**Project and Learning Plan**

**Intellectual Merit.** This project will investigate the role of surprise in children's selective learning, in collaboration with Student A and Student B. The last several decades of research have uncovered that even young infants have sophisticated expectations about the world around them. My research investigates how infants and children can use these expectations to guide subsequent learning. Because infants and children have limited cognitive resources, directing these resources to events that violate (rather than accord with) prior expectations could potentially boost learning efficiency.

In my previous work, I showed 11-month-old infants and 3- to 6-year-old children an event that either violated or accorded with their expectations about object behavior. For example, a ball was hidden behind one of two screens, and when the screens were lifted, they either saw an expected outcome in which the ball was revealed behind the same screen, or a surprising outcome in which the ball appeared behind the other screen (as if it had teleported). Infants and children more effectively learned novel information about the ball when it behaved surprisingly (Stahl & Feigenson, 2015, *Science*; Stahl & Feigenson, 2017, *Cognition*). These experiments show that infants and children prioritize learning about objects that violate their expectations (Stahl & Feigenson, 2019, *Topics in Cognitive Science*). However, objects do not act in isolation, but rather are typically acted upon by individuals. In collaboration with a former MUSE student*, I have recently found that infants are also more motivated to learn from the *individuals* who produce surprising outcomes (Stahl & Woods*, 2022, *Infancy*). However, it is unknown whether children are similarly motivated to learn from surprising individuals.

Children are adept at learning from others, but they do not do so indiscriminately – they deem certain individuals as being more worthy of learning from than others. For example, they are more likely to endorse information from reliable individuals (e.g., someone who labels familiar objects correctly) than unreliable individuals (e.g., someone who labels familiar objects incorrectly) (Koenig & Harris, 2005). Thus, children engage in selective learning by judging some individuals as better teachers with more reliable knowledge than others. Alongside Student A and Student B, this MUSE project will investigate whether children also deem individuals who produce surprising outcomes as more worthy of learning from than individuals who produce expected outcomes.

Children between 3 and 5 years old will see two individuals, one who produces a surprising outcome and one who produces a nearly identical but expected outcome, and then those individuals will teach the child conflicting information (e.g., they will each give the child a different novel label for an unfamiliar object), and we will ask the children which individual is correct. The key question is whether children are more likely to endorse the surprising individual. Given my prior findings showing that infants and children learn better about surprising *objects*, we hypothesize that they will also be more motivated to learn from the *individuals* who produced the surprising outcome. That is, surprise might help children identify and select individuals from whom to learn most effectively.

Because Student A and Student B will already be established researchers in the lab, this project is feasible within 8 weeks: *Week 1:* Recruit 3- to 5-year-olds; *Weeks 2-7:* Schedule participants and run experiment; *Weeks 7-8:* Code and analyze data; *Week 8:* Draft abstract submission for the Cognitive Development Society conference.

**Role of Students and Mentor.** Student A and Student B are stellar candidates for the MUSE program. Student A is a dual Special Education and Psychology major, and Student B is a Psychology major with a Social Justice minor in the Honors Program. Both Student A and Student B have excelled in our core course sequence of PSY121 (Methods & Tools of

Psychology) and PSY203 (Design and Analysis) and will have completed PSY299 (Research Seminar) prior to MUSE, which provide them with foundational skills in research design and statistical analyses. Student A and Student B also have experience working with children both inside and outside of my lab, which also prepares them for their roles in the MUSE program. Two students are being requested because the nature of our research requires the presence of two students. For example, one student conducts the experiment with the child, and the other student subsequently codes the data, blind to condition to prevent observer bias (Student A and Student B will alternate in these roles over the summer). Additionally, one student runs the experiment in our testing room while the other student might need to watch a sibling in our playroom, or answer parents' questions. As a result, our lab is highly collaborative in nature.

Student A and Student B will be responsible for every step of the research process: they will recruit the parents and children to participate by contacting local families in our database and visiting local events to find new families. They will be trained to conduct the experiments with the children, code the data, and analyze this data. Because Student A and Student B will have already worked in my lab prior to MUSE (Fall 2022 and Spring 2023 for Student A, Spring 2023 for Student B), they will begin MUSE equipped to immediately begin conducting the experiment. Over the summer we will have meetings at least once a week, during which we will assess recruitment progress, discuss the experiment, and read relevant scientific articles. They will also increase their mastery of data analysis and SPSS when we meet to discuss data interpretation. Student A and Student B will also improve their communication skills by regularly explaining our research to parents in the community, and disseminating the results to the scientific community through a conference abstract.

**Broader Impacts.** Student B is a Black, first-generation college student, demographics that are underrepresented in the MUSE program and in my field of cognitive development. She hopes to attend medical school to become a developmental pediatrician, and Student A plans to become a teacher - this intensive faculty-mentored research experience will make them competitive candidates for any job or graduate program to which they apply. In the shorter term, they each plan to continue working in the lab in Fall 2023, and participating in MUSE will allow them to quickly become leaders who can help train new student researchers who join the lab. Their research skills will equip them to succeed in any seminar course or other research experience at TCNJ. Additionally, the valuable skill of explaining developmental science to parents in the community will improve their oral communication skills that they will need in advanced courses and internship experiences outside of the college campus as representatives of TCNJ. Submitting an abstract to a national and peer-reviewed conference will give them the unique opportunity of communicating research findings to the broader scientific community, and their continued involvement in the lab after MUSE will afford them the opportunity to co-author a potential manuscript from this project (an outcome prior MUSE students of mine have achieved).

Finally, I hope to engage students in the rigors of scientific research. I have not participated in the MUSE program since 2020, as my on-campus lab was not able to reopen for studies until November 2022 due to COVID-19 (when young children were able to become fully vaccinated, and parents were more comfortable participating in in-person research). Recruitment and data collection for my research with infants and children are extremely time-intensive, and continuing my research program in the summer (often parents' preferred time of year to visit the lab) is critical to maintain momentum with our community outreach. As a result, summer is the most productive time of year for my research – we often collect as much data over a summer as we do in an entire academic semester. Summer 2023 in particular will be integral in helping us catch up from the years we were closed.