# Sophie D. Allen

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## Education

**Florida State University** *Tallahassee, Florida*
BS Psychology and Biomathematics *June 2020 - Present*

## Research Experience

**Independent Study | Department of Mathematics | Florida State University** *Tallahassee, FL*
Advisor: Emmanuel Hartman *Aug. 2023 - Present*

- Participated in the Directed Reading Program in Mathematics and conducted research on the project titled "WVariGrad: A Geometric Deep Learning Approach for Partial Matching of Shape Graphs," under the supervision of Emmanuel Hartman.
- Developed and integrated a partial matching framework into the gradient varifold of a geometric deep learning model using Python.

**Research Assistant | Lemmon Lab | Florida State University** *Tallahassee, FL*
Advisors: Dr. Alan Lemmon and Dr. Emily Lemmon *Oct. 2021 - Present*

- Contributed to the project "Modeling neural circuits to understand incipient speciation in Chorus Frogs."
- Applied advanced optimization techniques, including the Nelder-Mead optimization, within MATLAB to refine a neural amphibian model by incorporating behavioral data on female preference.
- Utilized optimized model parameters to simulate population hybridization and explored the parameter space, inferring evolutionary trajectories and gaining insights into speciation.
- Designed a graphical interface to showcase neuron spiking in the female Chorus Frog's midbrain in response to male calls.

**Research Assistant | Martin Memory Lab | Florida State University** *Tallahassee, FL*
Advisor: Dr. Chris Martin *Jan. 2021 - Present*

- Coordinated the research projects "Differential engagement of dorsal and ventral medial prefrontal cortex in retrieval of semantic and episodic memory" and "Characterizing the durability of experience-dependent representational changes in the Hippocampus."
- Utilized MATLAB to generate word lists used as stimuli and employed E-Prime3 to create fMRI experimental designs.
- Conducted fMRI data collection and programmed a pipeline to perform preprocessing using AFNI, FSL, MATLAB, and CONN.
- Manually segmented the hippocampus and perirhinal cortex in 30 participants and developed Bash scripts to create probabilistic segmentations using FSL.
- Programmed a pipeline using Bash scripting and MATLAB to conduct univariate and representational similarity analyses on fMRI data.
- Wrote Bash scripts to perform a general psychophysiological interaction in AFNI, as well as in the CONN toolbox.

**Summer Intern | Memory & Perception | University of Toronto** *Toronto, ON*
Advisor: Dr. Morgan Barense *May 2023 - Aug. 2023*

- Contributed to the project "Understanding the role of anterolateral entorhinal cortex in configural processing across the lifespan" supervised by Natalia Ladyka-Wojcik.
- Utilized ITK-SNAP to manually segment the sub-regions within the hippocampus (CA1, DG/CA3, Subiculum), as well as the perirhinal cortex, anterolateral entorhinal cortex, posteromedial entorhinal cortex, and parahippocampal cortex.
- Reconfigured and implemented an entorhinal-hippocampal circuit computational model to incorporate the anterolateral entorhinal cortex, as well as the posteromedial and anterior lateral entorhinal cortex components.

**Research Assistant | Clinical Neuroscience Lab | Florida State University** *Tallahassee, FL*
Advisor: Dr. Chris Patrick *July 2021 - May 2023*

- Applied 64-channel EEG caps and other biometric sensors (EMG, SCR, EKG) and recorded psychophysiological data using Neuroscan Curry8 program.
- Trained and supervised a team of undergraduate students, providing instruction on study protocol, participant interaction, EEG cap application, and data collection software.
- Processed Event Related Potentials from EEG data using Brain Vision Analyzer (BVA).

## Honours, Grants, & Scholarships

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| 2023 | **College of Arts and Sciences Conference Grant**, Florida State University | *$ 500* |
| 2023 | **The Tyler Center For Global Studies IDEA Grant**, Florida State University | *$ 4,000* |
| 2022 | **Gilman Scholar**, Benjamin A. Gilman International Scholarship Program | *$ 4,000* |
| Fall 2022 | **Dean's List**, Florida State University | |
| 2022 - 2023 | **1st Generation Matching Grant**, American Endowment Foundation | *$ 3,000* |
| 2022 - 2023 | **Goldwater Scholar**, The Barry Goldwater Scholarship and Excellence in Education Program | *$ 9,124* |
| 2021 - 2022 | **Wilson Family Endowed Scholarship**, Florida State University | *$ 3,000* |
| 2020 - 2023 | **President's Lists**, Florida State University | |
| 2020 - 2023 | **Florida Medallion Scholar**, Florida Bright Futures Scholarship Program | *$ 25,600* |

## Manuscripts

**Allen, S.D.**, Connolly, C.G., Martin, C.B., (*in prep*). Differential engagement of dorsal and ventral medial prefrontal cortex in retrieval of semantic and episodic memory.

## Presentations

### Talks

October 2023. *Characterizing the Durability of Experience-Dependent Representational Changes in the Hippocampus*. Talk: President's Showcase of Undergraduate Research Excellence

### Conference Posters

**Allen, S.D.**, Connolly, C.G., & Martin, C.B., (Nov. 2023). Differential engagement of dorsal and ventral medial prefrontal cortex in retrieval of semantic and episodic memory. Neuroscience 2023, Society for Neuroscience, Washington, D.C.

Ladyka-Wojcik, N., **Allen, S.D.**, Liang, J.C., Olsen, R.K., Ryan, J.D., & Barense, M.D., (Nov. 2023). Understanding the role of anterolateral entorhinal cortex in configural processing across the lifespan. Neuroscience 2023, Society for Neuroscience, Washington, D.C.

**Allen, S.D.**, Martin, C.B. (2023). The neural basis of cognitive control in task-relevant long-term memory retrieval. Undergraduate Research Symposium, Florida State University, Tallahassee, FL.

**Allen, S.D.**, Lemmon, A. (2023). Modeling neural circuits to understand incipient speciation in Chorus Frogs. Computational Exposition, Florida State University, Tallahassee, FL.

**Allen, S.D.**, Martin, C.B. (2022). The neural basis of task-relevant memory retrieval. Undergraduate Research Symposium, Florida State University, Tallahassee, FL.

## Technical Skills

**Programming Languages:**

*Advanced Proficiency:* MATLAB, Bash, C++

*Intermediate Proficiency:* Python, R, Julia, LaTeX, SAS, SPSS

**Neuroimaging Software:** AFNI, FSL, CONN, ITK-SNAP, BVA, Curry8

**Experiment Programming:** E-Prime3, Qualtrics, GorillaSC, PsychoPy

## Outreach & Service

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| May 2023 | **Math Fun Day**, Station Volunteer |
| April 2022 | **Homeschooled Group Science Class**, Neuroscience Teacher |
| March 2022 | **Brain Fair**, Station Volunteer |

## On-Campus Involvement

**Pi Mu Epsilon** | Mathematics Honor Society | Vice President of Communications

**Psi Chi** | Psychology Honor Society | Member

**C.A.R.E.** | Program for First Generation College Students | Member

## Professional Development

**MTL Segmentation Workshop**. Attended a comprehensive three-day tutorial focused on manual MTL segmentation led by Dr. Rosana Olsen at the University of Toronto. The workshop took place from May 24th to May 26th, 2023.

**Undergraduate Research Opportunity Program (UROP)**. Participated during the Fall 2021 and Spring 2022 semesters, attending bi-weekly research colloquia. Collaborated with and received mentorship from Dr. Chris Martin for a research project. Successfully presented my research findings at the culmination of the Spring 2022 semester.

**C.A.R.E. Summer Bridge Program**. Completed a comprehensive seven-week intensive orientation and transition experience, gaining essential skills and knowledge for college success designed for first-generation college students from a limited income family eligible for Pell-Grant.

## Other Work Experience

**Barista & Baker** *Tallahassee, FL*

La Florida Coffee & Wine *June 2022 - Present*

- Coffee Brewing Expertise: Proficient in the art of pulling impeccable espresso shots and crafting stunning latte art.
- Bakery Skills: Skilled in crafting a variety of pastries, muffins, cookies, and bread.
- Wine Connoisseurship: Demonstrating a keen understanding of pouring techniques, ensuring a flawless 5 oz. pour.