The Impact of Event Structure and Duration on Time-Compressed Memory Replay

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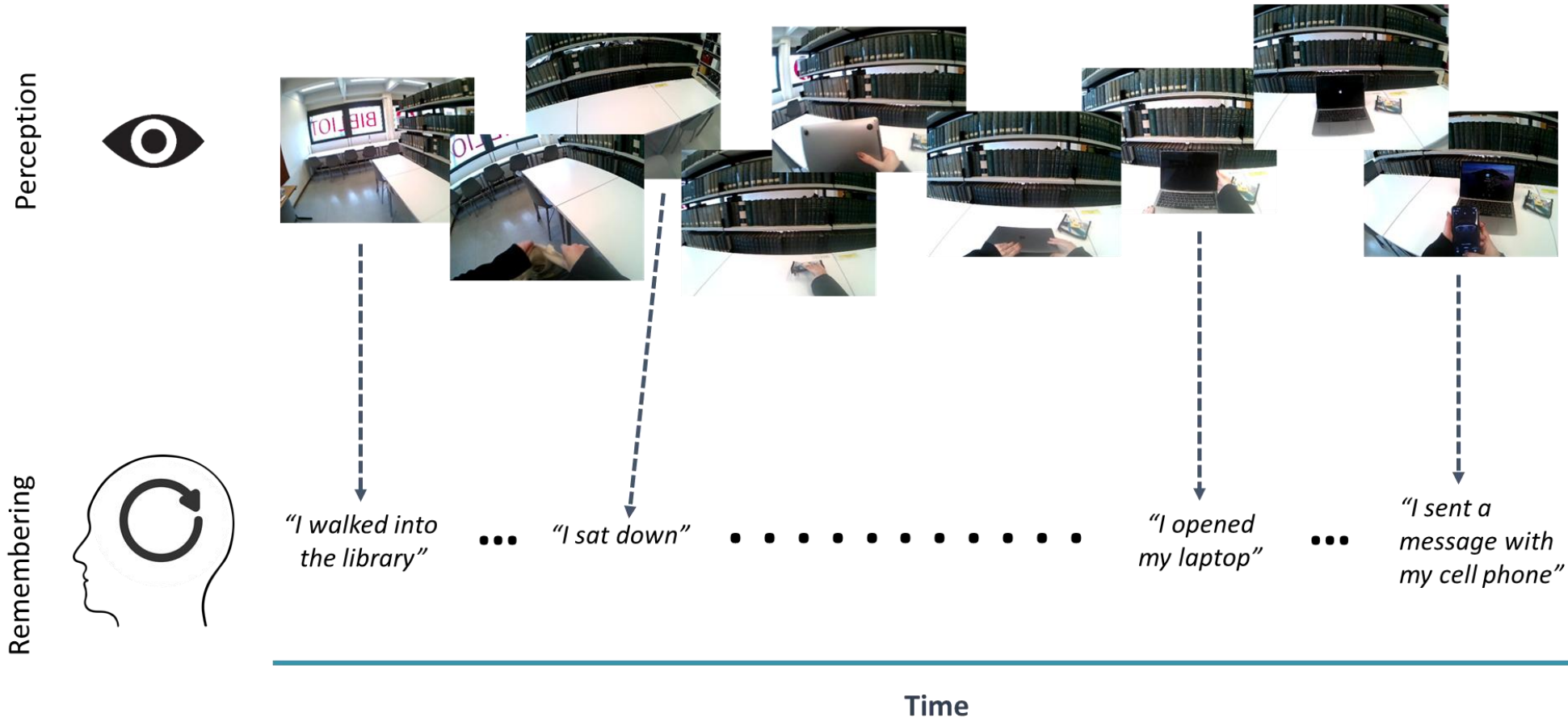
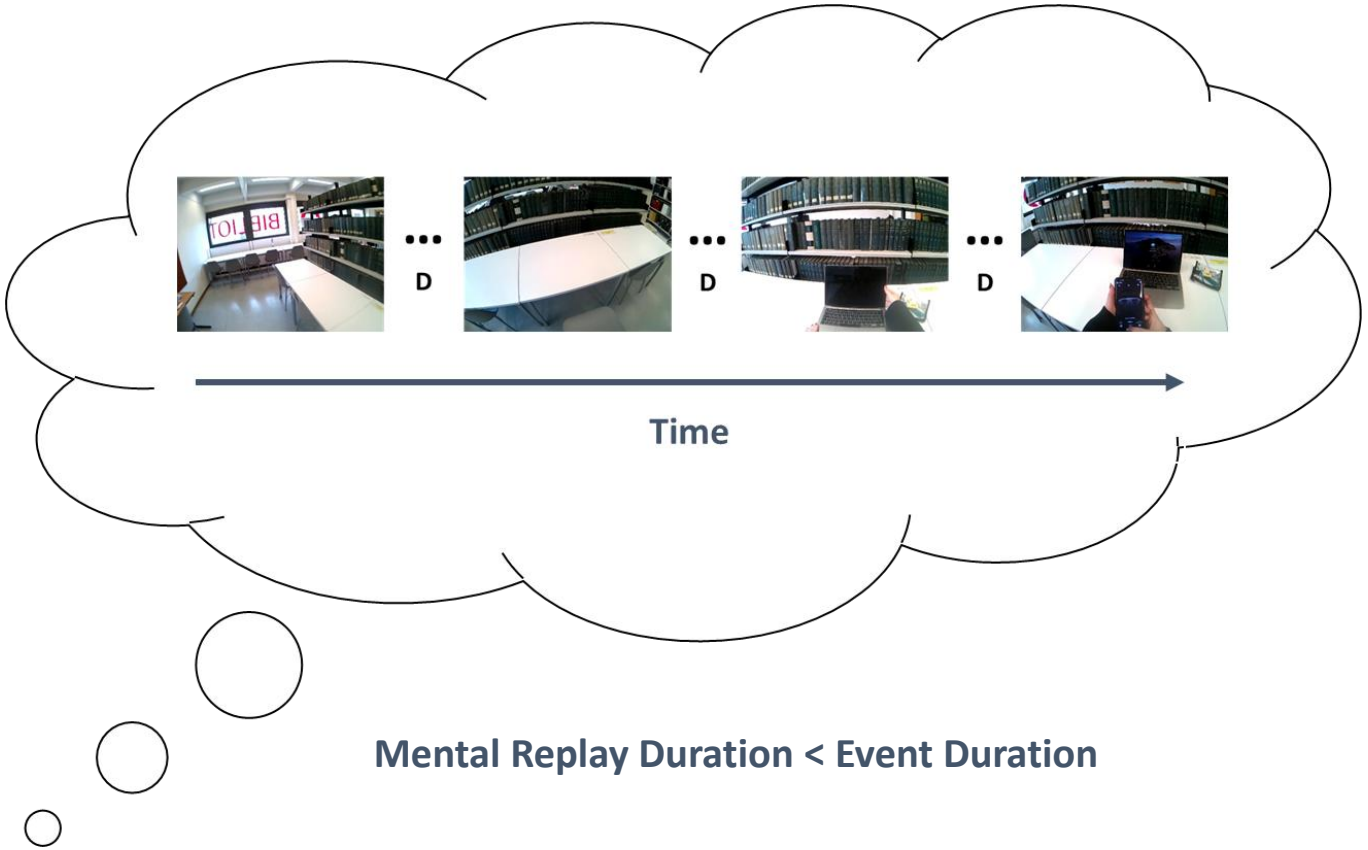
TEMPORAL DISCONTINUITIES IN MEMORIES



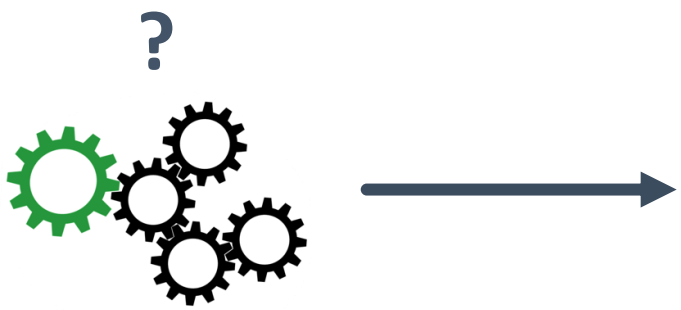
(For a review, see D'Argembeau et al., 2022)

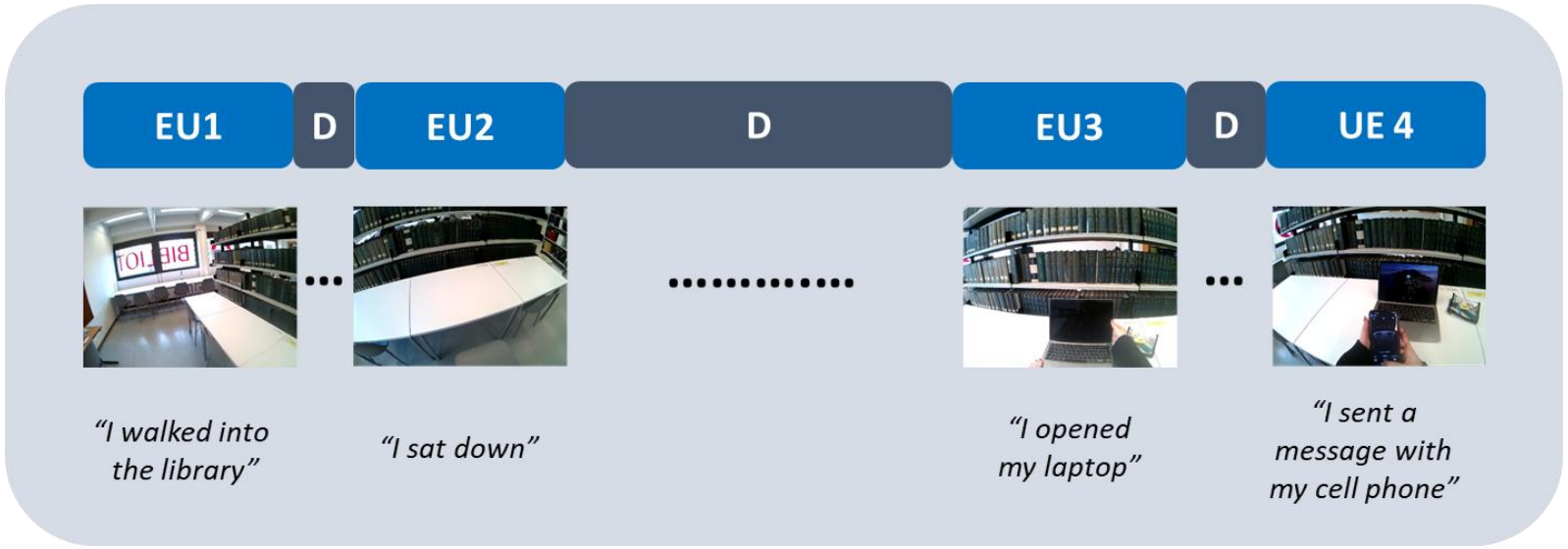
TIME-COMPRESSED MEMORY REPLAY



(Arnold et al., 2016; Bonasia et al., 2016; Faber & Gennari, 2015; Jeunehomme & D'Argembeau, 2019; Michelmann et al., 2019)

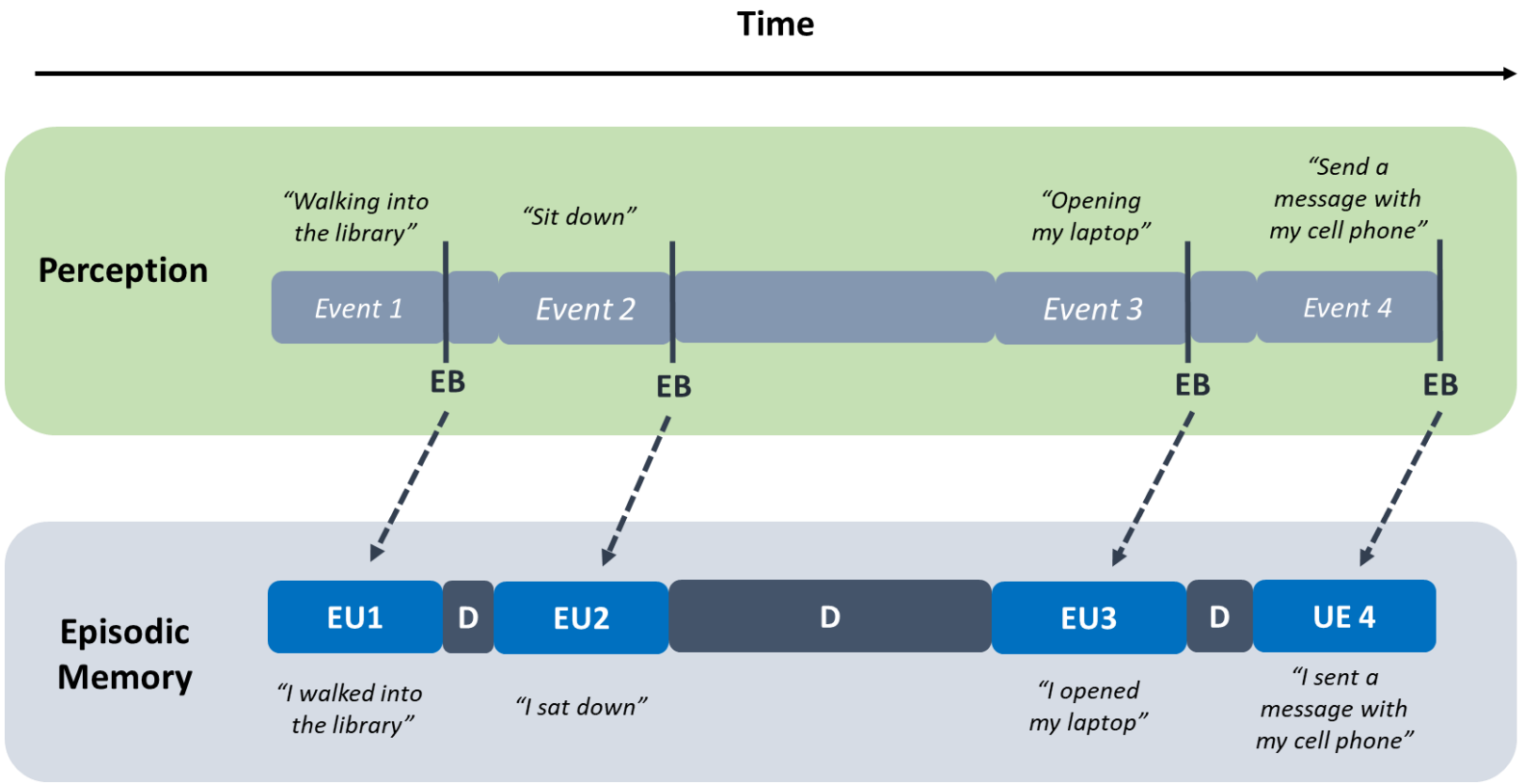
WHICH MECHANISMS?





Temporal Compression

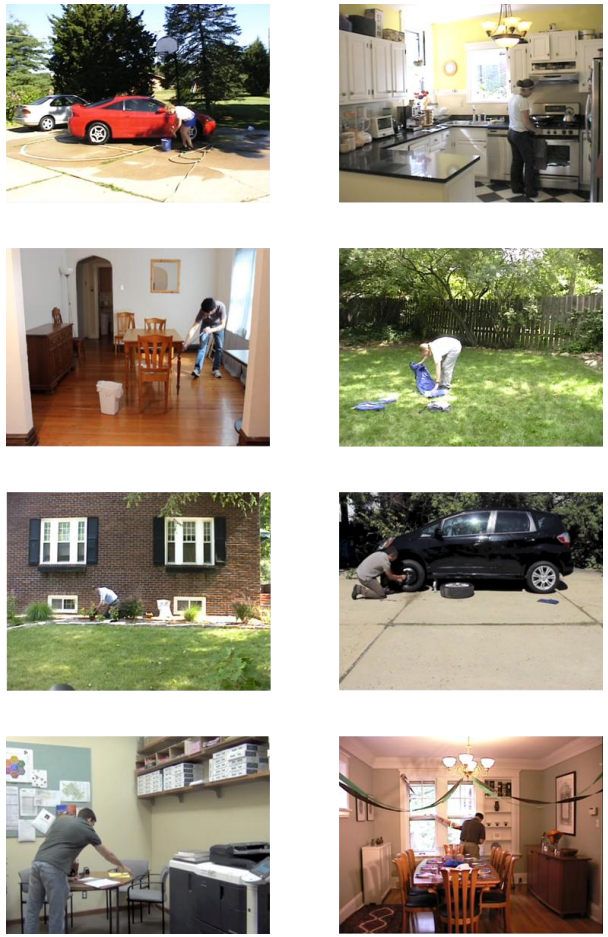
EVENT SEGMENTATION AND TEMPORAL COMPRESSION



EB: Event Boundary; **EU**: Experience Unit; **D**: Temporal Discontinuity

(Folville et al., 2020; Jeunehomme et al., 2020; Jeunehomme & D'Argembeau, 2020; Lu et al., 2022)

THE CURRENT STUDY

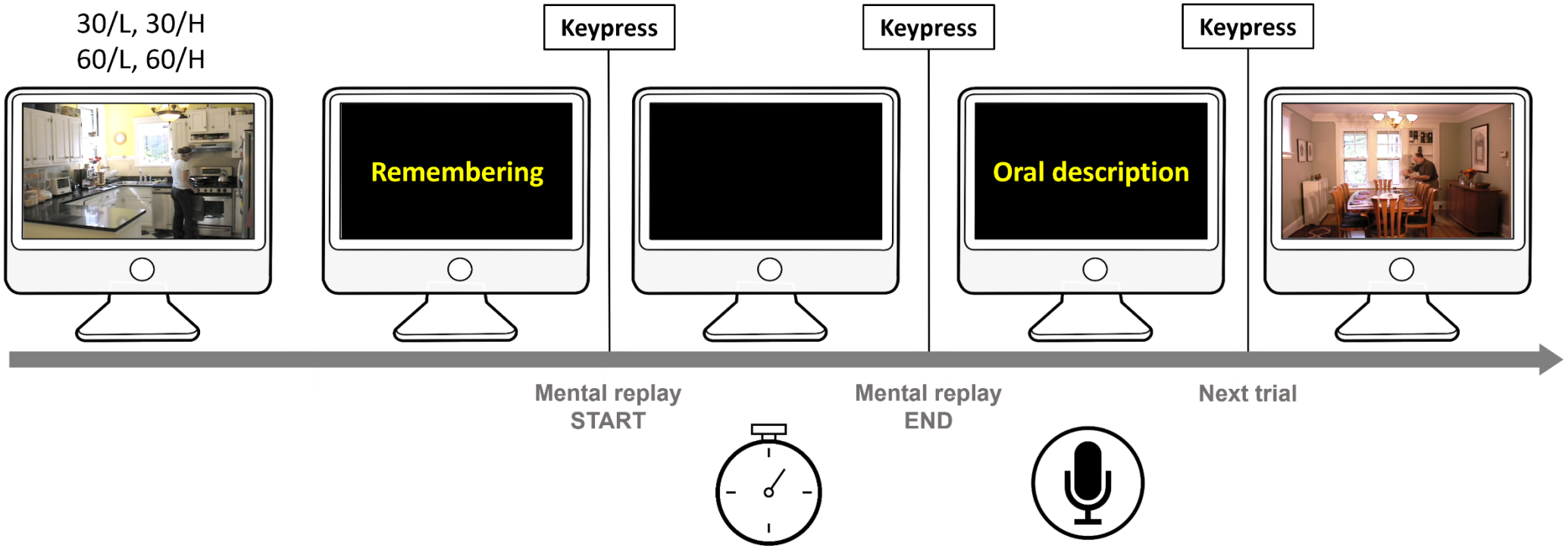


			EBs density	
			High	Low
Duration	Experiment 1 (n= 37)	30 s	8 video	8 video
		60 s	8 video	8 video
	Experiment 2 (n= 29)	20 s	8 video	8 video
		40 s	8 video	8 video

Same EBs density

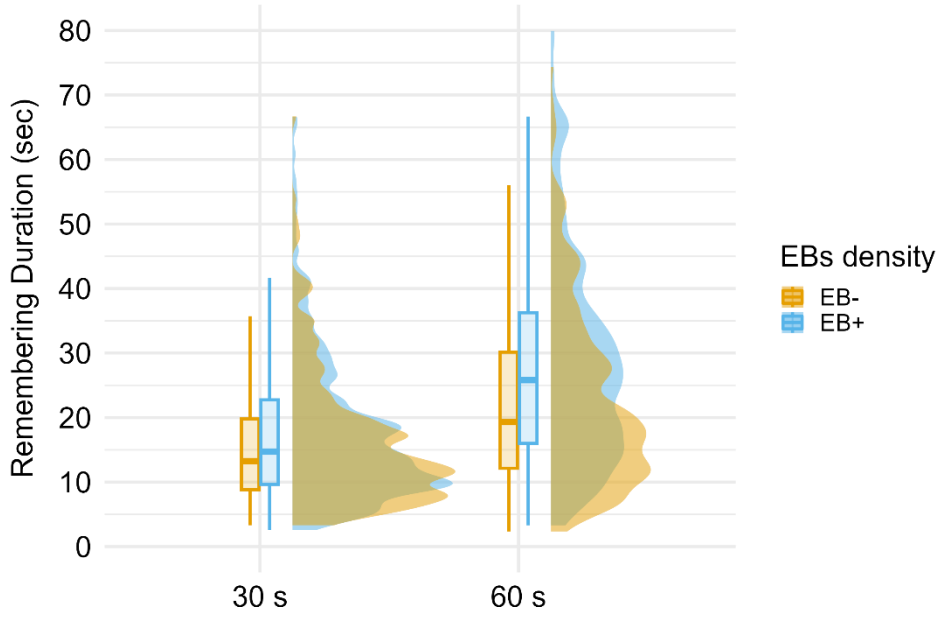
Same EBs density

TEMPORAL COMPRESSION TASK



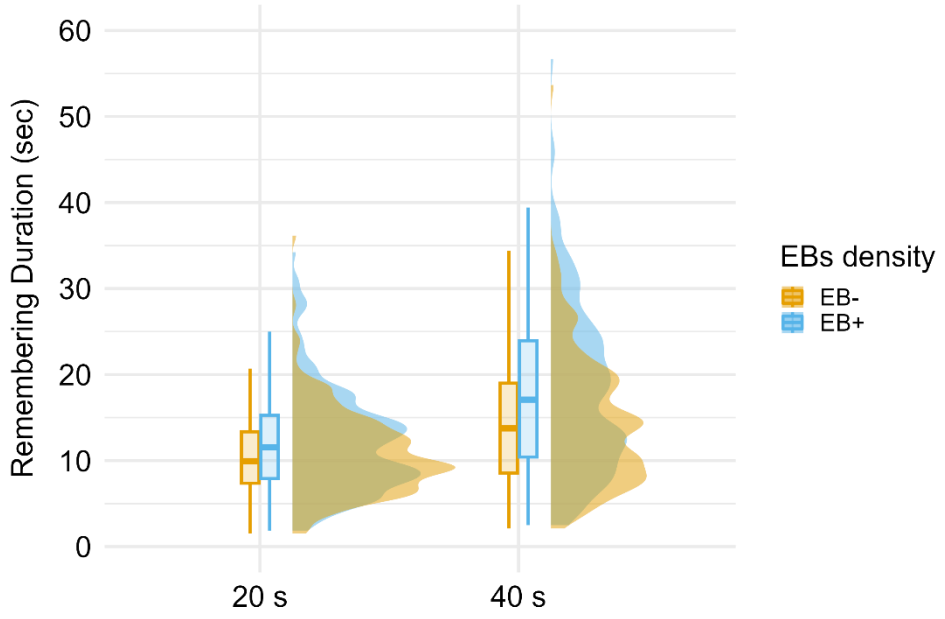
RESULTS – REMEMBERING DURATION

Experiment 1



Parameter	Coefficient	SE	CI_low	CI_high
Intercept	21.42	1.89	17.70	25.13
Duration	8.77	1.32	6.19	11.35
EBs density	3.70	0.75	2.22	5.17
Interaction	3.65	1.47	0.77	6.52

Experiment 2

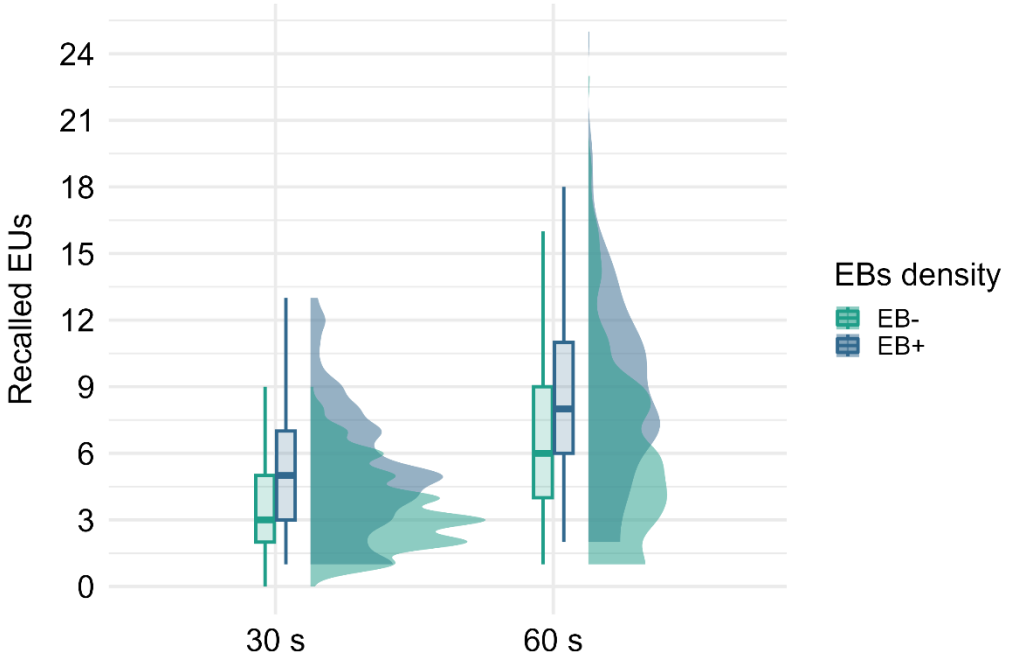


Parameter	Coefficient	SE	CI_low	CI_high
Intercept	13.80	1.01	11.82	15.77
Duration	4.73	0.91	2.95	6.51
EBs density	2.59	0.80	1.02	4.16
Interaction	2.17	0.88	0.44	3.91

Linear mixed effects models (Bates et al., 2015)

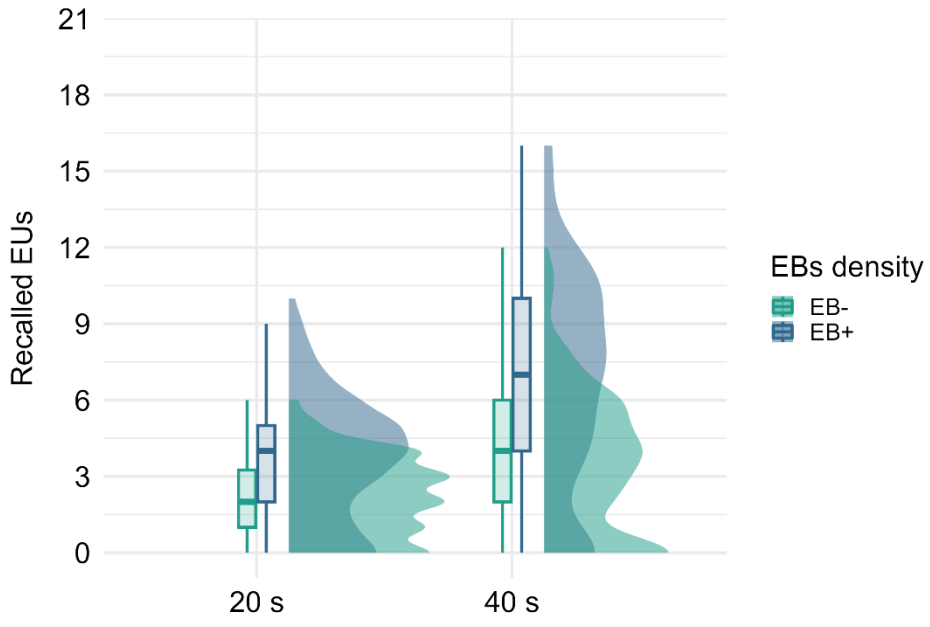
RESULTS – NUMBER OF RECALLED EXPERIENCE UNITS

Experiment 1



Parameter	Coefficient	SE	CI_low	CI_high
Intercept	6.05	0.55	4.97	7.13
Event Duration	3.34	0.40	2.54	4.13
EBs density	1.99	0.38	1.26	2.73
Interaction	0.61	0.46	-0.31	1.52

Experiment 2

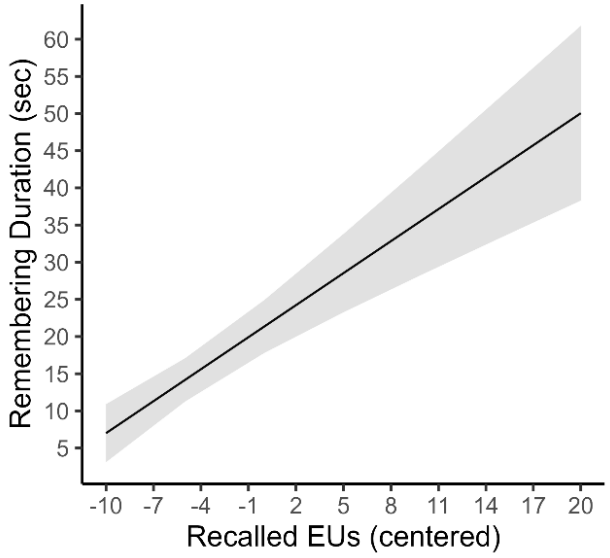


Parameter	Coefficient	SE	CI_low	CI_high
Intercept	4.36	0.43	3.52	5.21
Event Duration	2.36	0.43	1.52	3.21
EBs density	2.38	0.23	1.93	2.83
Interaction	1.66	0.50	0.68	2.65

Linear mixed effects models (Bates et al., 2015)

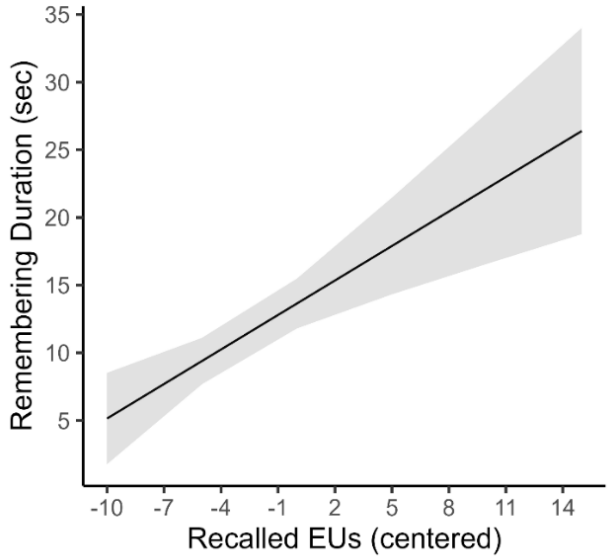
RESULTS – RECALLED EUS AND REMEMBERING DURATION

Experiment 1



Parameter	Coefficient	SE	CI_low	CI_high
Intercept	21.36	1.81	17.80	24.91
EUs	1.43	0.24	0.97	1.90

Experiment 2

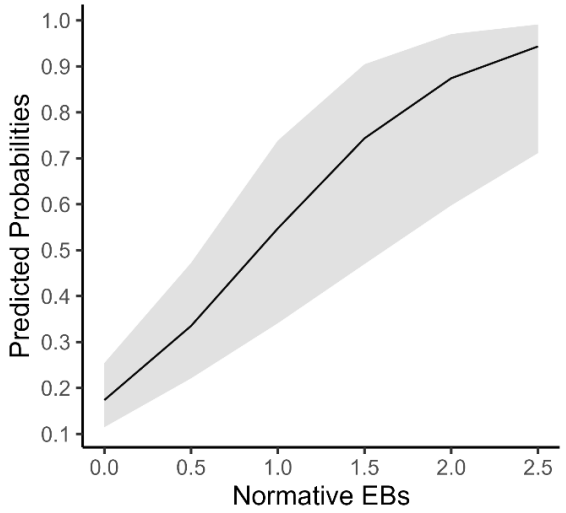


Parameter	Coefficient	SE	CI_low	CI_high
Intercept	13.64	0.94	11.81	15.48
EUs	0.85	0.22	0.43	1.27

Linear mixed effects models (Bates et al., 2015)

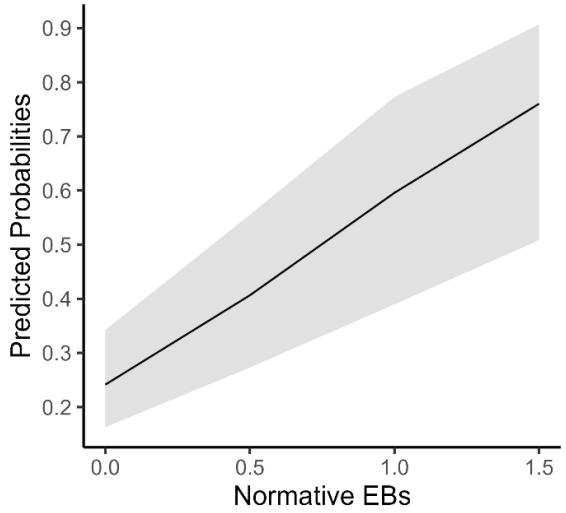
RESULTS – THE TEMPORAL STRUCTURE OF RECALL

Experiment 1



Parameter	Coefficient	SE	CI_low	CI_high
Intercept	-1.67	0.25	-2.16	-1.19
EBs	1.75	0.39	0.98	2.52
Moment Duration	0.06	0.01	0.04	0.07

Experiment 2

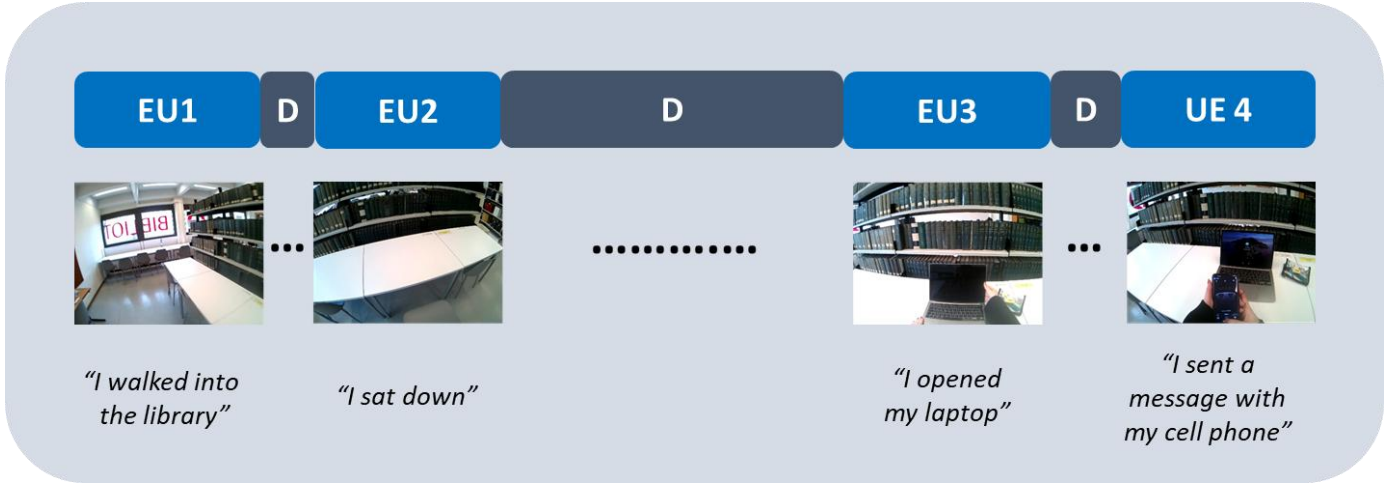


Parameter	Coefficient	SE	CI_low	CI_high
Intercept	-1.21	0.25	-1.70	-0.71
EBs	1.53	0.34	0.87	2.20
Moment Duration	0.06	0.01	0.04	0.09

Multilevel Logistic Regression (Sommet & Morselli, 2017)

DISCUSSION

Event Segmentation + Event Duration



Temporal Compression

Event Duration

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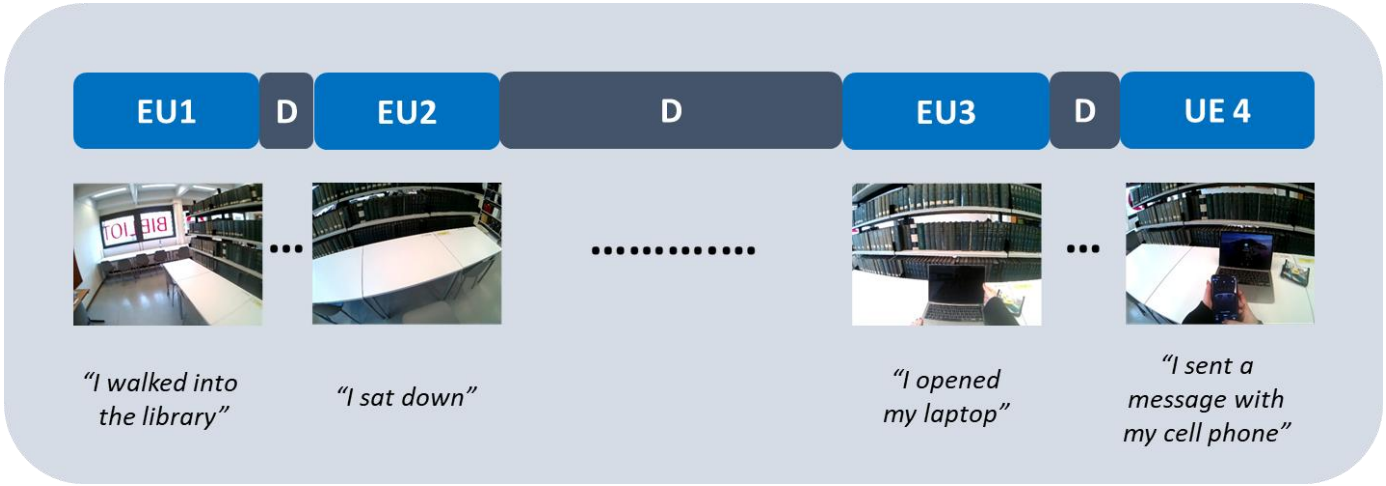

Temporal Compression

Acknowledgments

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Arnaud D'Argembeau

THANK FOR YOUR ATTENTION

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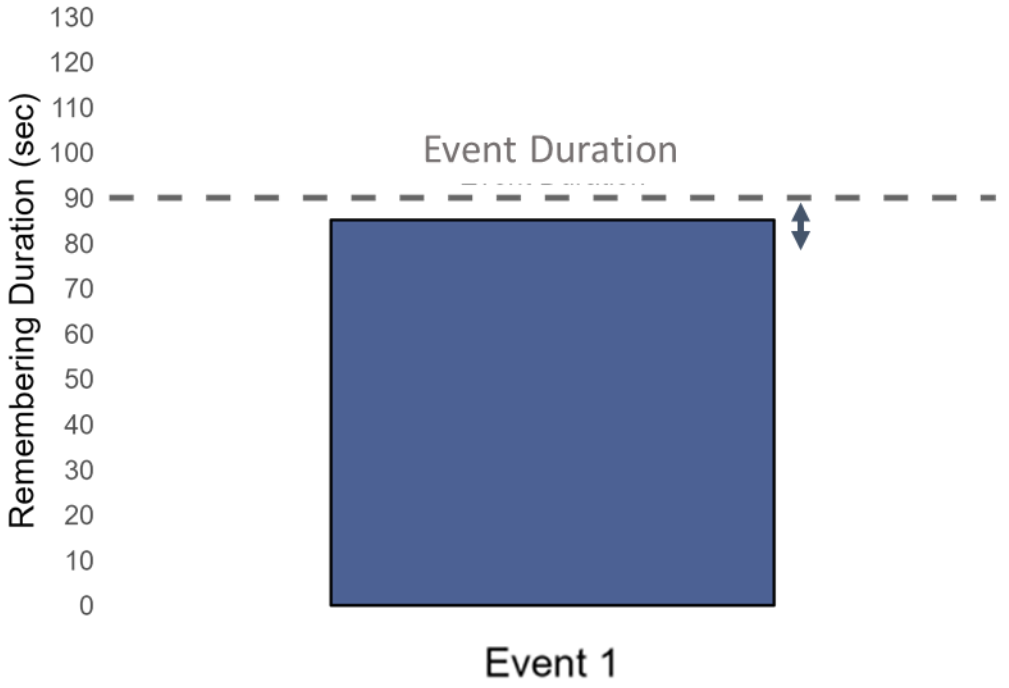
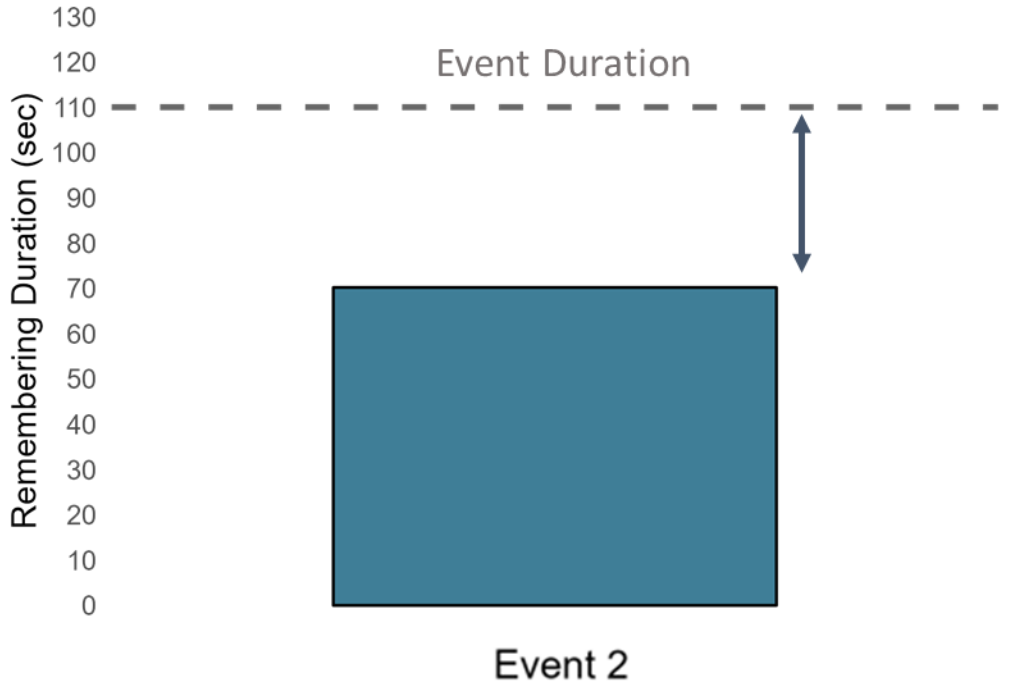
EXTRA SLIDES

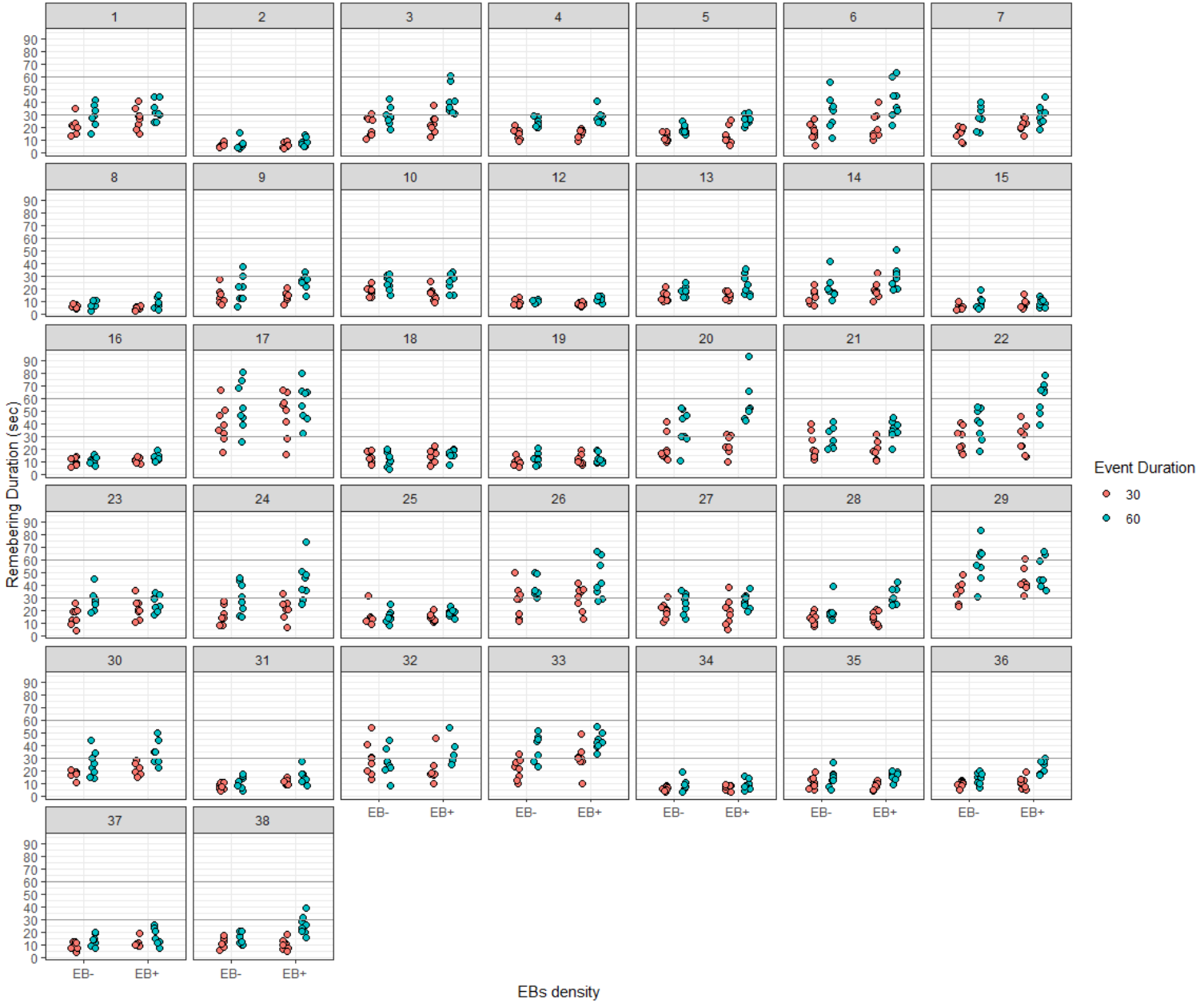
VARIATIONS IN TEMPORAL COMPRESSION





ABSTRACT

Everyday events are represented in memory as a sequence of experience units—each corresponding to a moment of past experience—separated by temporal discontinuities. As a result, mentally replaying events is faster than their actual duration. In two studies, we investigated how temporal compression rates vary with event duration and segmentation (i.e., the number of sub-events they contain). Participants watched 32 videos of daily activities lasting 30 or 60 seconds (Study 1, n = 37), or 20 or 40 seconds (Study 2, n = 29), with either few or many event boundaries (EBs), which mark sub-event transitions. Immediately after watching each video, participants mentally replayed and then verbally described its content. Results showed that temporal compression was greater for longer videos and those with fewer EBs. Participants recalled more experience units when videos contained many EBs, and the number of recalled units was negatively associated with temporal compression. Moreover, moments spanning EBs were more likely to be recalled. These findings support the idea that experience units in memory are formed during the perception of EBs, with event duration and segmentation jointly shaping temporal compression in memory representations.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EB-
EB+
Remebering Duration (sec)
EBs density
Event Duration
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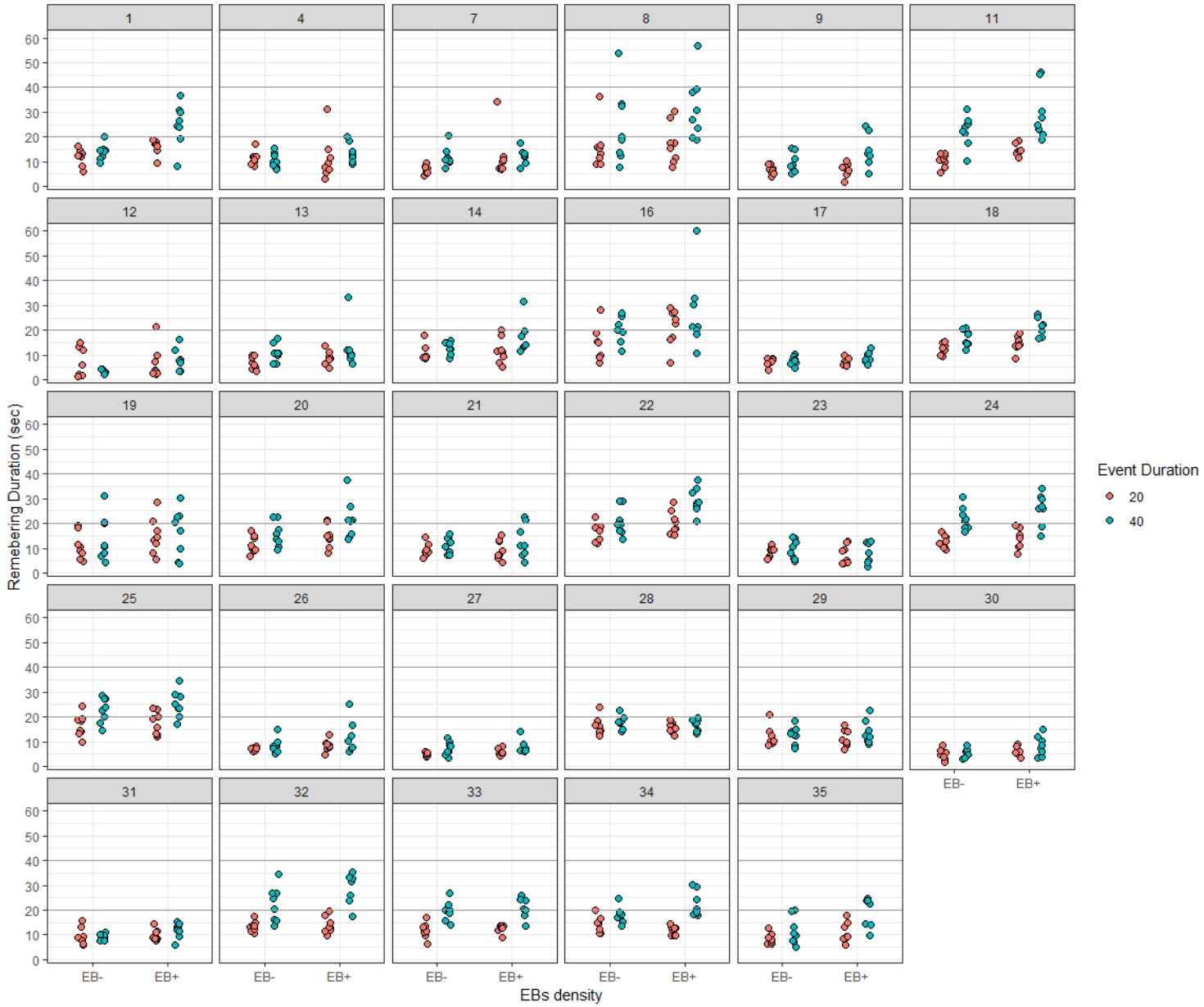
60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EB-
EB+
Remebering Duration (sec)
EBs density
Event Duration
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= Working memory capacity

= Part of the event still represented in working memory when an EB is perceived