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience.
- Morton NW**, Preston AR. 2017. Medial prefrontal cortex supports flexible memory retrieval. UT Austin Conference on Learning & Memory. Austin, TX.
- Morton NW**, Preston AR. 2016. Medial prefrontal cortex supports retrieval of integrated memories. Program No. 637.24. 2016 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience.
- Zippi EL, **Morton NW**, Mack ML, Preston AR. 2016. Mapping cortical representations of semantic similarity using Wikipedia and Google News. Program No. 644.22. 2016 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience.
- Morton NW**, Preston AR. 2015. Developing a neurocognitive model of memory integration. Program No. 719.23. 2015 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience.
- Morton NW**, Polyn SM. 2015. A predictive framework for evaluating models of semantic organization in free recall. Context and Episodic Memory Symposium. Philadelphia, PA.
- Morton NW**, Polyn SM. 2015. A predictive framework for evaluating models of semantic organization in free recall. UT Austin Conference on Learning & Memory. Austin, TX.

**Morton NW**, Polyn SM. 2014. Neural correlates of temporal context evolution in free recall. Annual Meeting of the Psychonomic Society. Long Beach, CA.

Polyn SM, Kragel JE, **Morton NW**. 2014. Medial temporal lobe activity reflecting the precision of mental time travel. Annual Meeting of the Psychonomic Society. Long Beach, CA.

**Morton NW**, Polyn SM. 2014. Oscillatory neural correlates of semantic organization in free recall. Context and Episodic Memory Symposium. Philadelphia, PA.

**Morton NW**, Polyn SM. 2013. Inter-item distraction dissociates temporal and semantic organization in free recall. Program No. 572.03. 2013 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience.

Polyn SM, **Morton NW**, Kragel JE, McCluey JD. 2013. Incorporating neural signals into computational models of memory search. Program No. 572.01. 2013 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience.

Chan SCY, Applegate MC, Manning JR, **Morton NW**, Polyn SM, Norman KA. 2013. Recall order is predicted by category-specific neural activity of preceding items at study. Program No. 284.15. 2013 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience.

**Morton NW**, Polyn SM. 2013. A neurally constrained model of category clustering in free recall. Context and Episodic Memory Symposium. Philadelphia, PA.

**Morton NW**, Polyn SM. 2012. A neurally constrained model of category clustering in free recall. 53rd Annual Meeting of the Psychonomic Society. Minneapolis, MN.

**Morton NW**, Polyn SM. 2012. Manipulating the forward asymmetry of the contiguity effect with categorized stimuli. Context and Episodic Memory Symposium. Bloomington, IN.

**Morton NW**, Polyn SM. 2011. Category-sensitive neural oscillations predict recall organization during memory search. 52nd Annual Meeting of the Psychonomic Society. Seattle, WA.

**Morton NW**, Polyn SM. 2011. Oscillatory neural correlates of category cuing during memory search. Context and Episodic Memory Symposium. Philadelphia, PA.

Kragel JE, **Morton NW**, Cohen ZD, McCluey JD, Polyn SM. 2011. Neural correlates of organization in free recall. Context and Episodic Memory Symposium. Philadelphia, PA.

- Morton NW**, Polyn SM. 2010. Illuminating the dynamics of memory search: Tracking category-related oscillations during free recall. Program No. 396.6. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience.
- Cohen ZD, **Morton NW**, Polyn SM. 2010. Using the context maintenance and retrieval model to interpret task-related neural activity in free recall. Program No. 396.7. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience.
- Polyn SM, **Morton NW**, Kahana MJ. 2010. Using intracranial oscillatory patterns to bridge cognitive and neural theories of memory search. Program No. 413.23. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience.
- Morton NW**, Polyn SM. 2010. Illuminating the dynamics of memory search: Tracking category-related oscillations during free recall. Context and Episodic Memory Symposium. Philadelphia, PA.
- Polyn SM, **Morton NW**, Kahana MJ. 2009. Unraveling subsequent memory: Tracking category-specific and category-general neural patterns using scalp EEG. Program No. 279.4. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience.
- Polyn SM, **Morton NW**, Kahana MJ. 2008. Bridging cognitive and neural theories of memory search with the Context Maintenance and Retrieval model. Program No. 870.21. 2008 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience.
- Morton NW**, Burke JF, Hollidge BS, Polyn SM, Kahana MJ. 2008. Recency and contiguity in a temporal-context model of paired-associate learning. Poster presented at the 41<sup>st</sup> Annual Meeting of the Society for Mathematical Psychology. Washington, DC.
- Morton NW**, Polyn SM, Kahana MJ. 2007. Tracking encoding task context during free recall using scalp EEG. Program No. 526.1. 2007 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience.
- Polyn SM, Koshkin VS, **Morton NW**, Kahana MJ. 2007. Tracking category-related neural patterns during free recall using scalp EEG. Program No. 526.2. 2007 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience.
- Polyn SM, **Morton NW**, Kogen DK, Norman KA, Kahana MJ. 2007 Task context and memory accessibility in free recall. Cognitive Neuroscience Society Annual Meeting. New York, NY.
- Polyn SM, **Morton NW**, Kogen, DK, Norman KA, Kahana MJ. 2006. Task effects on memory accessibility in free recall. Poster presented at the 47<sup>th</sup> Annual Meeting of the Psychonomic Society. Houston, TX.

## Research Software

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- WikiVector, Creator 2021  
Improved quantification of conceptual similarity based on general knowledge from Wikipedia.  
<https://doi.org/10.5281/zenodo.4453878>
- Psifr, Creator 2020  
Python package for analysis and visualization of free recall data.  
<https://psifr.readthedocs.io>
- CyMR, Creator 2020  
Python package for simulating free-recall data using the context maintenance and retrieval (CMR) model.  
<https://cymr.readthedocs.io>
- PsiReact, Creator 2020  
Python project for modeling response time data using the Linear Ballistic Accumulator model with hierarchical Bayesian methods.  
<https://doi.org/10.5281/zenodo.4282757>
- NiReact, Creator 2020  
Python project for measuring representational geometry of fMRI activation patterns and its effect on subsequent response times during memory retrieval.  
<https://osf.io/6eqbf/>
- Wiki2vec, Co-creator 2019  
Python project for quantifying conceptual similarity between pairs of people, places, or things based on general knowledge from Wikipedia.  
<https://osf.io/72apm/>
- Mindstorm, Creator 2019  
Python package for partial representational similarity analysis of fMRI data.  
<https://doi.org/10.5281/zenodo.4248135>
- TCM, Co-creator 2018  
MATLAB and c++ software package for efficiently running simulations of free recall and parameter fitting with the Temporal Context Model.  
<https://github.com/prestonlab/tcm>
- Episodic Memory Behavioral Analysis in MATLAB (EMBAM), Developer 2008  
MATLAB-based software package for analysis of recall performance and organization in free recall paradigms.  
<https://github.com/seanpolyn/EMBAM>

Aperture, Creator 2007  
 MATLAB-based software package for univariate and multivariate analysis of EEG data; supports ERP analysis, oscillatory power analysis, distributed computing, plotting and report generation.  
<https://mortonne.github.io/aperture>

## Grants

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National Institute of Mental Health (NIMH) 2017–2020  
 Postdoctoral National Research Service Award  
 A neurocognitive framework for understanding how experience shapes object representations (1F32MH114869-01)

University Cooperative Society, The University of Texas at Austin 2015  
 Undergraduate Research Fellowship  
 Awarded to Ellen Zippi (Undergraduate student)

Vanderbilt University 2009–2014  
 University Graduate Honor Fellowship – \$10,000 additional yearly stipend

## Teaching

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### **The University of Texas at Austin, Psychology Department**

Guest Lecturer, Cognitive Neuroscience (Prof. Alison Preston) 2015, 2017–2018  
 Guest Lecturer, Cognitive Psychology (Dr. Suzanne van der Feest) 2018

### **The University of Texas at Austin, Department of Statistics and Data Sciences**

Instructor, Code Development in Python 2020  
 Instructor, Introduction to Matlab and Intermediate Matlab 2016–2020  
 Instructor, Matlab (Summer Statistics Institute) 2016

### **Vanderbilt University, Department of Psychology**

Expert Teaching Assistant Panelist and Practice Teaching Leader 2013  
 Teaching Assistant and Guest Lecturer, Human Memory (Prof. Sean Polyn) 2012  
 Teaching Assistant, Introduction to Psychology (Prof. Isabel Gauthier) 2011  
 Teaching Assistant and Guest Lecturer, Cognitive Psychology (Prof. Gordon Logan) 2011  
 Teaching Assistant, Principles of Experimental Design (Prof. Sean Polyn) 2010

## Academic Advising

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### **Graduate Researchers (University of Texas at Austin)**

Athula Pudhiyidath	2019–2020
Sharon Noh	2020
Eliya Ben-Asher	2020
Anthony Dutcher	2020
Ayesha Nadiadwala	2020

### **Undergraduate Researchers (University of Texas at Austin)**

Meghana Potturu	2019–present
Rodrigo Viveros	2019–present
Demetrius Rowland	2019–2020
Ellen L. Zippi (Dean’s Scholars Honors Program)	2015–2017
Dean’s Honored Graduate	
Ph.D. student, University of California at Berkeley	
NSF GRFP fellow (2017–2019)	

## **Service**

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### *Professional Memberships*

Society for Neuroscience	2007–present
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### *Journal Reviewer*

†Assisted with review

Cerebral Cortex†

Current Biology†

Current Opinion in Behavioral Sciences†

eLife†

Journal of Cognitive Neuroscience†

Journal of Experimental Psychology: Human Perception and Performance

Journal of Experimental Psychology: Learning, Memory, and Cognition

Journal of Mathematical Psychology

Journal of Memory and Language

Nature†

Nature Communications

Nature Human Behavior

NeuroImage

Neuron†

Neuropsychologia†

Neuroscience Letters†

Proceedings of the National Academy of Sciences†

Psychological Review

Psychonomic Bulletin & Review

Quarterly Journal of Experimental Psychology†

Science Advances†

List of confirmed reviews: <https://publons.com/author/1557900/neal-morton>

*Conference Reviewer*

Annual Meeting of the Cognitive Science Society

*Public Outreach*

Expert Panel, UT Brainstorms	2018, 2020
Experiment Demonstration, Memory Matters Public Lecture Series	2016
Presentation, UT Children's Research Center Outreach	2015