"Here be dragons." Scrawled on the edges of ancient maps, this warning cautioned voyagers to stay within the boundaries of the known world. In second grade I learned how intrepid explorers disregarded that admonition and set forth into unmapped territory. Slowly but surely the supposed dragons were replaced by continents as cartographers etched out Earth's true borders. As happy as I wanted to feel for those explorers and their achievements, my second-grade self could not help but lament that everything in the world had already been mapped out. I eventually realized I did not need to cross an ocean to find something groundbreaking; I just needed to look inside our skulls. As one of the grandfathers of neuroscience, Santiago Ramón y Cajal, once wrote, "The brain is a world consisting of a number of unexplored continents and great stretches of unknown territory." This realization that our most important organ is one of the least understood reignited my second-grade explorer aspirations. I knew then that I had to be a cognitive neuroscientist.

At the start of my sophomore year at [Undergrad University] I began my scientific career as an undergraduate research assistant in Dr. B's Cognitive Neuroscience of Cognitive Control and Memory lab. I ran participants in computer-based and functional magnetic resonance imaging (fMRI) paradigms, and grew proficient in Excel and MATLAB. Additionally, I learned how to dissect and discuss peer-reviewed papers, and think critically about psychological constructs and how to test them in a laboratory setting. My first few years as a research assistant were spent working on a project that examined how false positive feedback during a memory test can alter the decisions people make about their memory. That project not only gave me invaluable experience helping a study progress from design to analysis to journal submission[1, 2], but also sparked my interest in investigating how different factors, like feedback and reward, influence memory.

I completed my tenure as an undergraduate research assistant with an honors independent research project investigating how motivation may underlie the testing effect, wherein previously tested items are more likely to be subsequently remembered. When people engage in a memory test, they are motivated to complete the goal of the task (i.e., successfully remember test items). I hypothesized that the intrinsic reward associated with completion of this goal promotes future memory of those test items. I found that when participants endorse items as previously studied during an initial test, they are more likely to remember those items later on a subsequent test.

Moreover, that effect was amplified when the goal of the initial test was remembering previously studied items, as opposed to identification of novel items. Together, these findings suggest that perceived familiarity of study items and successful completion of the task goal both positively contribute to subsequent memory. In graduate school I hope to follow up this study with an fMRI experiment, which I proposed to the National Science Foundation for their Graduate Research Fellowship. Past research has shown that making goal-congruent responses in a memory test activates reward-signaling areas in the brain[3], and that reward-associated items are better remembered[4]. I hypothesize that these neural reward areas will be activated in the initial test when participants perceive items as previously studied and when they make goal-congruent responses, and that this neural activity will predict subsequent memory. Adapting this study for fMRI will provide further insight into the cognitive mechanisms underlying the testing effect.

After graduating from [Undergrad University] with a Bachelor of Science degree with honors in Cognitive Neuroscience, I continued to hone my research skills by working as a full-time research associate for one of the leading scientists in social cognitive neuroscience, Dr. L. Since joining his team at the [Post-Bac University], I have worked on two large-scale fMRI studies: a placebo-controlled double-blind randomized control trial investigating the effects of the neuropeptides oxytocin and vasopressin on social cognition, and a multi-modal study of persuasion utilizing both fMRI and functional near-infrared spectroscopy. For both of these studies I coded multiple stimulus presentation scripts in PsychToolbox in MATLAB, and have run over 120 participants in fMRI sessions on a Siemens 3T Prisma. In addition to writing code for data collection, I have also gained experience creating and modifying analysis scripts. Using primarily SPM8, I have learned how to preprocess, run first and second level models, and create correlation, regression, region of interest, whole-brain, and contrast analyses. In September I assisted in teaching the basics of fMRI preprocessing and analysis to Dr. L's first-year graduate students. My experiences in this lab have been invaluable for bolstering my research skills and opening my eyes to further research topics and methodologies. I have been incredibly fortunate to not only work in Dr. L's lab, but also continue investigating memory by volunteering with other researchers concurrently.

In addition to working for Dr. L, I volunteer in Dr. G's lab on a study investigating fronto-striatal contributions to learning and memory. Specifically, the project examines the neural response to positive and negative feedback in adolescents and adults, and how this

feedback influences subsequent memory. For this study I have helped run over a dozen adolescent participants in an fMRI paradigm. My experience in the G lab has been indispensable for introducing me to developmental cognitive neuroscience and teaching me further methods for investigating fronto-striatal memory processes.

I hope to continue my scientific career in the Graduate Program in Psychology at University XYZ. My years of experience have prepared me to excel in this research-focused program. It would be an honor to join this collaborative community of scholars as a doctoral student, plus be able to utilize the University XYZ Center for Brain Imaging.

For graduate school I would like to work with Dr. P. Her work on how emotion influences learning, memory, and decision making is very interesting to me. I would be excited to work with her on projects exploring how various affective states impact people's ability to encode and retrieve information.

Dr. D's research on fronto-striatal contributions to mnemonic processes also aligns with my research interests. I am interested in working with her on exploring how rewards and valuation impact learning and memory. Particularly, I would like to investigate how and why people perceive different things as valuable and how that valuation process affects memory and subsequent behavior.

In sum, I believe I would make a great addition to University XYZ's psychology department. After graduate school I intend to continue investigating how motivation and reward impact learning and memory as a professor. Completing my doctorate at University XYZ would provide me with the training and knowledge to broaden our understanding of the brain and vanquish the dragons that lurk on the edges of the unknown.

References. **1.** S, K, & B. (Invited Resubmission) *Nature Communications*. **2.** S, & B. (Under Review*) Memory & Cognition*. **3.** Han et al. (2010) *Journal of Neuroscience.* **4.** Adcock et al. (2006) *Neuron*.