While I was teaching a lesson for a human physiology course at Colorado State University, a student of mine asked how pores along the axon of a neuron affect the flow of electrical current. My first attempt at clarification, admittedly, was an utter failure. Excitedly, I drew two parallel lines on a faded whiteboard with an old dry-erase marker, "poked" holes in the rudimentary tube by erasing segments with my finger, traced arrows through those holes and said: "See? The current flows out!" My student remained perplexed. I regrouped and tried a different approach – I compared the pores in the axon to holes in a garden hose. The flow of ions became the flow of water, and the abstract idea of current within a neuron was transformed into a tangible concept that the student had real-life experience with - which finally allowed the mechanism to "click."

Moments like these have inspired my interest in uncovering **how people learn best**. My passion for the intricacies of learning began with my undergraduate research and teaching experiences and solidified during my time as a lab manager at the University of Connecticut. The skills I have developed in research and creative thinking – from fMRI to pupillometry to science communication to undergraduate mentorship – have all prepared me for a successful graduate school career. While I am interested in understanding learning strategies more broadly, I specifically hope to pursue research in relational reasoning. Beyond the implications for advancing the field in its understanding of the neural mechanisms of relational reasoning, I strongly believe that educationally relevant research should not be restricted to academia. The faculty in the Psychology department at the University of Connecticut, and specifically the **Perception, Action, and Cognition division** demonstrate a commitment to communicating research outside of academia and encouraging interdisciplinary approaches to complex

questions. The University of Connecticut cultivates an environment of scholarship and innovation that I believe will best support my research and translational goals.

My early academic experiences instilled in me a belief that significant scientific progress requires collaboration across fields and professions. I was a member of the inaugural cohort in the Neuroscience major at Colorado State University. My studies ranged from bench science classes in organic chemistry and molecular genetics to foundational neuroscience courses in functional neuroanatomy and cellular neurobiology. Perhaps the most unexpectedly rewarding class was called "Writing in the Disciplines: Science" which taught me how to rewrite journal articles for a public audience. In 2017 I graduated cum laude with a B.S. in Neuroscience, a concentration in Behavioral and Cognitive Neuroscience, and a minor in Biomedical Sciences.

During my first semester at CSU, I was captivated by a wonderfully succinct presentation about fMRI and category learning given by Dr. Carol Seger. I promptly set up a meeting with her for the following week, after which she invited me to join her lab. The first lesson I learned was the importance of tailoring stimuli to answer a specific question, so I worked with a team to carefully adjust the position of the decision boundary between two stimulus categories. Piloting took close to nine months, after which the visual category learning task was implemented in an fMRI experiment that looked at how consistent motor response mappings affect learning. I analyzed the data using SPM12 within MATLAB, presented preliminary results, and will help to write the manuscript for publication once analysis is complete.

In my final two semesters at CSU, I conducted a thesis investigating two questions. What are the underlying functional neural connections that support visual analogical reasoning, and how do those networks fluctuate over time? Although not a focus of Dr. Seger's, she nonetheless encouraged me to pursue my own line of research – one that continues to inform my current

research interests. I designed novel stimuli, spearheaded behavioral piloting, scanned seven participants in the MRI, and analyzed the univariate data with SPM12. To extend previous work, I conducted a multivariate analysis using constrained principal component analysis (CPCA) to extract the functional networks supporting analogical reasoning. Data from this pilot study indicate differential activity in the executive control network by stage of analogical reasoning. **This work directly inspired the research plan of the NSF GRF proposal I submitted for the 2020 award cycle.**

I am specifically interested in how *language* influences learning in analogical reasoning, since verbal analogies are commonly used by educators. Therefore, after I graduated from CSU, I accepted a lab manager position with Dr. Emily Myers at the University of Connecticut to continue developing my neuroimaging skills and to transition to language research. My first project was an fMRI study that looked at the effects of semantic context on speech perception. An open question is whether speech processing in the brain is different in predictive contexts (*they picked apples from the tree*) compared to non-predictive contexts *(they built a shed near the tree*). Our results suggest that ambiguity in the speech sounds percolate up to semantic processing, as indicated by graded brain activation. I am currently writing a manuscript for this project for publication as the first author. Additionally, I am working on a study that uses pupillometry to measure pupil size while participants listen to speech. Pupillometry is a relatively new methodology in speech research, and best practices for data pre-processing and analysis have not yet been established. As such, I have worked with researchers at multiple universities to develop a standardized pupil data pre-processing pipeline with the intention of making my script widely accessible on the Open Science Framework (OSF) to promote consistency across labs.

Beyond research, I spend a considerable amount of time mentoring my undergraduate research assistants. When I came to UConn, I created the *LAB Lab Digest* to teach skills of science communication to undergraduates. As editor-in-chief, I provide guidance on potential interviewees, edit written summaries and interviews, and remind RAs of the goal of the *Digest*: to take research about aphasia treatment and make it accessible for people with aphasia and their caregivers. I hope that helping undergraduates build a solid foundation in communication will encourage conversations between scientists and non-scientists now and into the future. I have also found myself in the unexpected position of serving as a career mentor for my RAs. Mentorship involves uncovering students' passions and providing honest advice as they figure out their paths in the world. Just this past year, I helped two of my former RAs find public health policy and skilled nursing as careers that marry service and science. In graduate school, I will continue to work with students to find their true passions and teach them the necessary skills so that they will succeed in their chosen careers - whether in science or otherwise.

From the labs of Dr. Seger and Dr. Myers, I have learned the value of precision in experimental design and a myriad of technical skills to launch into a productive graduate career. My extensive research experience and commitment to science communication and scientific transparency will support me in becoming a strong student and researcher. I am excited to have the opportunity to continue my thesis work with **Dr. Emily Myers and Dr. Eiling Yee** and to learn from their expertise in neuroimaging and semantic memory. UConn is a hub for innovative and interdisciplinary language research and thus I believe that it is the best place to pursue further study into the intersection of language, learning, and reasoning.