Time-of-day optimality effects on eyewitness memory performance

Summary

Chapter 1: Introduction. This chapter provides an introduction of the phenomenon of circadian variations in memory performance. I describe the mechanism of functioning of our circadian clock and review the literature on inter-individual differences in the timing of circadian phases. Importantly, the circadian clock determines the hours of the day when we reach or peak cognitive performance. Optimal performance can be achieved during periods of the day that are aligned with circadian phases of peak alertness. I review previous studies showing time-of-day variations in memory performance and describe potential relevance of these findings to different aspects of memory functioning in eyewitnesses.

Chapter 2: Circadian variations in eyewitness memory performance. This chapter presents an initial attempt to investigate time-of-day optimality effects across three domains relevant to eyewitness memory performance. For this purpose, I recruited one-hundred-and-three participants with morning and evening chronotype and tested each participant in the morning and in the evening. In each session, participants encoded a digitally recorded stimulus event that depicted a staged theft. At test, they provided free recall narratives about what they had seen, answered cued questions about the incident and the appearance of the people involved, and identified the individuals they saw in the stimulus event from target-present and target-absent lineups. I hypothesized that participants would provide more accurate free narratives and answers to cued questions when tested at their optimal compared to the non-optimal time of day. I also expected higher identification accuracy in the optimal compared to the non-optimal sessions. I hypothesized that non-optimal testing would weaken the postdictive value of confidence and decision times. Finally, I administered a visual version of the DRM paradigm, expecting that non-optimal testing would result in higher of false memory rates.

Accuracy in free narratives and answers to cued questions and false memory rates in the DRM task did not vary across the optimality conditions. Unexpectedly, participants showed higher identification accuracy in target-present but not target-absent lineups at non-optimal compared to the optimal time of day. Target selection rates were lower in optimal sessions, while foil selections did not vary as a function of testing optimality. The decision time-accuracy relationship commonly found in choosers was diminished at the non-optimal time of day. The confidence-accuracy relationship was not affected by testing optimality, with some evidence for superior calibration of confidence judgments at non-optimal compared to optimal sessions.

Chapter 3: Chronotype and time-of-day effects on eyewitness identification accuracy and its postdictors. Following our unexpected findings showing superior identification performance at non-optimal compared to the optimal time of day, I conducted Experiment 2 to further investigate synchrony effects in lineup identification performance. I tested three-hundred-and-twenty-four participants with morning or evening time-of-day preference recruited with the help of the Amazon MTurk platform. Participants were tested either at their optimal or the non-optimal time of day. After encoding a staged stimulus event, participants identified people involved in the depicted incident from target-present and target-absent lineups. I was interested in testing whether our surprising findings from Experiment 1

would replicate in a more diverse MTurk sample. Results showed no significant differences in identification accuracy between optimal and non-optimal sessions. Interestingly, evening-type participants were significantly more accurate in their identification decisions compared to morning types. Confidence was a stronger of accuracy in choosers at non-optimal compared to the optimal time of day. Decision times were not predictive of accuracy, likely due to the specifics of online testing environment.

Chapter 4: Circadian effects on face recognition and source memory performance. Long-term memory performance is generally better at the optimal compared to the non-optimal time of day. However, circadian fluctuations in face recognition performance received no attention in the literature to date. In Experiment 3, I used the face recognition paradigm to test possible synchrony effects in face recognition and source memory performance. Ninety-one morning- and evening-type participants were tested either in the morning or in the evening. Participants were presented with two sets of face stimuli in two contexts. One set of faces was embedded in a crime-related scenario, whereas the other set was presented in a neutral scenario. I hypothesised that general recognition performance would be better at the optimal compared to the non-optimal time of day. I also expected participants to be better at excluding familiar but irrelevant stimuli in the optimal compared to the non-optimal sessions. Results showed that overall recognition performance was unaffected by testing optimality. When asked to exclude familiar but irrelevant faces, participants showed only slight benefit from non-optimal testing that was not statistically significant. Although the current findings show no evidence for the effects of circadian arousal on face recognition and source memory for faces, future research is necessary to explore the underlying mechanisms of time-of-day effects in face recognition and source memory performance in vulnerable witnesses.

Chapter 5: General Discussion. In the final chapter, I attempt to synthesise the results obtained across all experiments within the research programme. The discrepancies between our findings and previous research are analysed from the viewpoint of divergence of methodological approaches to studying eyewitness memory performance from generic memory research methodology used in prior studies. An important line of discussion revolves around the problem of integrating findings obtained in generic laboratory experiments into applied contexts, such as eyewitness memory domain. The chapter outlines exciting directions for future research, such as the study of unorthodox synchrony effects in processing of faces and the effect of non-optimal testing on postdictors of eyewitness identification performance. I outline initial conclusions regarding the role circadian variations in arousal play in the eyewitness memory field, with an extra emphasis on the importance of replication of our findings due to the novelty of the research line. Finally, I discuss limitations of the current research programme and provide methodological suggestions for future study of the circadian effects in eyewitness memory performance.