The role of working memory in encoding the temporal structure of events in episodic memory

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Past events are represented in episodic memory as a sequence of experience units (EUs)—a succession of moments of prior experience. These EUs are separated by temporal discontinuities (moments of prior experience that are not represented), such that the time taken to remember past events is inferior to their actual duration. This temporal compression is not constant: for a given duration, the more an event is represented in memory by many EUs, the higher its remembering duration (and the lower its temporal compression). The number of EUs formed to represent an event in memory depends on the amount of event boundaries (EBs; moments perceived as the end of one sub-event and the beginning of another; Zacks, 2020) it contains. Moreover, the amount of working memory (WM) resources available during perception could also play a central role in the formation of EUs (when fewer resources are available, fewer EUs would be formed; Loschky et al., 2020).

To test this hypothesis, 60 healthy young adults had to watch and mentally replay sixteen 60-s videos (with either many or few EBs), and then wrote down the content of their mental replay. For half of the trials, participants had to perform a concurrent WM task (counting backwards by 3; Figure 1). The results showed that performing the concurrent task during viewing led to a decrease in the number of recalled EUs and remembering duration. Furthermore, both the number of recalled EUs and remembering duration were superior for videos with many EBs. Finally, the number of recalled EUs predicted remembering duration, such that the higher the number of recalled EUs, the higher the remembering duration. Taken together, these results suggest a role of WM in the formation of EUs representing the unfolding of events in episodic memory and therefore in determining their temporal compression.
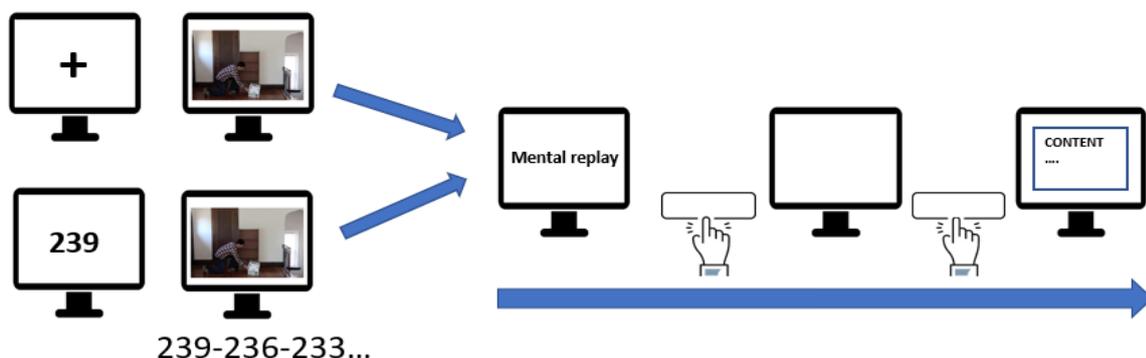

Figure 1. *Representation of the experimental paradigm. Each trial started with the display a 60-s video. For half of the trials, participants simply had to carefully watch the video. For the other half, they had to perform a concurrent WM task during viewing (counting backwards by 3). The rest of the trial was identical for both experimental conditions: participants had to mentally replay the unfolding of the depicted event in as much details as possible and then to write down the content of their remembering.*

References:

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