The effect of strategic processes at encoding on associative memory

Stéphanie Crête, Héloïse Drouin, Dr. Patrick Davidson
Undergraduate Research Opportunity Program, University of Ottawa

Introduction

Episodic memory requires memory for particular features (e.g. objects: keys, location: kitchen table), and memory for the binding of these features together into a coherent whole (e.g. “I last saw my keys on the kitchen table.”) (Chalfonte & Johnson, 1996). The binding of features can be strengthened by the use of effective memory strategies (e.g. interactive imagery: pumpkin in a box) at encoding. This has previously been observed in paired-word associates learning paradigms (e.g. Naveh-Benjamin, 2007).

The purpose of this study is to investigate the self-initiated strategies that younger adults use to help them memorize associations, such as paired-object (e.g. remembering the association between keys and wallet), and paired-object locations (e.g. remembering that the keys are to the left of the wallet on the kitchen table). We were particularly interested in measuring the association between memory performance for both types of associations and self-initiated strategy production.

Participants also completed measures of executive functioning, and meta-memory to investigate whether these factors influence self-initiated strategy production, and associative memory performance. This experiment is the first to directly compare both types of associative memory while measuring the impact of self-initiated encoding strategies on performance.

We hypothesize that:
1) Effective strategy production will be significantly associated with higher performance on both associative memory tests.
2) The performance on the object-object associations test will be better than the object-location associations test.
3) Higher executive functioning with generation of more effective strategies and better meta-memory.

Methodology

N = 13 Younger adults (18-30 years old) were recruited through the Integrated System of Participation in Research (ISPR).

Participants were presented with two tests of associative memory:
1) paired-object, where participants were asked to remember pairs of objects and 2) paired object-locations, where participants were asked to remember the location of objects in a grid. Participants were given the opportunity to practice before each test. During the encoding phase, object-pairs were presented in a grid for 8 seconds to allow sufficient time for strategy generation.

Following both memory tests, strategy production was measured retrospectively, item-by-item for all pairs of objects studied in both tests.

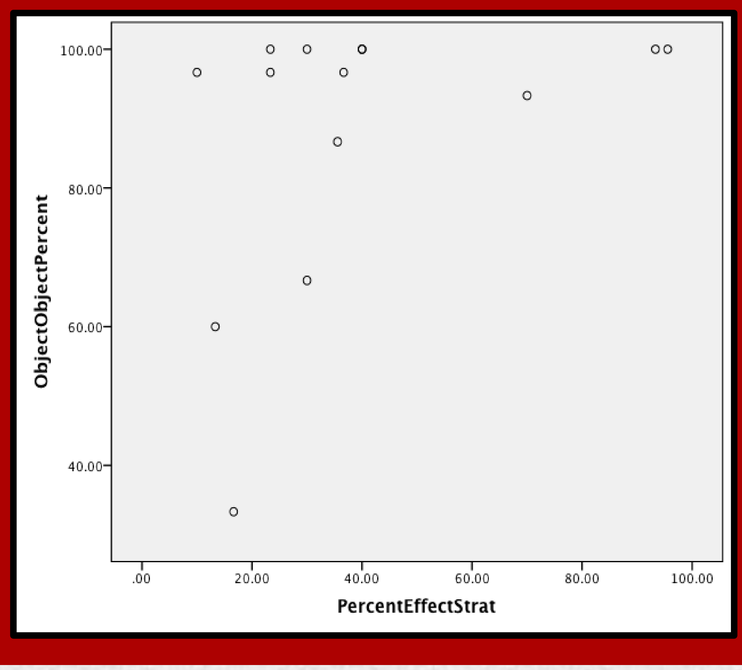
Participants also completed general questionnaires (demographics, general health, mood, quality of sleep) questionnaires measuring meta-memory (Mutlifactorial Memory Questionnaire, & Personal Encoding Preference Questionnaire) and a battery of executive functioning tests (Wisconsin Card Sorting Test, Verbal Fluency (FAS), Backward Digit Span, and Mental Control).

Acknowledgement

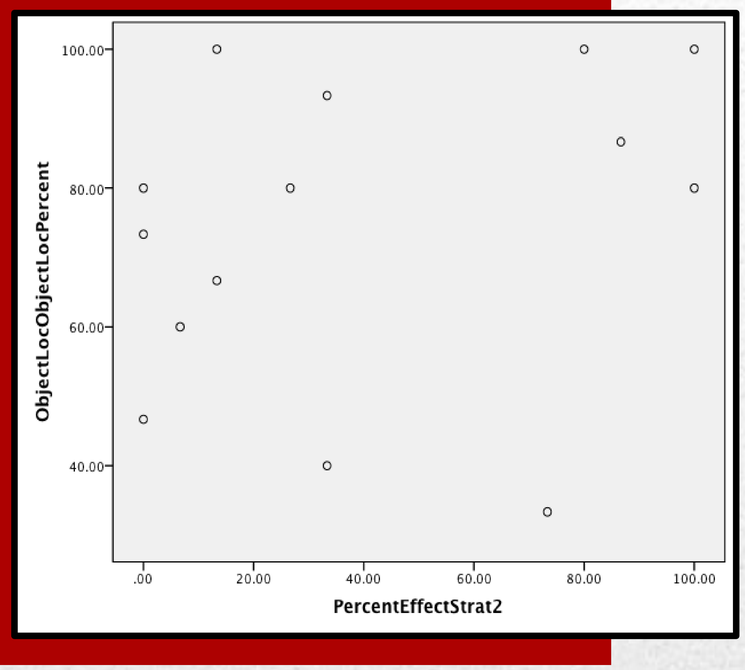
Thank you to Dr. Patrick Davidson and Héloïse Drouin for giving me the chance to work with them this semester. Being a part of this research program was very interesting. I would also like to thank the participants for contributing their time. Thanks to the UROP program for this great opportunity.

Results

Paired-Object Memory Test



Paired-Object Location Memory Test

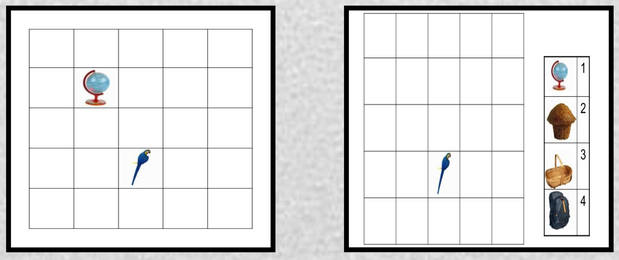


First, we conducted paired samples t-test to compare performance on the paired object learning test, and the paired object-location tests. We found that participants obtained a significantly higher score on the memory test for object-object associations, M=92.05 (13.37) than they did on the memory test for paired object locations, M =76.92 (20.84), t = 3.94(12), p < .002.

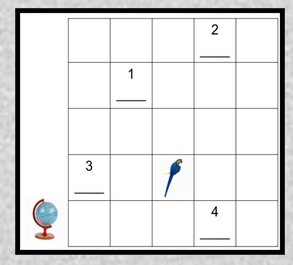
Second, we conducted Spearman correlations to measure whether performance on the memory tests was associated to effective strategy production. For the object-object test we found a correlation of $r_{s=}$.42, p = .14 n.s. For the object-location test we found a correlation of r_s =.47, p = .09 n.s., between the test and the use of effective strategies. Although these correlations show a medium effect size, these effects were non significant.

Finally, we conducted Spearman correlations between executive functioning and effective strategies to measure whether there is a relation between the two. The results were non-significant. Spearman correlations between meta-memory and effective strategies were also non-significant. The data of one participant was removed because of significant health conditions that impaired attention and memory.

Paired-Object Associations



Paired-Object Location Associations



Conclusions

There is no significant effect between performance on the memory test of paired object associations and effective strategies as well as between the memory test of paired object location associations and these strategies. However, there is a trend that indicates that there is a relation between the two, which suggests that we may obtain this statistical significance when we reach the total number of participants required to obtain 80% statistical power (n=32). This seems to indicate that performance on these associative tests is responsive to the generation of effective strategies at encoding. This may be due to greater depth of processing which helps to strengthen the binding of features.

There were no significant correlations between executive functioning and generating of effective strategies. Furthermore, there were no significant correlations between strategy production, executive functioning and meta-memory. This may be partly due to the small sample size.

Further information

scret084@uottawa.ca
613.898.1509

References

Chalfonte, B. L., & Johnson, M. K. (1996). Feature memory and binding in young and older adults. *Memory & Cognition*, 24(4), 403-416.

Naveh-Benjamin, M., Brav, T. K., & Levy, O. (2007). The associative memory deficit in older adults: The role of strategy utilization. *Psychology and Aging*, 22(1), 202-208.