

Schema-based temporal memory in parietal cortex (SCHETEMP)

ABSTRACT:

Background

The ability to organize events in time is a hallmark of episodic memory. However, relatively little is known about the cognitive and neural mechanisms underlying temporal memory for complex events.

Aims

We investigated behaviorally the role of schematic prior knowledge on temporal memory. An EEG study aimed to identify an oscillatory signature of temporal memory precision. A TMS study tested the hypothesis of a causal role of the angular gyrus (AG) in temporal memory.

Method

Participants performed a timeline task. Behaviorally, a mismatch between prior knowledge and encoding material was created. For the EEG study, a multivariate pattern analysis (MVPA) of the time-frequency data was used to classify trials associated with low, medium and high precision. A representational similarity analysis (RSA) was used to examine the similarity between the behavioral and neural distance associated with pairs of movie parts. We applied rTMS over AG during the timeline task.

Results

Participants tended to automatically adjust the temporal representation according to their schematic knowledge. We found that widespread oscillatory activity in the high beta/low gamma frequency (28-40Hz) codes for both temporal memory precision and the representation of event structure. We found a facilitatory effect on temporal memory after the beta stimulation of the right AG (but not of the left AG).

Conclusions

We found an automatic effect of prior knowledge on temporal memory. Crucially, we found an oscillatory signature of temporal memory in high beta/low gamma band. This activity seems to be subserved by a distributed cortical network which involves the right angular gyrus.

Keywords

Temporal episodic memory, Temporal representation, Beta/gamma band, Parietal cortex, Angular gyrus

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Published Work:

Frisoni, M., Di Ghionno, M., Guidotti, R., Tosoni, A. & Sestieri, C. (2022). Effects of a narrative template on memory for the time of movie scenes: Automatic reshaping is independent of consolidation. *Psychological Research*, 87(2), 598-612. doi: 10.1007/s00426-022-01684-w

Frisoni, M., Selvaggio, A., Tosoni, A., & Sestieri, C. (2023). Long-term memory for movie details: selective decay for verbal information at one week. *Memory*, 31(9), 1232-1243. doi: 10.1080/09658211.2023.2253568

Researcher's Contacts:

Matteo Frisoni
Università degli Studi "G. d'Annunzio" Chieti – Pescara
Department of Neuroscience, Imaging and Clinical Science
Via dei Vestini, 33
66100 Chieti
Italy
Phone: +3908713556935
Email: matteo.frisoni1@gmail.com