Debriefing Form

Changes in Concept Learning and Episodic Memory over a One-Week Delay

The experiment you just completed investigates how multiple sleep episodes and concept dimensions influence individuals' concept learning and episodic memory. Specifically, *concepts* are notions that allow individuals to categorize phenomena in the world, and *episodic memory* is the memory of individual life events. Conceptual knowledge and episodic memories are processed by a series of neural activities called *memory consolidation*, which commonly occurs when individuals are asleep (Cacioppo & Freberg, 2018). A plethora of studies suggest memory consolidation is time-dependent: it may gradually enhance people's concept learning and erode their episodic memory overtime (Lutz et al., 2017). To gain more insights into such a time-dependent process, we aim to assess changes in individuals' concept learning and episodic memory over a week of sleep. In addition to examining the effects of memory consolidation, we are also interested in whether this process affects individual concepts in different ways. Past findings indicate that the brain encodes different concepts distinctively (Mack et al., 2016). For example, a unidimensional concept, which is defined by a single feature (e.g., color), elicits a neural activation pattern that diverges from the pattern caused by a bi-dimensional concept, which is defined by two features (e.g., color and shape). Accordingly, will those concepts, with different neural representations, show distinct changes after a week of sleep? We seek to answer this question in the present study.

To assess the effects of memory consolidation on concept learning and episodic memory, we tested your ability to categorize images under fictional categories (e.g., *avolnia* for flowers; *cordies* for turtles) and your ability to recognize individual images. We focus on evaluating the differences in your task performance before and after the one-week delay. Based on previous studies, we developed two hypotheses: (1) individuals will perform better in the categorization task after a week, and (2) individuals will perform worse in the recognition task after a week. Moreover, to determine the role of concept dimension in memory consolidation, we instructed you to learn unidimensional and bidimensional concepts using the two fictional species. That is, one of the species you learned is defined by only one feature (e.g., any flower with four petals belongs to the species *avolnia*), and the other is defined by two features (e.g., any turtle with a rectangular shell and a purple skin belongs to the species *cordies*). We expect concept dimension to moderate changes in individuals' task performance over the delay.

Completion of this project will inform theories of memory consolidation by shedding a light on how multiple sleep episodes interact with the concept dimension to influence concept learning and episodic memory. This project will also inform future studies we will conduct that investigate different brain regions critical for concept acquisition and memory consolidation.

If you have any questions, please contact Dr. Michael Mack at 416-978-4243 or by email at mack@psych.utoronto.ca.

Thank you for participating in our experiment!

References

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