

Word learning and semantic integration: memory reactivation as a key mechanism for building the mental lexicon.

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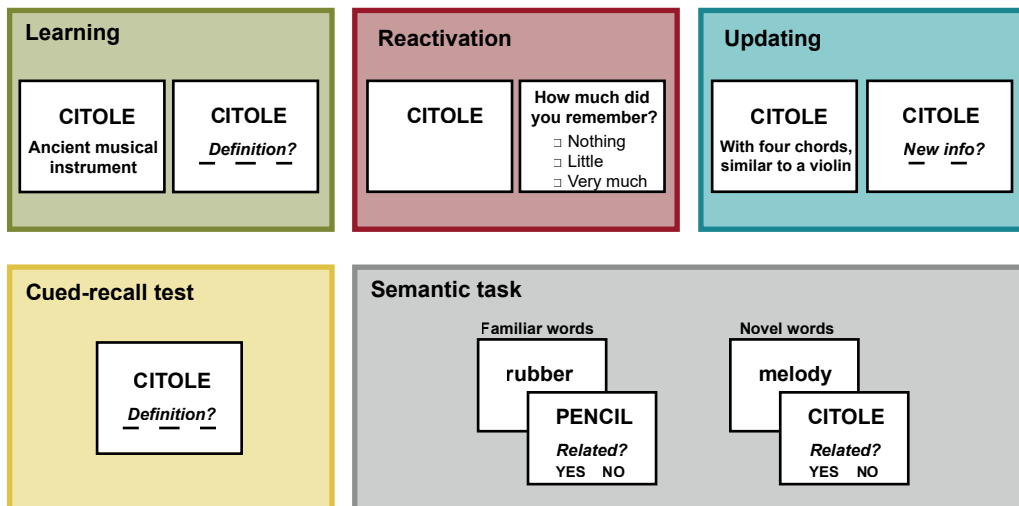
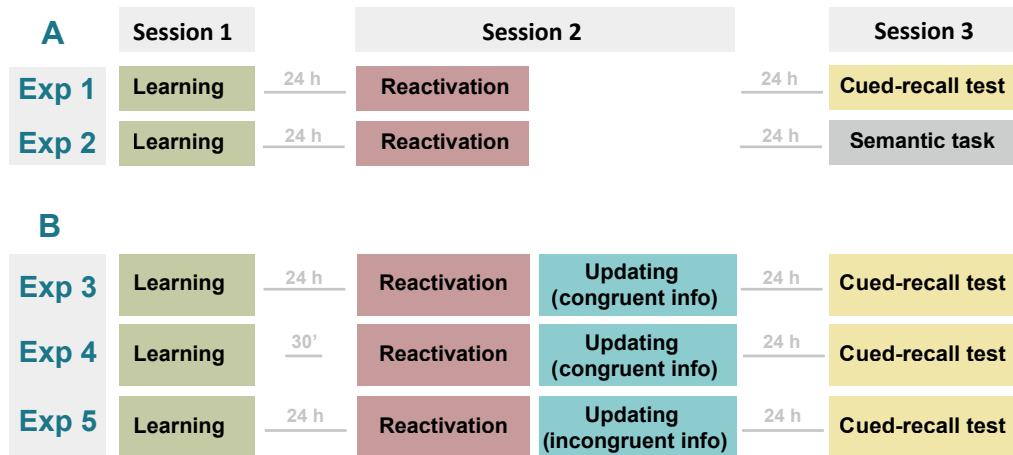
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Motivation

- Learning the meaning of new words is an important aspect of human language. However, after learning occurs, words must be able to integrate with other lexical items accordingly, while remaining malleable for possible updates.
- The reactivation framework proposes that, upon reactivation, the stabilized memory item transiently destabilizes and again engages neuronal mechanisms of re-stabilization. Thus, memories become susceptible to disruption, enhancement and modification by experimental treatment.
- **Objective:** Analyze the contribution of memory reactivation to the enhancement and updating of words' meaning. Our hypothesis is that reactivating a novel word's meaning could be a key mechanism for its lexical integration and plasticity.

Methods

- Participants: Native speakers of Spanish, 18-35 years.
- Stimuli: 20 low-frequency Spanish words (average 0.03 in EsPal), with between 5-8 letters.



• Both studies were performed online using The Gorilla Experiment Builder (www.gorilla.sc).

• Statistical Analysis: Accuracy data were analysed performing a Generalized linear mixed model with binomial distribution. Response times data were analysed performing a General linear mixed model of the log-transformed response times. Participants and words were included as random effects for all models.

Discussion

- Reactivation not only played a role in enhancing the explicit memory for the novel words, but also enhanced the interaction of the words with other lexical entries which is considered as a measure of lexical integration.
- Long-term consolidation is not essential for memory updating but it may elicit stronger effects; whereas congruency with an existing memory schema is required for updating a novel's word meaning.
- Taking into account both studies, we suggest that memory reactivation might be an important mechanism for constructing and updating our mental dictionary.

Results

Study A: Role of reactivation in memory strength.

Experiment 1

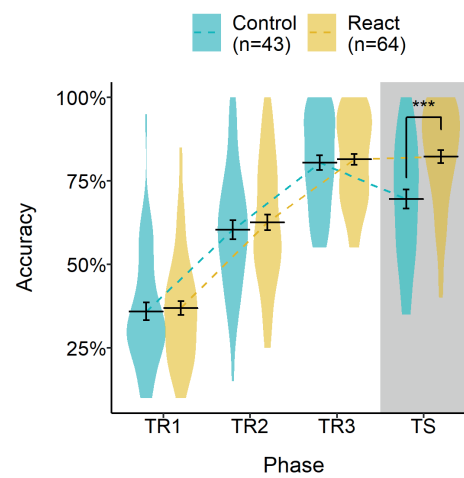


Fig 1. Accuracy in the learning task (TR1, TR2, TR3) and in the cued-recall test (TS) for each group.

Experiment 1 shows a significant enhancement of word recall in the Reactivated group compared with a group that didn't receive the reactivation session.

Experiment 2

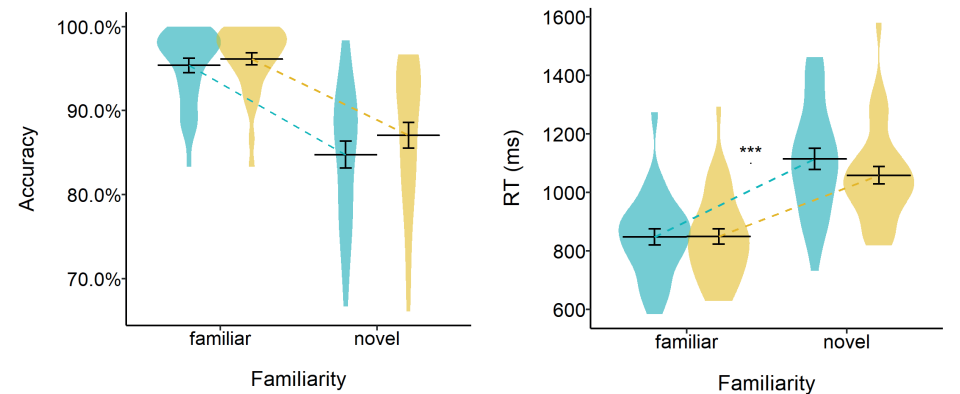


Fig 2. Accuracy and response times in the semantic task for familiar and novel words for each group.

Experiment 2 shows a significant enhancement of semantic recognition speed in the Reactivated group for the novel words compared with a Control group with no reactivation.

Study B: Role of reactivation in memory updating.

Experiments 3, 4 and 5

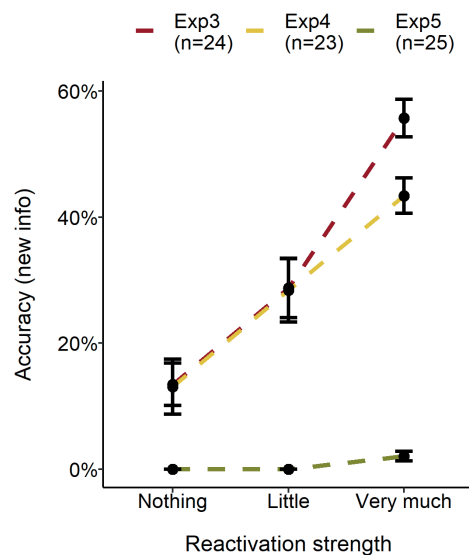


Fig 3. Accuracy in the cued-recall test by reactivation strength of the initial definition (reported in the Reactivation phase) and by experiment.

Experiment 3 and Experiment 4 reveal a significant enhancement of the updated definition memory that increases according to the reactivation strength of each word. Experiment 5, which included incongruent new information, didn't show any retention of the updated definition's memory.

Further analysis between experiments reveal that congruence and reactivation 24 hs after the learning session show a significantly higher retention of the updated definition.