Negative emotion reduces the temporal compression of events in episodic memory

Charline COLSON [a], Gaëlle PANNEELS [a] & Arnaud D'ARGEMBEAU [a,b]

a University of Liège, Psychology and Neuroscience of Cognition Unit - PsyNCog
b Fund for Scientific Research (FNRS)

Introduction

Remembering past events typically takes less time than the actual duration of prior experience (Jeunehomme & D'Argembeau, 2019)
➔ **Temporal compression of events in episodic memory**

What event characteristics determine temporal compression rates in memory?

Emotion enhances memory (Holland & Kensinger, 2010), including memory for temporal information: enhancement of temporal-order memory and dilatation of remembered duration for negative events (Petrucci & Palombo, 2021)

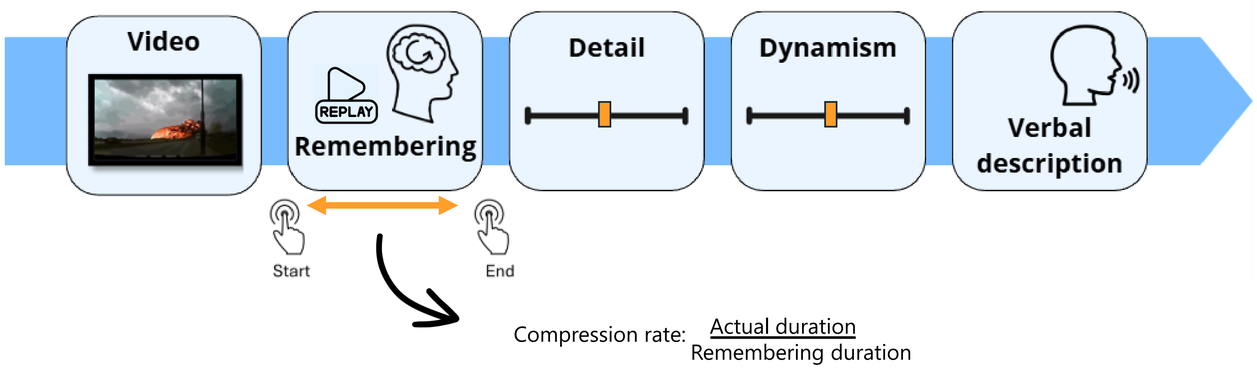
To what extent does **negative emotion** affect the temporal structure and compression of episodic memories?

Hypothesis:

We predicted that the course of negative events would be less summarized in memory, resulting in a lower compression rate compared to neutral events

Method

Experiment 1



Compression rate: $\frac{\text{Actual duration}}{\text{Remembering duration}}$

Stimuli: 8 negative and 8 neutral videos matched in duration (range: 12-35 sec)

Videos recalled **individually** and **immediately**

34 healthy young adults

Experiment 2

Same method but presentation of the stimuli **in a mixed list** that includes both emotional and neutral stimuli:

1. The entire set of 16 videos is shown
2. Memory task: remembering, subjective evaluations and verbal description

Compared to Experiment 1:
- Stimuli in mixed list
- Short delay between encoding and retrieval
- Incidental encoding

34 healthy young adults

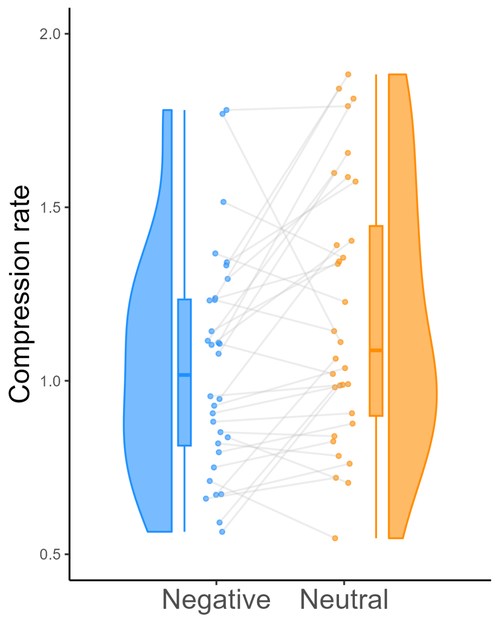
Results

Robust Linear Mixed-effects Models (Koller, 2016)

Rmodel <- rlmer(log(CompressionRate) ~ Emotion + Video_duration + (Emotion | ID) + (1 | Videos)

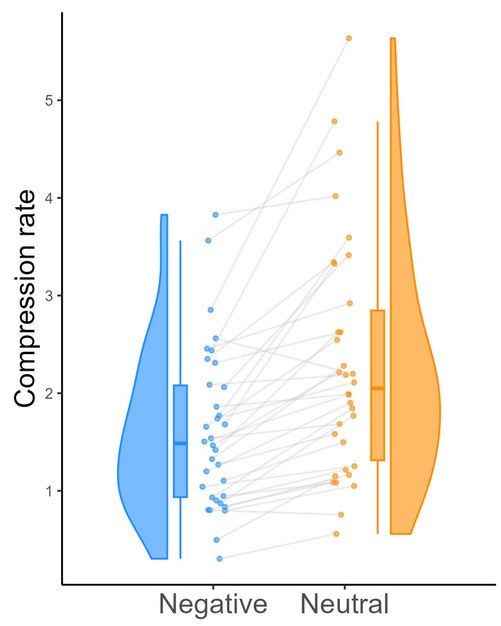
Experiment 1

b = -0.13, SE = 0.06, t = -2.28, p = 0.023



Experiment 2

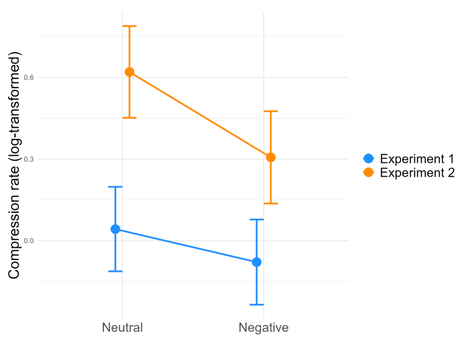
b = -0.32, SE = 0.08, t = -3.97, p < .001



Comparison between Experiments 1 and 2

Interaction:

b = -0.19, SE = 0.06, t = -3.35, p < .001



Discussion

- Negative events are less compressed in memory than neutral events
- Memories of negative events contain a greater density of information per unit of time when the unfolding of the event is represented
- Higher emotional effect observed in Experiment 2, compared with Experiment 1

Cognitive mechanisms?

During **initial encoding**:

- Attention
- Segmentation processes

Post-encoding:

- Consolidation

Preprint

References:
Holland, A. C., & Kensinger, E. A. (2010). Emotion and autobiographical memory. Physics of Life Reviews, 7(1), 88–131. https://doi.org/10.1016/j.plrev.2010.01.006
Jeunehomme, O., & D'Argembeau, A. (2019). The time to remember: Temporal compression and duration judgements in memory for real-life events. Quarterly Journal of Experimental Psychology, 72(4), 930–942. https://doi.org/10.1177/1747021818773082
Koller, M. (2016). robustlmm: An R Package for Robust Estimation of Linear Mixed-Effects Models. Journal of Statistical Software, 75(6). https://doi.org/10.18637/jss.v075.i06
Petrucci, A. S., & Palombo, D. J. (2021). A matter of time: How does emotion influence temporal aspects of remembering? Cognition and Emotion, 35(8), 1499–1515. https://doi.org/10.1080/02699931.2021.1976733

Contact:
Charline.colson@uliege.be