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BEHAVIOURAL AND NEURAL CORRELATES OF VISUAL **WORD LEARNING**

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BACKGROUND:

According to distributed models of the lexicon[1] a fully lexicalised word interacts with other entries in vocabulary, competing for activation during word processing (lexical competition).The CLS model[2] predicts that lexical competition (LC) occurs after a period of consolidation, as a symptom that the word has been transferred into long term memory.

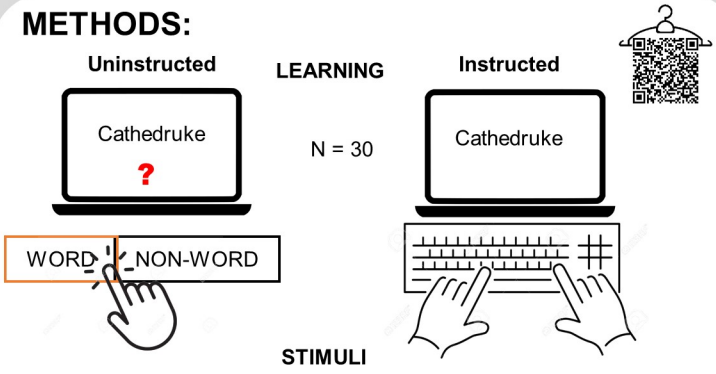
However how and when a novel word is integrated and thus becomes functional is still an open question. Results are not entirely coherent, e.g., facilitation[3], null effects[4], unclear role of sleep [5,6]. It remains even less clear whether learning methods play a role.

AIMS:

Test word knowledge of instructed learning routines already proven to be successful[7] against forms of learning that are incidental, i.e., uninstructed.

Compare the classic behavioral measure of lexical competition with a more robust measure of word learning acquired through EEG with Fast Periodic Visual Presentation (FPVS) & oddball paradigm.

METHODS:



STIMULI

60 novel words derived from real Italian words without neighbours (hermit words) by substituting one letter, e.g:

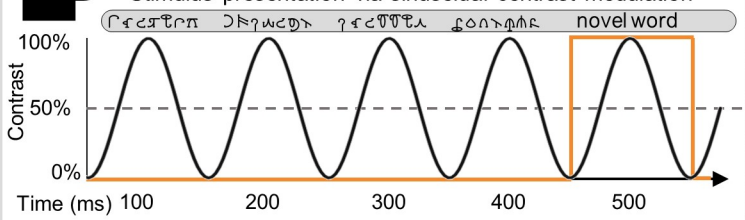
Banana → Banara

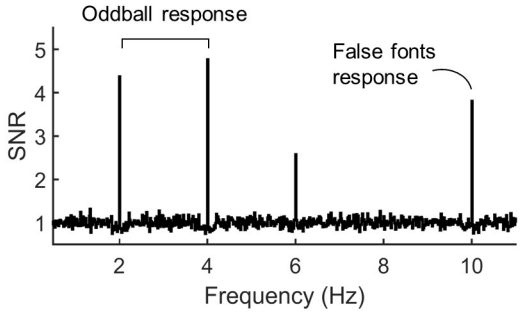
Divided in two lists: trained stimuli, control stimuli. Participants were assigned randomly to the two lists.

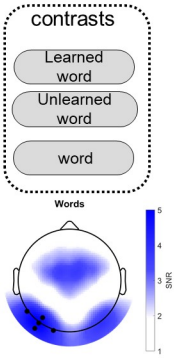
TESTING

Fast Periodic Visual Stimulation (FPVS) with an oddball paradigm + EEG recording [8]

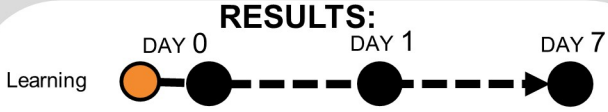
Stimulus presentation via sinusoidal contrast modulation

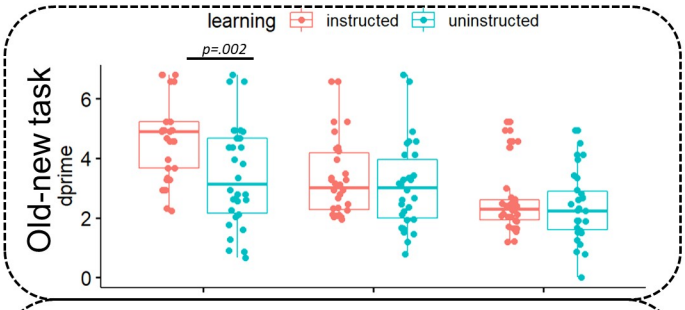


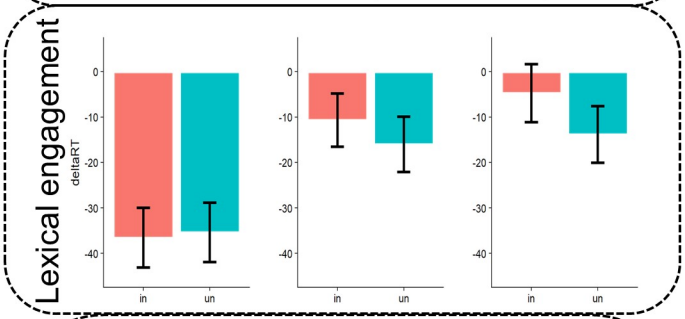


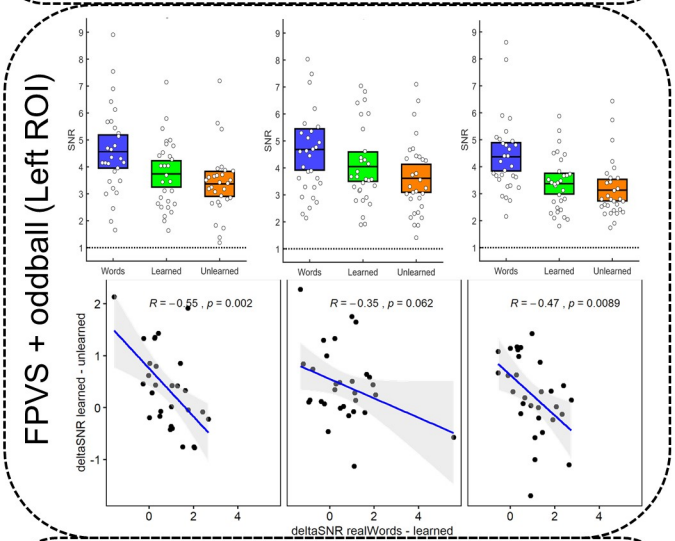


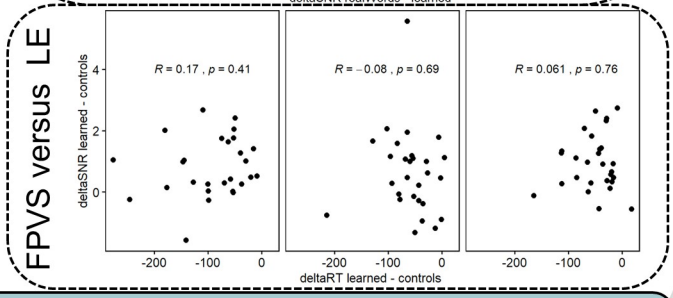
RESULTS:











CONCLUSIONS:

These findings provide evidence of rapid word memory integration. We observed lexical facilitation rather than lexical interference. Novel words were integrated in the lexicon soon after learning as shown by training-induced neural changes for trained novel words. Crucially, our EEG task do not correlate with the behavioral effects, suggesting that they probably assess different cognitive mechanisms involved in visual word recognition.

[1] Gaskell, M. G., & Marslen-Wilson, W. D. (1997). *Language and cognitive Processes.* **[2]** Davis, M. H., & Gaskell, M. G. (2009). *Philosophical Transactions of the Royal Society B: Biological Sciences.* **[3]** Merkx, M., Rastle, K., & Davis, M. H. (2011). *The Quarterly Journal of Experimental Psychology.* **[4]** Gaskell, M. G., & Dumay, N. (2003). *In Proceedings of the 15th ICPhS conference.* **[5]** Lindsay, S., & Gaskell, M. G. (2013). *Journal of Experimental Psychology: Learning, Memory, and Cognition* **[6]** Kapnoula, E. C., Packard, S., Gupta, P., & McMurray, B. (2015). *Cognition.* **[7]** Tamminen, J., Davis, M. H., Merkx, M., & Rastle, K. (2012). *Cognition.* **[8]** Lochy, A., Van Belle, G., & Rossion, B. (2015).*Neuropsychologia*