I have always loved telling stories. Growing up, I devoted myself to creative writing, fashioning characters and plots and weaving them into my own fictional worlds. I found my characters—not to mention the people around me—bewildering yet inspiring: tangled masses of impulses and ideas that manifested as human beings just going about their lives, thinking, perceiving, and acting. I was determined to figure them out.

As I began my undergraduate studies at New York University, my desire to understand the human mind had only deepened. Yet I became increasingly unsatisfied with inventing my own answers. Thus, I immersed myself in cognitive psychology courses, soon realizing that I wanted to do more than study psychological research: I wanted to *contribute* to it. After my sophomore year, I joined Dr. Peter Wais at UC San Francisco to examine the brain networks implicated in high-fidelity memory. I used repetitive transcranial magnetic stimulation (rTMS) to administer magnetic pulses to participants' scalps during learning and analyzed behavioral data to assess the impact of rTMS on high-fidelity recognition memory. Importantly, this work ignited my curiosity in the neurocognitive bases of learning and memory.

During my senior year, I then conducted an honors thesis project in NYU's Computation & Cognition Lab, advised by Drs. Todd Gureckis and Shannon Tubridy. My thesis aimed to identify neural signals (via electroencephalography, or EEG) emitted *during learning* that best predicted whether a person would recall studied words *later on*. Throughout this yearlong project, I wrote scripts for presenting our task, collected EEG recordings, and analyzed my data using Matlab and Python. I found that, *on average*, recall was best predicted by high-amplitude event-related potentials (ERPs) detected by frontal electrodes. However, participants varied in the spatial and temporal characteristics of the signals that best predicted *their* performance specifically.

In the months preceding graduation, I was also selected as one of six undergraduates to join NYU's Training Program for Computational Neuroscience (TPCN). As part of TPCN, I explored the relevance of my thesis findings to the Computation & Cognition Lab's OMNI project (Optimizing Memory using Neural Information), which aims to develop a computational model that leverages behavioral and neural data to predict learning. Through tutorials and discussions with my advisors, I acquired knowledge of this model's mathematical structure, and how it uses learning-related neural signals (e.g., the ERPs identified in my thesis) to help infer the latent "state" of a learner's memory. I have since continued my involvement in OMNI, now investigating functional magnetic resonance imaging (fMRI) measures that might serve as "trait-level" markers of learning ability. Ultimately, my work on this project—in addition to resulting in my first co-authored publication[1]—has expanded my analytical acumen and emphasized how highly I value approaching cognitive questions from an interdisciplinary perspective.

After graduation, I strengthened my training in cognitive neuroscience by joining Dr. Lila Davachi's lab as lab manager, first at NYU and now at Columbia University. In one collaboration, I am working with Dr. David Clewett to examine how context shifts during learning affect our memory for sequential events. Through two eye-tracking studies, for which I helped collect and analyze data, we found that a change in context disrupts memory for event order—an effect that was associated with fluctuations in physiological arousal (operationalized as pupil dilation). Through such work, I have been able to explore how learning and memory are shaped by our affective and attentional states, as well as contribute to the preparation of our resulting manuscript[2].

I am also conducting an independent line of research in the Davachi Lab, examining how our brains "reinstate" previously learned information during successful memory retrieval. My work aims to characterize how the location and fidelity of neural reinstatement changes as a function of a memory's age. To this end, I am analyzing an fMRI dataset in which participants' brain activity was measured during the encoding and retrieval of object-scene pairs. I have learned to use FSL to preprocess fMRI data, define regions-of-interest, and conduct functional connectivity and general linear modeling analyses. Now, I am using representational similarity analysis[3] to quantify the similarity between encoding and retrieval brain activity patterns, searching for reinstatement in regions implicated in memory retrieval.

In my graduate research, I hope to further investigate the adaptive and flexible nature of human memory—how it is shaped by our context, attention, and goals. As a member of the Davachi Lab at Columbia University, I have had the privilege of working in this department's deeply collaborative environment, conducting research among professors and students who explore memory's dynamic interplay with a multitude of cognitive systems and processes. I am thus confident that pursuing my doctoral studies at Columbia would provide an ideal setting in which to examine the questions that have captured my interest. I would particularly welcome the opportunity to continue my work with Dr. Davachi. Her mentorship has been essential to my growth as a scientist, guiding both my theoretical understanding of the mechanisms underlying episodic memory and my use of analytical tools to investigate them. I am eager to expand the projects we have developed thus far, digging deeper into the formation, content, and function of neural memory representations. How, for example, are representations shaped by our expectations? How might different "types" of representations (e.g., those representing general context vs. individual items) subserve different memory judgments?

Dr. Mariam Aly's focus on the intersection between memory, perceptual, and attentional systems is also well-aligned with my interests. As her work has emphasized, many components of core memory systems (e.g., the hippocampus) show tremendous flexibility in their ability to support diverse cognitive functions. I am interested in how the hippocampus' integration within broader cortical networks during learning makes such flexibility possible.

I am also interested in working with Dr. Christopher Baldassano, using computational, neuroscientific, and behavioral approaches to better understand how we perceive and remember the structure of our experiences. I am especially curious how our existing knowledge might influence how and when we draw boundaries or connections between disparate events.

Ultimately, I still want to tell stories. Through my research, I want to examine and elucidate the mechanisms that shape and preserve our experiences. My long-term goal is to become a professor at a major research institution, where I can continue to investigate the cognitive neuroscience of memory, sharing my findings and my curiosity. The chance to further my scientific training within the accomplished community of scholars at Columbia University would undoubtedly lay strong groundwork for achieving such ambitions in the future.

***References**:* **1.** Halpern, Tubridy, Wang, **Gasser**, Popp, Davachi, & Gureckis (2018). *EDM*. **2.** Clewett, **Gasser,** & Davachi. (in prep). **3.** Kriegeskorte et al. (2008). *Front Syst Neurosci.*