

Separating Judgements of Learning from Memory Encoding: An Event-Related Potential Study

Ida-Maria Skavhaug¹, Edward L. Wilding² and David I. Donaldson¹

¹Dept. of Psychology, University of Stirling, Scotland, ²School of Psychology, Cardiff University, Wales



INTRODUCTION



Research has shown that self-monitoring of long-term memory operations can influence how successful learning will be. To investigate how people self-monitor, psychologists have asked learners to make judgments about the likelihood of future recall of recently studied material; known as Judgments of Learning (JOL).

Little is currently known about the functional and neural basis of JOLs and how they relate to memory encoding. Here we use behavioral and neuroimaging methods to ask whether JOLs genuinely reflect a higher-order process independent of memory.

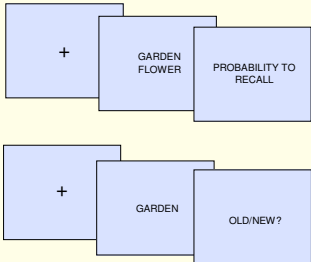
Are Judgments of Learning simply a result of memory encoding or mediated by neural processes that are distinct from encoding?

METHOD

(N = 24)

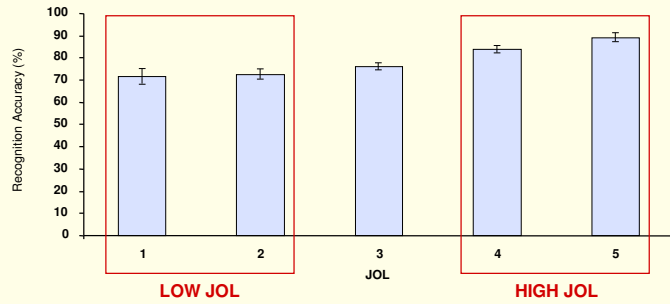
Study
280 word pairs presented visually. Participants estimated on a scale from 1 to 5 how likely they would be to recall the target word (Flower) when presented with the cue (Garden) at test.

Test
280 old + 140 new words. Participants decided whether each word was old or new.



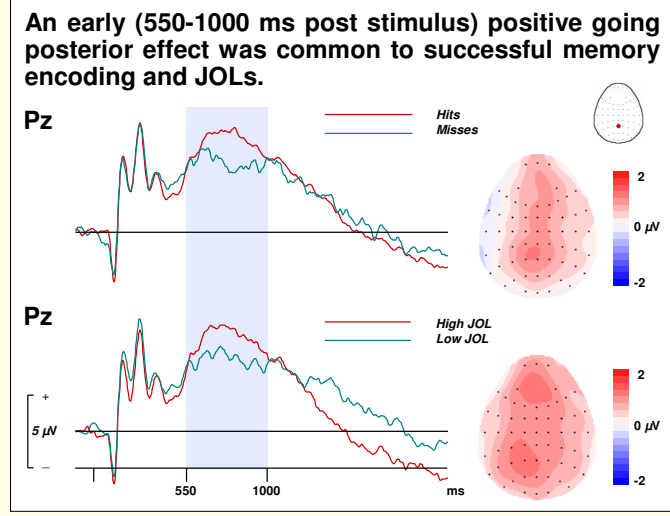
Key Contrasts: Event-Related Potentials (ERPs) elicited by study items were recorded from 62 locations and separated in two ways. First, according to whether items were subsequently remembered or forgotten. This contrast indexes successful encoding processes. Second, according to whether study items attracted High or Low JOLs. This contrast indexes a subjective assessment of memory encoding. **If these two contrasts reveal different effects, this would support the claim that JOLs do not reduce to the same processes that support successful encoding.**

RESULTS

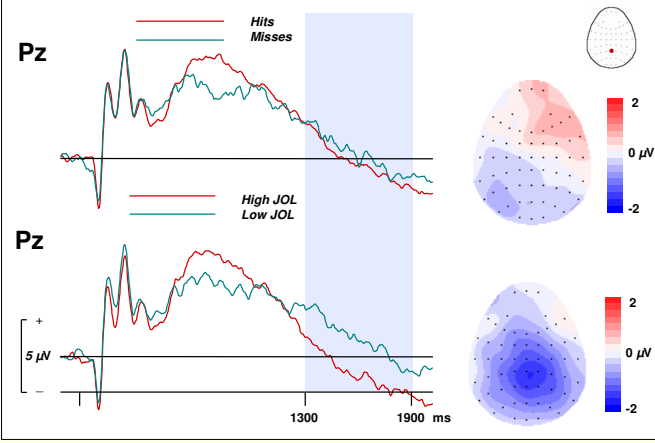


Recognition Memory Performance: Probabilities of correct responses to old items split by JOL are shown in the graph above: response accuracy improved with increasing JOL. Overall, participants identified old items correctly (hits) 80% of the time, and new items incorrectly (false alarms) 18% of the time.

The ERPs below illustrate the activity that differentiated: (i) items remembered or forgotten at test, and (ii) items rated likely or unlikely to be remembered later (high and low JOL).



A later (1300-1900 ms post stimulus) negative going left central effect was specific for JOLs.



SUMMARY AND CONCLUSION

Participants were relatively accurate at making JOLs. Successful memory encoding and JOLs are associated with a common ERP effect:

- It is possible that JOLs are partly a result of memory encoding.

There is, however also neural activity that is specific to JOLs:

- The presence of the second topographically distinct JOL effect suggests that additional JOL processing is occurring *after* encoding.

While some processes are common to subjective and objective measures of memory accuracy, there are also processes that distinguish the two.

Judgements of Learning reflect in part metacognitive assessments of memory processing rather than simply the effectiveness of memory encoding operations.

*Correspondence address: is10@stir.ac.uk