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Introduction

Remembering daily life activities (e.g., gardening, having breakfast) generally takes less time than the actual experience duration, a phenomenon known as the **temporal compression (TC)** of episodic memories. Previous research showed that TC tends to increase with event **duration** (e.g., Bonasia et al., 2016) but is negatively associated with the number of **event boundaries (EBs)**; moments perceived as the end of a meaningful unit and the beginning of another unit; Jeunehomme & D'Argembeau, 2020; Kurby & Zacks, 2008). However, in these previous studies, event segmentation (quantity of EBs by time unit) and duration were correlated, such that the **respective contribution** of these two dimensions in the TC phenomenon remains unclear.

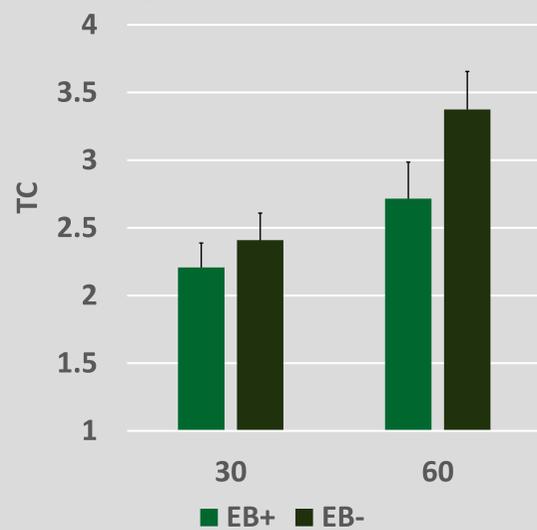
Hypothesis

Earlier research (Jeunehomme & D'Argembeau, 2020) showed that events containing more EBs are remembered in a less compressed way because people tend to remember more experience units (EUs; moments of the past experience) for these events compared to those including less EBs.

We therefore expected 1) the density of EUs to predict TC (the higher the EUs density, the lower the TC) and 2) to observe a **higher EUs density and less temporal compression for EB+ videos** compared to EB- videos. We also hypothesized that long videos would be more compressed than short ones.

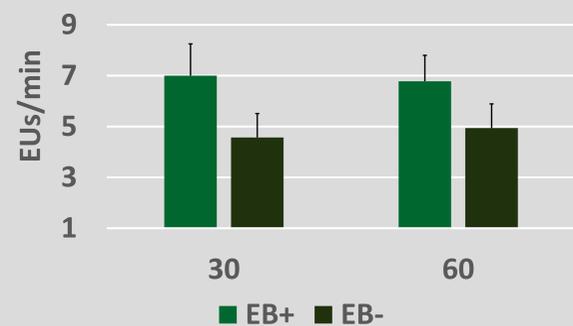
Results (linear mixed models)

Prediction of TC by segmentation and duration



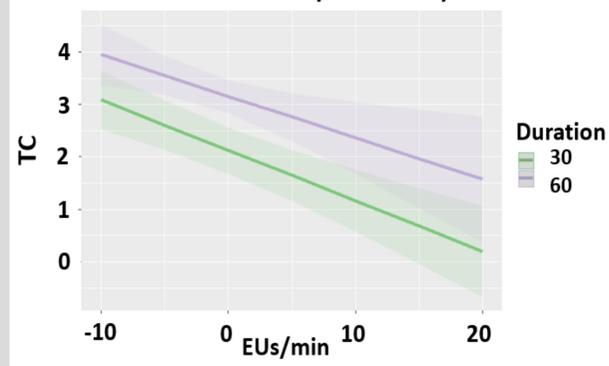
Main effect of segmentation:
 $b = 0.434, t = 6.490 (p < 0.001)$
 Main effect of duration:
 $b = -0.771, t = -7.063 (p < 0.001)$
 Interaction:
 $b = -0.446, t = -4.375 (p = 0.002)$

Prediction of EUs density by segmentation and duration



Main effect of segmentation:
 $b = -2.157, t = -3.288 (p = 0.012)$
 Main effect of duration:
 $b = -0.058, t = -0.136 (p = 0.895)$
 Interaction:
 $b = -0.640, t = -0.780 (p = 0.456)$

Prediction of TC by EUs density

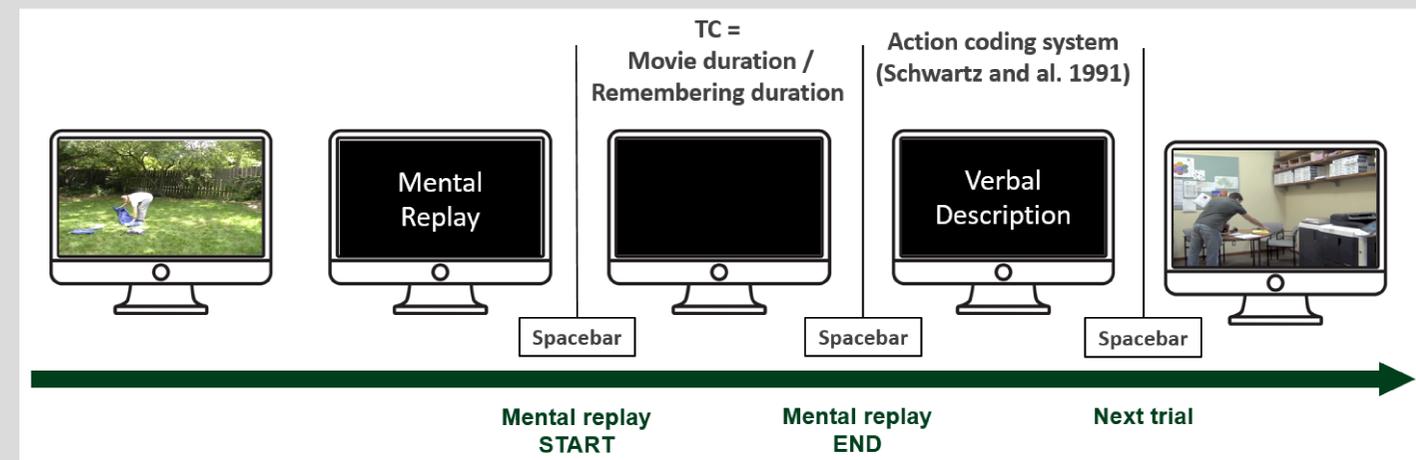


Main effect of segmentation:
 $b = -0.09, t = -4.67 (p < 0.001)$
 Main effect of duration:
 $b = -1.03, t = -9.817 (p < 0.001)$
 Interaction:
 $b = -0.17, t = -0.955 (p = 0.34)$

Aim

The present research aimed to evaluate the extent to which **TC** depends on the **segmentation** and **duration** of events by manipulating both dimensions orthogonally.

Paradigm



Participants & Procedure

37 young adults (18 women; mean age: 22.37 years, SD= 2.67) had to watch, mentally replay and then verbally describe 32 movie clips of everyday activities. Each clip lasted 30s or 60s and included few or many EBs (EB+ vs. EB-).

Discussion

As expected, TC was significantly lower and EUs density significantly higher for EB+ compared to EB- videos. Moreover, EUs density predicted TC (the higher the EUs density, the lower the TC) for both long and short movies. On the other hand, long videos were remembered with higher TC compared to short videos, but the density of recalled EUs was not lower for long compared to short videos. Interestingly, we also found that the impact of EBs on TC was higher for longer than shorter videos.

In conclusion, our results showed that **both segmentation and duration play a specific role** in the TC phenomenon. These results suggest that TC may not only depend on the density of recalled EUs (which varies as a function of event segmentation) but also on the speed at which they are mentally replayed (which is modulated by event duration). Further investigations are needed to shed light on the cognitive and neural mechanisms underlying the contribution of these features to TC for daily life activities.

References :

- Bonasia, K., Blommestejn, J., & Moscovitch, M. (2016). Memory and navigation : Compression of space varies with route length and turns. *Hippocampus*, 26(1), 9–12. <https://doi.org/10.1002/hipo.22539>
- Jeunehomme, O., & D'Argembeau, A. (2020). Event segmentation and the temporal compression of experience in episodic memory. *Psychological Research*. <https://doi.org/10.1007/s00426-018-1047-y>
- Kurby, C. A., & Zacks, J. M. (2008). Segmentation in the perception and memory of events. *Trends in Cognitive Sciences*, 12(2), 72-79. <https://doi.org/10.1016/j.tics.2007.11.004>
- Schwartz, M. F., Reed, E. S., Montgomery, M., Palmer, C., & Mayer, N. H. (1991). The Quantitative Description of Action Disorganisation after Brain Damage : A Case Study. *Cognitive Neuropsychology*, 8(5), 381-414. <https://doi.org/10.1080/02643299108253379>