

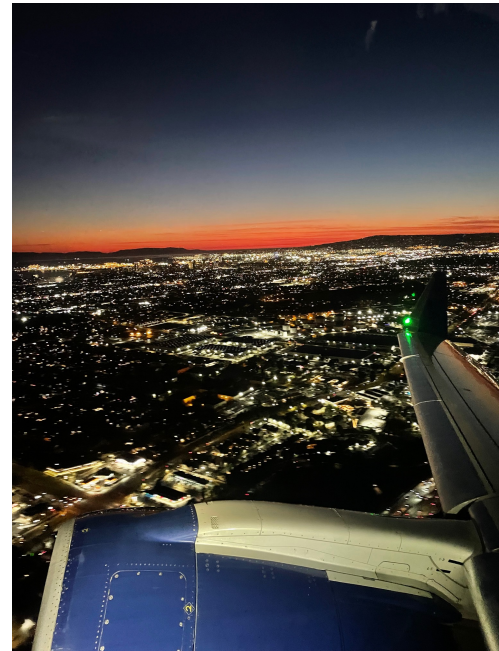
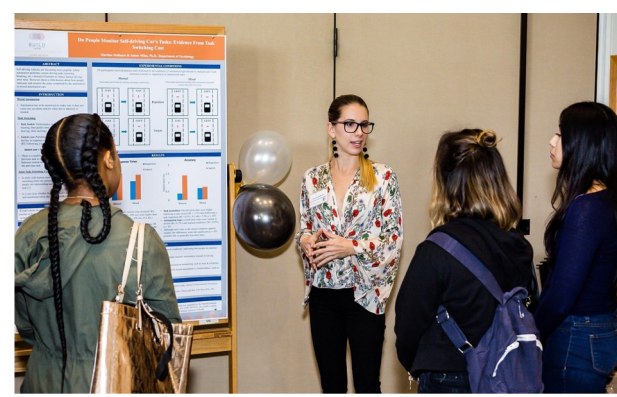


# My Journey in Psychology and Neuroscience

Martina Krisztina Hollearn  
4/11/2023

Cognition and Neural Sciences  
Department of Psychology  
University of Utah

*Good luck*





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# My journey through science



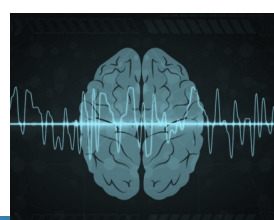
**YALE**



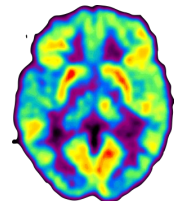
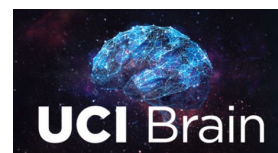
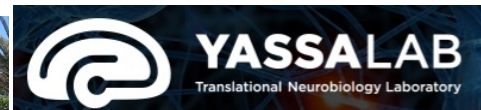
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**NO THANKS**

**APPROVED**



CALIFORNIA REPUBLIC

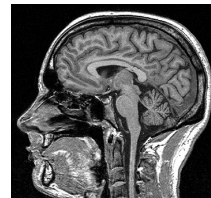


Budapest

**REJECTED**



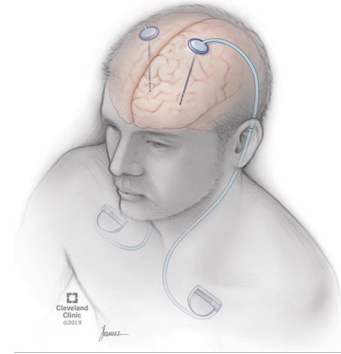
UCIRVINE



The **90+** Study

# How neuroscience changes lives

Parkinson's Disease patient's life normalized with a neurostimulator.



Can also help patients with severe cases of depression, OCD, and PTSD.

# What is neuroscience?

Study of the brain

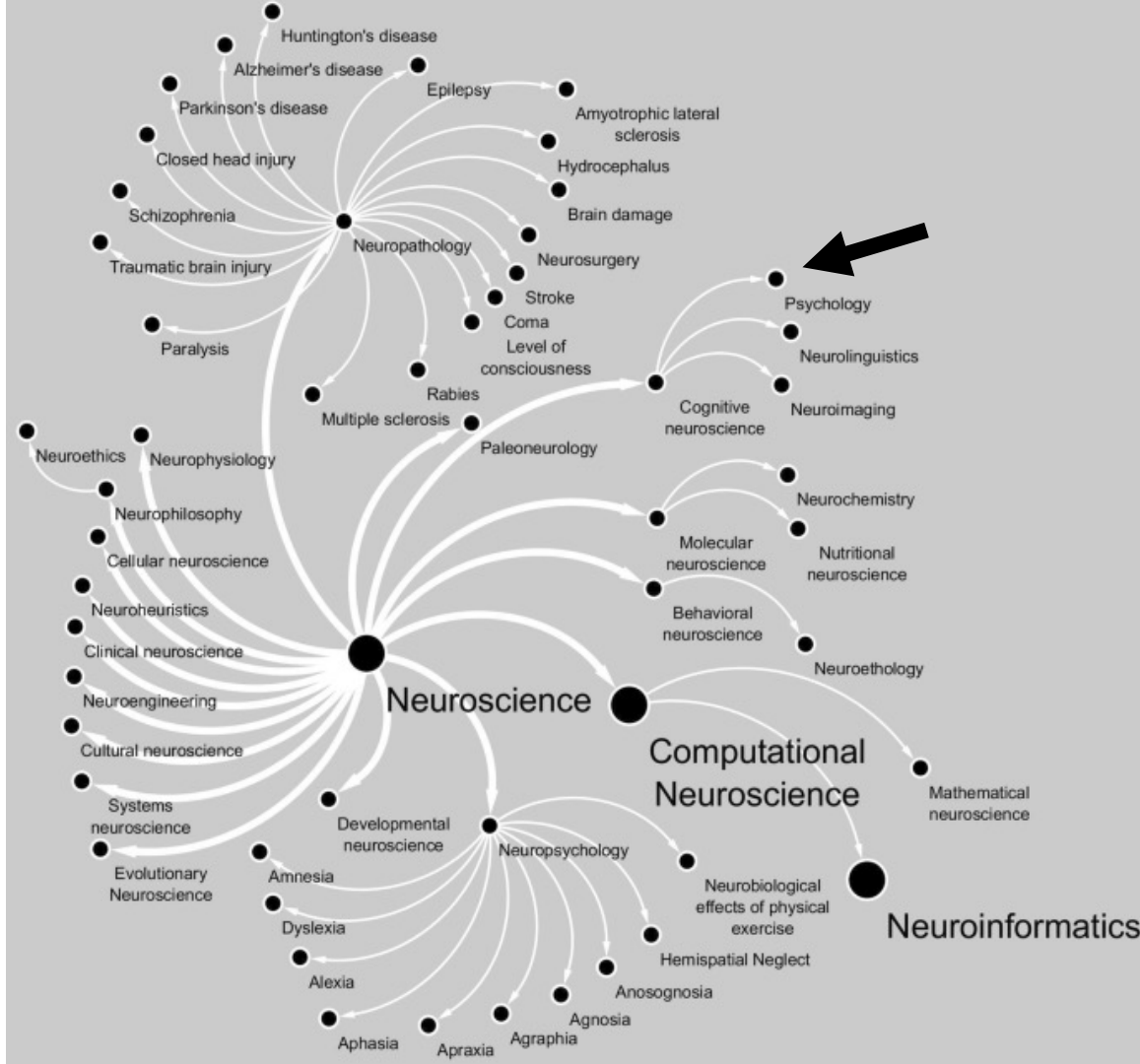
OK, but how?

How to get from Psychology to Neuroscience?

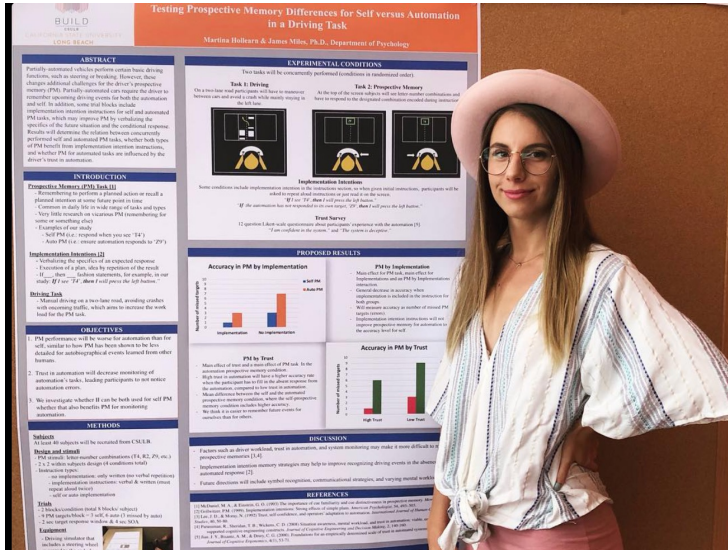
- Bio/chem degree helps
- Math and stats help
- Programming helps
- Experience with patients

What if you don't have any of this?

- Get research experience!



# My first works



1227

## Do People Mentally Represent Automated Tasks? Evidence from Task-Switching Costs Following Takeovers

Martina K. Hoffmann & James D. Miles  
Department of Psychology  
California State University, Long Beach, CA, USA

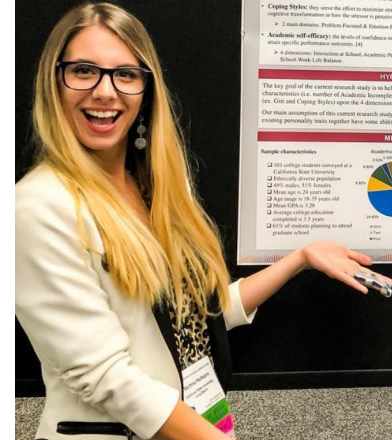
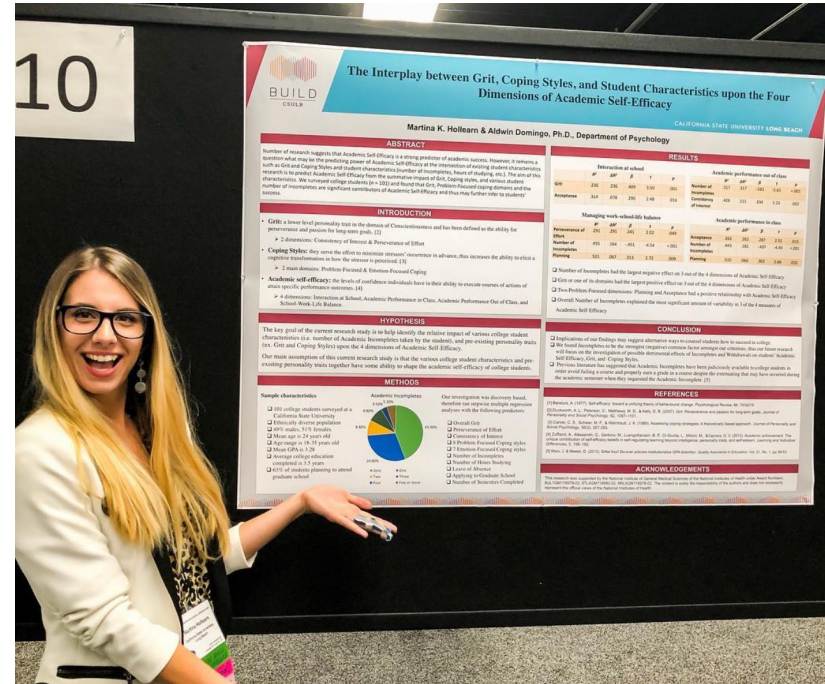
Partially automated vehicles, in which automation performs parts of the driving task, introduce new challenges of automation monitoring and human-automation teaming to the driving experience. We describe a new method for measuring whether operators mentally represent automated task performance using a version of the joint task-switching (JTS) task paradigm. In the JTS task, an operator and a teammate take turns performing two intermixed tasks. Following takeover from the teammate, task-switching costs (slower responses following a task switch) versus repetitions indicate that the operator mentally represents the teammate's performance. We measured performance following task switches and repetitions with and without a takeover from automation. Switch costs disappeared following takeovers, indicating a lack of representation of the prior automated task. We discuss how task switch costs automation situations can serve as indirect measures of whether operators mentally represent automated task performance in mixed automation situations.

### INTRODUCTION

Automated machines such as surgical robots, self-driving vehicles, military drones, and planet explorers fulfill tasks that are designed to make human lives more convenient, efficient,

### performance during takeovers from the automation

(Parasuraman, 2008; Ness, 2016; Muir, 1994; Adams & Bruyn, 2003). The cognitive and affective aspects of trust stem from knowledge about the target of trust and specific



**ABSTRACT**  
Number of research suggests that Academic Self-Efficacy is a strong predictor of academic success. However, if entering a task with a high level of Coping Style and higher Academic Self-Efficacy is a strong predictor of academic success, then the relationship between Academic Self-Efficacy and the outcome of academic performance is moderated by Coping Style. The current study investigated the relationship between Academic Self-Efficacy and the outcome of academic performance in the context of Coping Style, and tested whether the relationship of Coping Style and Academic Self-Efficacy is moderated by student characteristics.

**INTRODUCTION**  
Grit is a trait-level personality trait in the domain of Characteristic and has been defined as the ability to persevere and pursue long-term goals. (1)  
2. Dimension: Consistency of Interest & Perseverance of Effort  
Coping Style: They are the effort to minimize stressor's occurrence to enhance, thus increase the ability to resist or adapt to stressors to have the stressor prevented. (2)  
3. Dimension: Problem Focused & Emotion Focused Coping  
Academic self-efficacy: The level of confidence individuals have in their ability to execute various acts of academic performance activities. (3)  
4. Dimension: Interaction of Class, Academic Performance in Class, Academic Performance Out of Class, and School Work Life Balance

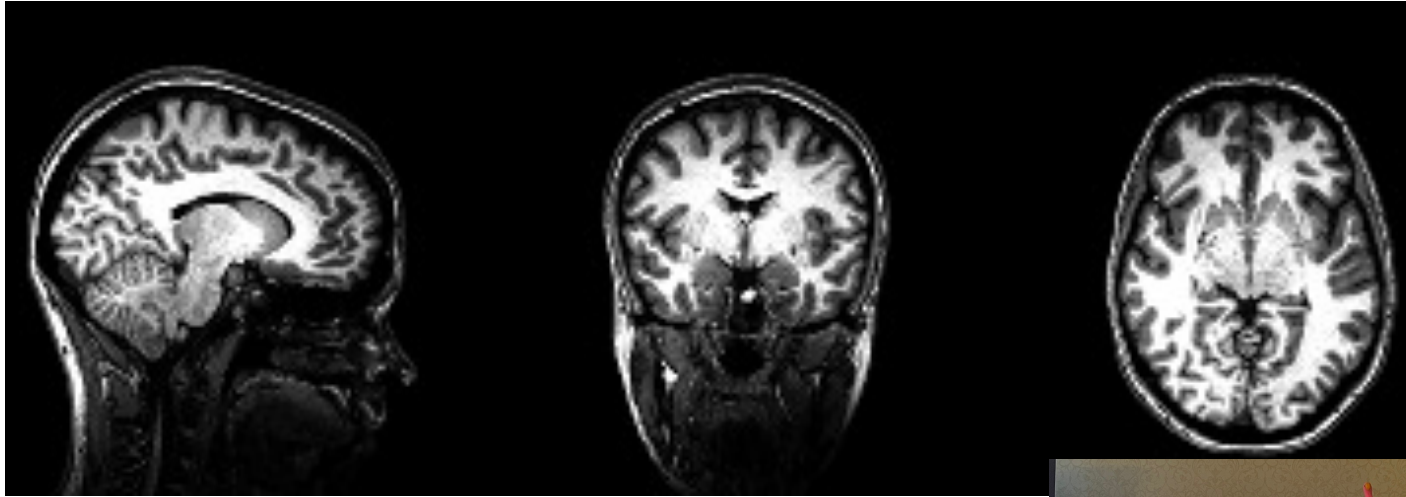
**HYPOTHESIS**  
The first goal of the current research study is to help identify the relative impact of various college student characteristics (i.e., number of Academic Incentives taken by the student, and pre-existing personality traits) will have on the relationship of Coping Style upon the 4 Dimensions of Academic Self-Efficacy.  
Our main assumption of this current research study is that the various college student characteristics and pre-existing personality traits together have some ability to shape the academic self-efficacy of college students.

**RESULTS**  
Interaction of school  
Academic performance out of class  
Interaction of school  
Academic performance in class  
Interaction of school  
Academic performance in class  
Interaction of school  
Academic performance in class

**CONCLUSION**  
The goal of the current research study is to help identify the relative impact of various college student characteristics (i.e., number of Academic Incentives taken by the student, and pre-existing personality traits) will have on the relationship of Coping Style upon the 4 Dimensions of Academic Self-Efficacy.  
Our main assumption of this current research study is that the various college student characteristics and pre-existing personality traits together have some ability to shape the academic self-efficacy of college students.

**REFERENCES**  
Duckworth, A. (2017). Grit: Good for your health. Retrieved from https://www.psychologytoday.com/blog/grit/2017/07/grit-good-for-your-health  
Duckworth, A., Peterson, C., Matthews, M., & Kelly, D. (2002). The psychology of grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, 82(1), 159-165.  
Duckworth, A., Peterson, C., Matthews, M., & Kelly, D. (2007). The psychology of grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, 82(1), 159-165.  
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Duckworth, A., Peterson, C., Matthews, M., & Kelly, D. (2007). The psychology of grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, 82(1), 159-165.

# My work after graduating college

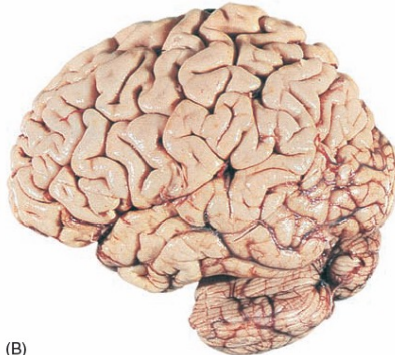


Alzheimer's disease

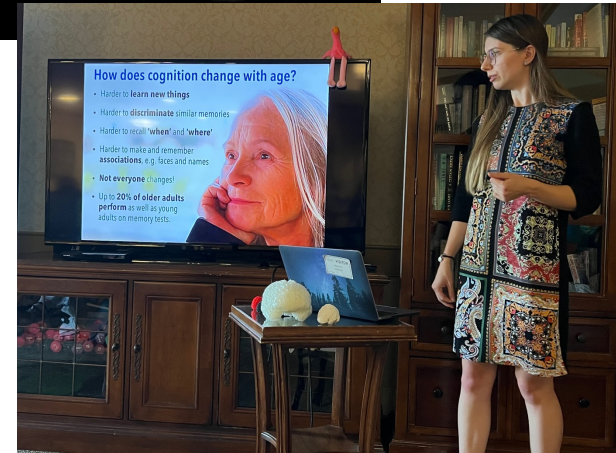


(A)

Normal Brain



(B)

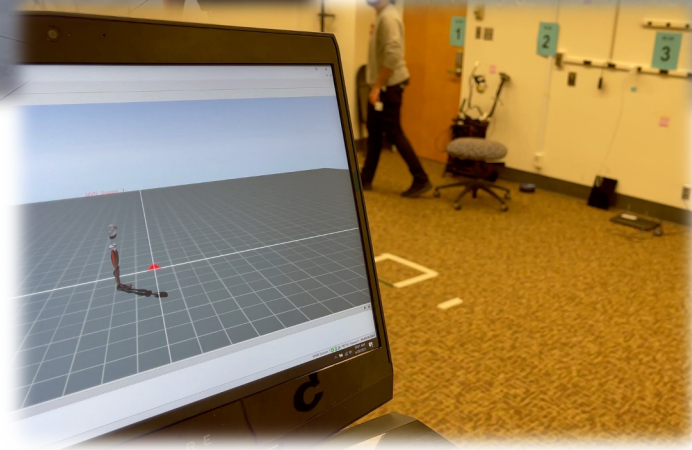
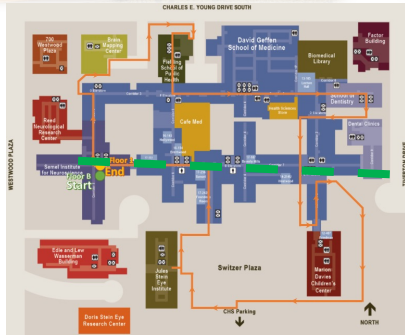




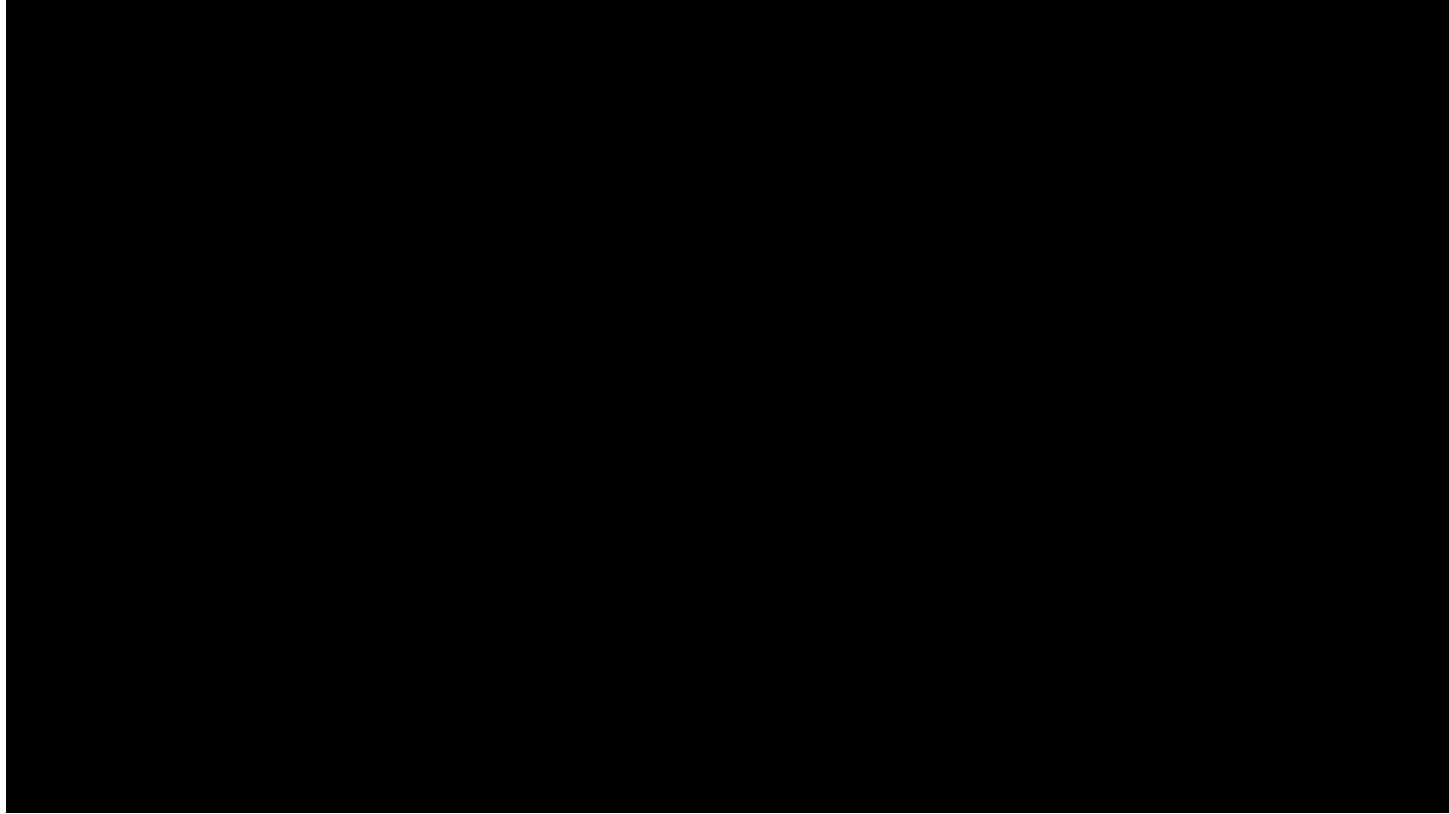
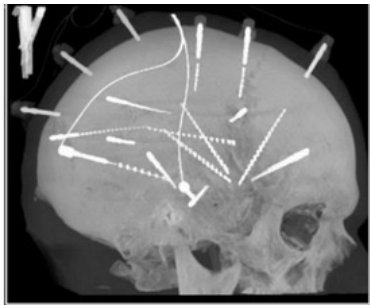
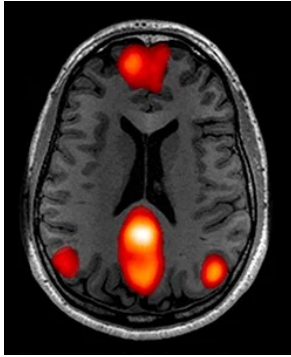
# How do we see and remember our everyday life?



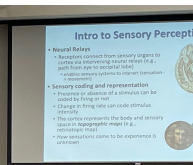
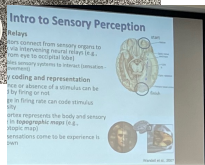
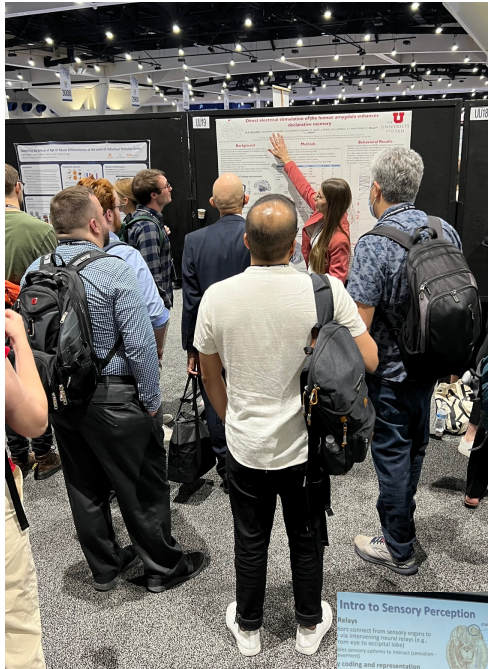
# Studying Memory formation



# Studying Memory enhancement



# My current work



## Exploring stimulation parameters and individual differences in amygdala-mediated memory modulation

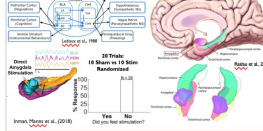
M. K. HOLLEARN<sup>1</sup>, L. BLANPAIN<sup>1</sup>, J. R. MANNS<sup>1</sup>, S. B. HAMANN<sup>1</sup>, K. BIJANKI<sup>1</sup>, R. E. GROSS<sup>1</sup>, D. DRANE<sup>1</sup>, J. M. CAMPBELL<sup>1</sup>, K. L. WAHLSTROM<sup>1</sup>, J. T. WILLIE<sup>1</sup>, C. S. INMAN<sup>1</sup>

<sup>1</sup> Psychiatry, Interdepartmental Program in Neuroscience, University of Utah, Salt Lake City, UT, Neuroscience, Neurosurgery, Emory School of Medicine, Atlanta, GA, <sup>2</sup>Psychology, Emory University, Atlanta, GA, <sup>3</sup>Neurosurgery, Baylor College of Medicine, Houston, Texas, <sup>4</sup>Neuroscience, Washington University School of Medicine and Barnes-Jewish Hospital, Saint Louis, MO



### Background

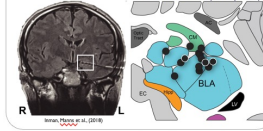
- Deep brain stimulation (DBS) has been successfully at treating drug-resistant neurological conditions like Parkinson's Disease or Major Depressive Disorder<sup>1</sup>
- Human DBS has in the MTL also shown promise for memory modulation, and most prior studies focused on hippocampus, entorhinal cortex, which have shown mixed results in memory enhancement.<sup>2,4-6</sup>
- The amygdala has been mostly ignored in human DBS studies despite its established role in emotional memory modulation.<sup>7,8</sup>
- We have previously demonstrated that brief basolateral amygdala (BLA) electrical stimulation enhances memory in rodents<sup>9,10</sup> and humans without eliciting an emotional response.<sup>11</sup>
- The present study examined various stimulation parameters and individual differences in patients contributing to the memory modulation effects of prior amygdala stimulation.



### Amygdala stimulation will modulate memory retrieval at the one-day delay.

Factors contributing to memory modulation

- |  |   |
|--|---|
| <b>Experimental factors</b>  | <b>Patient factors</b>  |
| <ul style="list-style-type: none"> <li>Stimulation duration</li> <li>Stimulation timing</li> <li>Stimulation location</li> <li>Stimulus intensity</li> <li>Memory encoding</li> <li>Stimulation electrode</li> <li>Stimulation type</li> </ul> | <ul style="list-style-type: none"> <li>Demographics</li> <li>Baseline memory</li> <li>Neuroanatomical features</li> <li>Stimulus response</li> <li>Alzheimer factors</li> </ul> |



### Methods

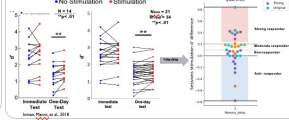
- Participants**
- 31 patients (15 female; MDD<sub>n</sub>=9(41%); FSIQ = 87(17)) with intractable drug-resistant epilepsy in the Emory University Hospital for intracranial monitoring (EEM)
  - Individual contacts implanted in both hemispheres in the basolateral amygdala
  - No epileptiform activity or stimulation awareness was elicited by the stimulation
  - Stimulation did not evoke any subjective emotional arousal to patients
  - Stimulation parameters examined: Duration, Timing relative to stimulus, and Location within the BLA

Experiment	Stimulation condition	Delay	N subjects	N sessions
Original	1 after	3 day	14	14
Duration	1s and 3s after	3 day	5	6
Timing	1s before, during, and after	3 day	12	14
Total			31	34



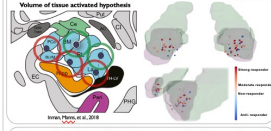
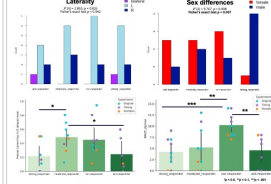
### Results

Building onto our prior work we found an **enhanced memory enhancement at the 1-day delay (but not immediate delay)** for previously stimulated subjects compared to previously not stimulated subjects.



### Results continued

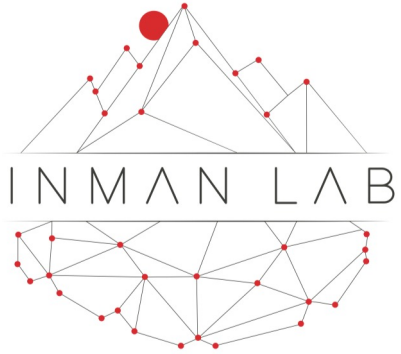
- Strength of positive response to prior amygdala stimulation was influenced by individual differences in sex and baseline memory performance on neuropsychological tests of long-term memory (but not intelligence capacity)
- We found no differences between the various stimulation parameters (duration or timing relative to stimulus)
- We found no differences in stimulation-related memory enhancement based on the hemisphere of the stimulated amygdala.



### Conclusion & Current Directions

- Direct amygdala stimulation causes prioritization of temporally specific, distinctive memories for later retrieval, independent of stimulation response (padding with emotion or attention), and sex differences seems like they may influence the strength of memory prioritization.
- Other stimulation parameters, the timing and duration, we explored do not seem to improve memory more than our original stimulation parameters.
- Baseline memory performance measured by MTL dependent neuropsychological tests (BWA), Big-5 (personality based) of long-term memory seems to differentiate between responders and non-responders.
- Location of stimulation and volume of tissue activated might explain the most variability in our results.
- Our next steps are to examine the neural data.

# Thank you!



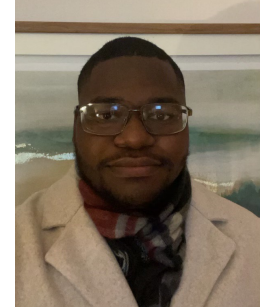
**Cory Inman**  
PI and Mentor



**Krista Wahlstrom**  
Postdoc



**Justin Campbell**  
Predoc, MD/PhD



**Lensky Augustin**  
Predoc, Psychology



**Carson Miller**  
Undergrad RA



**Wyatt Wilson**  
Undergrad RA



**Kiersten Olson**  
Lab Manager



**Griffin Light**  
Undergrad RA

# Ways to study Cognitive Neuroscience

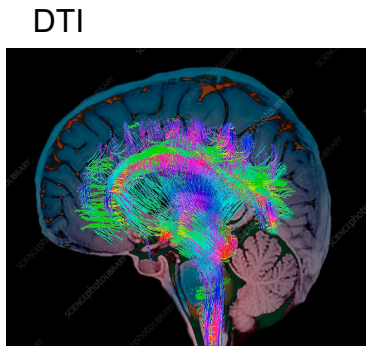
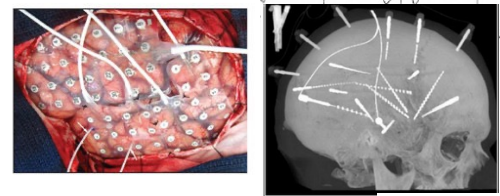
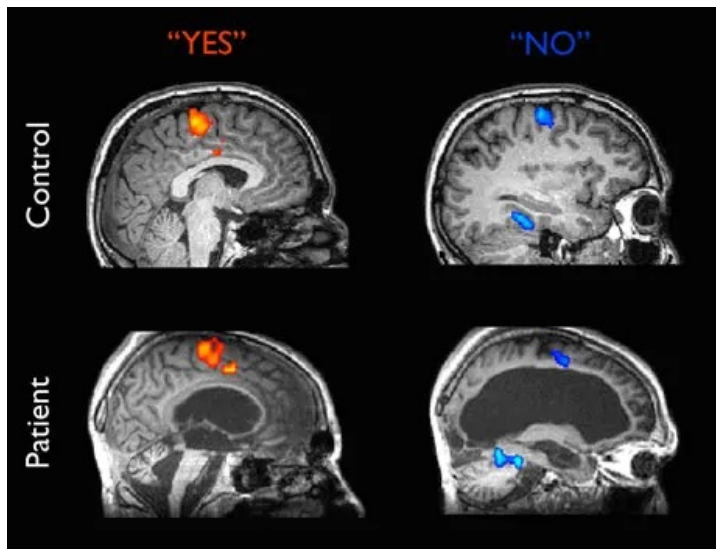
Neurophysiology = visualizing neural responses

Single unit or multi unit

Methods

- EEG
- SEEG
- ECoG
- fMRI
- MRI
- PET
- DTI

fMRI



SEEG

# The power of brain stimulation – face perception



# The power of brain stimulation – smiling/laughing

