

Statement of Purpose

I am fascinated by the way that the myriad connections of the brain form a city of neural highways in our heads, giving rise to the higher cognitive processes that define human character and capacity. Enabled by the opportunities afforded by the rigorous Research Specialist Program in Psychology at the University of Toronto, I have developed a passion for cognitive neuroscience research. I have continually sought out current debates in the field, demonstrating creativity and persistence as I worked to bring my ideas to fruition. With the guidance of my mentors, I have proposed and designed three distinct programs of research, leading to a poster presentation at this year's Society for Neuroscience conference and several first-author papers currently under review and in preparation. Moreover, I am engaged as an active member of the scientific community, regularly attending guest lectures and conferences. Above all, I am drawn to cognitive neuroscience by the compelling and ecologically valid research questions, as well as the distinctively challenging methodological puzzles.

As a first-year student, I was selected for a competitive seminar program on the rhetoric, methodology, and philosophy of science. The culmination of this program was the completion of a 9,000-word mock grant proposal, extensively researched, designed, and written over a five-month period. Under the mentorship of Dr. Morgan Barense, I delved into the memory literature and designed an original study about social cognitive influences on memory reconsolidation. This early opportunity inspired me to pursue psychological research and cultivated my interest in the malleability of human memory. I refined my scientific writing skills over the course of this seminar program, learning to effectively convey my ideas, justify a program of research, and develop informed hypotheses.

In the years following, I have continued to pose novel research questions and design original experimental paradigms. In my thesis research project under the supervision of Dr. Barense, I am investigating the neural substrates of episodic memory reconsolidation in humans. For the first time, we have demonstrated that prediction error governs whether naturalistic memories will dynamically adapt to accommodate new information. By synthesizing ideas from prior rodent and human research, we generated novel hypotheses about complex human cognition and uncovered a new phenomenon of episodic memory. Extending these behavioral findings which we have submitted for publication, we are currently piloting an fMRI adaptation of the paradigm.

Additionally, as a member of Dr. William Cunningham's lab, I am conducting two programs of research. First, we are investigating stereotype and social category formation. Using the SUSTAIN computational model of category learning and a dynamical systems framework, we will assess how the accumulation of experience over time and individual differences in personality predict stereotype resiliency. Second, I have proposed an fMRI study to test the controversial theory that the neural substrates of physical and social pain (e.g., rejection) overlap in the dorsal anterior cingulate cortex. My novel paradigm elicits both physical and social pain within a single task, offering the means to resolve inconclusive and controversial existing evidence. We will also adapt this paradigm to test whether social support attenuates the experience of physical pain (i.e., social baseline theory).

In addition to my proven success with formulating research questions and developing original paradigms, I have also contributed to other stages of the research process. Over the past

three years, I have gained varied and interdisciplinary experience, conducting research in cognitive neuroscience, computational affective neuroscience, and social cognition. I have constructively contributed to lab meetings, programmed and executed experiments, prepared stimuli, administered neuropsychological assessments, and conducted statistical analyses. Furthermore, I have applied my presentation skills to my scientific endeavors. For seven years, I have pursued my love of the performing arts through theatre and choir. Drawing on this extensive experience, I have gained confidence and clarity in public speaking. I have effectively communicated my research findings by writing papers, giving talks, lecturing, and presenting first-author posters at several conferences. At the Toronto Area Memory Group Conference, I earned an award for my critical contributions to discussion, demonstrating my aptitude for constructive scientific discourse. I also received the Outstanding Poster Presentation award at the NeuroXchange Conference, reflecting my speaking abilities.

At this year's Society for Neuroscience conference, I had the pleasure of meeting Dr. Janice Chen and Dr. Chris Honey from Johns Hopkins University. I found their research interests to be highly compatible with mine, particularly with regards to prediction error and episodic memory. I was especially drawn to the way in which Dr. Chen emphasizes naturalistic stimuli and narrative comprehension, similar to the methodology of my thesis research on episodic memory reconsolidation. I was also fascinated by Dr. Honey's work on prediction error and hierarchical processing. I appreciate his emphasis on investigating research questions with multiple methodologies, synthesizing evidence from neuroimaging, intracranial recordings, and computational modelling to better characterize a phenomenon. Moving forward, I wish to continue investigating the reconstructive nature of episodic memory, as influenced by prediction error. Overall, I believe that I would greatly enjoy the collaborative nature of the department and cutting-edge research methods at Johns Hopkins.

My undergraduate studies, spanning a range of subfields within and beyond psychology, have informed my understanding of how the brain supports cognition and behavior. My diverse research experience has enriched this foundation in cognitive neuroscience, allowing me to contribute to the experimental process from study design to the communication of research findings. My exemplary faculty mentors at the University of Toronto have inspired me to pursue graduate studies and, ultimately, an academic career as a professor of cognitive neuroscience. I would be honored to further my research at Johns Hopkins University, posing and investigating new questions to better understand how the brain enables the mind. Thank you for your consideration.

Sincerely,

Alyssa H. Sinclair