1. **Accomplishments**

I have accomplished many things within this funding period. We have completed data collection using the previously described paradigm and will soon begin recruitment for the follow-up study that we indicated we would complete in response to concerns from Reviewers 1 and 2 regarding lack of a non-ambiguous social control within the initial paradigm. We aim to collect data from an additional sixty (60) subjects in this study. Much of the analysis for the proposed project has been completed. As outlined within my Activities Planned Under This Award, I did develop proficiency with nltools for pre-processing neural data and the application of intersubject correlations. However, due to complications (See Section F.2 Challenges & Delays), I also developed proficiency in additional analytic techniques which I hadn’t anticipated needing, including dynamic sliding windows, in order to complete this project and meet my stated goal of characterizing neurotypical adult responses to social and non-social sources of ambiguity.

Descriptions of this project were included in my applications to both the Summer Institute for Social and Personality Psychology (SISSP) and Methods in Neuroscience at Dartmouth (MIND) Computational Summer School, which I had attended in 2023. Attending these events allowed me to discuss and receive feedback on this project from like-minded individuals, as a significant component involved presenting and developing a specific research project idea across the duration of the programs. This project and its results were further disseminated via disparate presentations throughout 2024. I had worked closely with an undergraduate research assistant (See B.4 Training & Professional Development) to examine the effects that adopting different perspectives in the study had upon subjects’ memories. These results were presented at a conference organized by Temple for honors students. A poster highlighting differences in brain-behavior relationships between social and non-social sources of ambiguity was also presented as a poster in the 2024 SANS conference in Toronto. I was invited to present this project to Dr. Emily Finn’s lab at Dartmouth which was an invaluable experience, as they provided insightful feedback and were very enthusiastic about the project. Lastly, I was fortunate to be selected as the winner of the *Ipsos-CARD* dissertation award for novel decision-making research, which also required a presentation on our project be given to an audience of mostly non-neuroscientists. This was a great exercise in science communication and encouraged me to think deeply about the most essential parts of the project.

Although I have not yet published any manuscripts relevant to the project, I have produced one manuscript and I have one other in preparation. I had deviated slightly from my initial writing plan, as conversations at both SANS and with Emily Finn’s lab helped me to realize that a significant gap in the literature existed regarding the neural effects of rating. All previous research confounded the act of rating with additional task instructions. In other words, the field had previously only contrasted rating a specific question to fully passive viewing, which does not instruct subjects in any way. Our study, on the other hand, gave subjects the same question to consider when rating and non-rating, thus allowing us to better isolate which systems are directly altered by the act of rating. In discussions with my sponsorship team, we decided that such an analysis would provide an important context in which to situate our social and non-social ambiguity results. This manuscript will soon be submitted to *Social Cognitive and Affective Neuroscience* for consideration. The results of our examination comparing social and non-social ambiguity are now being compiled and we anticipate submitting these to a high-impact journal in the coming months. Note that this is still well ahead of the timeline initially submitted.

There are a number of major findings and developments which we can cite thus far. By using independent raters to identify which scenes subjects recalled and had not recalled in the surprise memory task, we were able to determine that rating synchrony (i.e., how similarly subjects rated the stimulus over time) predicts recall synchrony (i.e., how similarly they recalled or did not recall scenes), but only for subjects that had adopted the same perspective (i.e., subjects who suspected the same character as being guilty). This may be indicative of shared framework cognitive frameworks which influence what subjects attend to, thus influencing memory, and how they interpret the stimulus, thus synchronizing ratings. However, much more work is required to complete the memory analyses that we intend to complete. This was not a central component of my grant and may ultimately be spearheaded by an incoming graduate student interested in analyzing this data due to limitations on my own time. However, the analyses that we have completed thus far complement the results of our exploratory analysis comparing neural activity while subjects rate and do not rate the stimulus. In this analysis, we used intersubject correlations and univariate contrasts to identify networks differentially activated by both. Previous work contrasting passive and active (i.e., rating) viewing found limited differences in sensory and attention processing regions and no differences in higher cognitive or emotion-related regions. Despite this relatively circumscribed activity, a common sentiment in the field is that the act of rating may be disruptive to the viewing process. Using the Kong 2022 17-network schema, our analysis suggests that rating demanded complex problem-solving (Control Network A) and error monitoring (Control Network B) via top-down, voluntary attention (Dorsal Attention Network A) for sustained periods of time (Dorsal Attention Network B) in search of unexpected, decision-relevant (Salience Network B) stimuli. Reflective viewing (i.e., not rating but while consistently evaluating the same question as the rating group) generated more mind-wandering (Default Mode Network A), mentalizing (Default Mode Network B) and may have promoted broader sensory processing (Auditory, Visual A, Visual B) while noting unexpected, decision-relevant (Salience Network B) stimuli. Our analysis still failed to find substantive differences outside of interoceptive, attention, and sensation networks, in agreement with previous work, but found wider recruitment of these structures than previously documented. We believe this may be valuable for any researchers interested in video fMRI and, in our manuscript, we outline many use cases for active viewing approaches.

Our primary analysis aimed to characterize neural responses to dynamic social and non-social sources of ambiguity using a dynamic sliding window ISC approach. We used the neural synchrony between subjects to predict synchrony in rating behavior between subjects in circumscribed periods (See Section F.2 Challenges & Delays). In doing so we found dissociations in the neural activity responding to each domain. In response to social foci, we found that synchronized ratings followed synchrony in dorsal anterior cingulate and anterior insulae, which likely indicates similarities in theory error detection (i.e, “Is Jonathan Guilty?”) and social tracking processes, respectively. We also found a negative association between precuneus synchrony and decision synchrony, which may represent heterogeneity in mentalizing while making decisions. Only the inferior parietal lobe, likely involved in quantifying ratings, and motor regions were consistently activated across domains. Interestingly, synchrony of the dorsolateral prefrontal cortex – often a hallmark of uncertainty processing - predicted synchronous non-social, but not social, evaluations. This may reflect domain-specificity in the role of the dorsolateral prefrontal cortex when processing uncertainty, as studies in which it demonstrates activation overwhelmingly rely on calculation-like uncertainty, as in gambling tasks, which may be more similar to our non-social task than our social task. However, some additional analyses are required. Regardless, non-social uncertainty also recruited a broader range of sensory and attention processing regions than did social uncertainty.

There is still substantial work to be done, however. Our previous memory analyses did not examine recall deeper than gist-level and a higher-resolution detail analysis could likely provide a deeper understanding of the nuanced ways in which perspective moderates processing of social information. Even if I do not lead the memory analyses, I will still be heavily involved in every stage of that specific project. Additionally, our previously mentioned follow-up study still requires data collection and analyses. I will be greatly assisted by other lab members in order to complete this before I transition to my post-doctoral position. However, to maximize efficiency, the planned analytic pipeline has already been programmed and tested using what I have learned completing the first project. My sponsorship team and I would also like to pursue more advanced modelling of our data if time permits, to take advantage of the dynamic natural of our study design. This may include hidden Markov modeling to examine the states subjects engage in response to stimulus events and how they transition between these states in response to novel information.