International Journal of Research Studies in Medical and Health Sciences
Volume 3, Issue 6, 2018, PP 19-21
ISSN : 2456-6373

Semantic and Associative Memory Strategies in Young Adults

Kuo, M.C.C., Ng, C.Y., Tsang, K.W., Chan, H.W., Chung, O.K.

School of Medical and Health Sciences, Tung Wah College, Hong Kong

***Corresponding Author:** Michael C. C. Kuo, PhD, School of Medical and Health Sciences Tung Wah College, Mongkok, Kowloon, Hong Kong*

ABSTRACT

Semantic and associative encoding are both effective memory strategies. However, direct comparisons in a Chinese (pictographic) word pair context for their effectiveness is not known to have been conducted. Fourty-three young adult participants were recruited. Participants studied Chinese characters using a semantic, an associative encoding strategy or without a specific strategy (neutral condition), followed by a recognition memory test. The semantic strategy condition required the participants to judge whether a Chinese character is related to the animal category. The associative strategy condition required them to view Chinese character pairs and judge whether they are strongly associated. The recognition phase requires participants judge whether they have viewed the word or word pair in the study phase. Results indicated that associative strategy was more effective than semantic strategy, which in turn was more effective than the neutral condition.

Keywords: *memory; semantic; associative; encoding*

INTRODUCTION

Memory is a central cognitive function that supports an individual's daily function. Clinicians in rehabilitation usually help individuals with memory deficits to manage this difficulty by compensatory methods that support the retrieval of stored information (van Hulle & Hux, 2006). Intervention is under-developed for modulating the encoding process and, though it may be available, it is not always appropriate to apply directly to the aging or clinical population. Though semantic and associative strategies are distinct, they both allow a deeper processing of information. These strategies form the foundation for memory strategies such as elaboration and mnemonics approaches. Nevertheless, direct comparisons in a Chinese word pair context for their effectiveness is not known to have been conducted. The data obtained from this study will work as a baseline for future comparisons. This study should contribute to the theory and design of memory remediation programs in aging and clinical populations. It is expected that young adults will benefit from both semantic encoding and associated encoding strategies.

METHODS

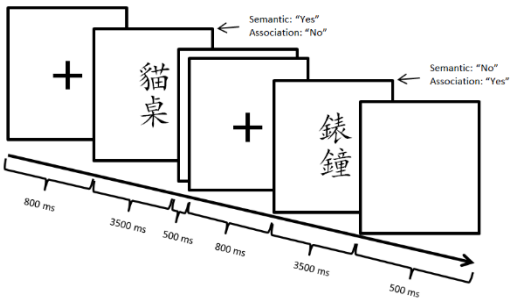
Participants

Fourty-three young adults (19 male, 24 female, age between 18 and 29) studying in a local college were recruited. Inclusion criteria included being a native Chinese speaker and having normal or corrected-to-normal vision. Exclusion criteria included any history of memory and neurological disorders. Informed consent was obtained for all participants.

Task Design and Procedure

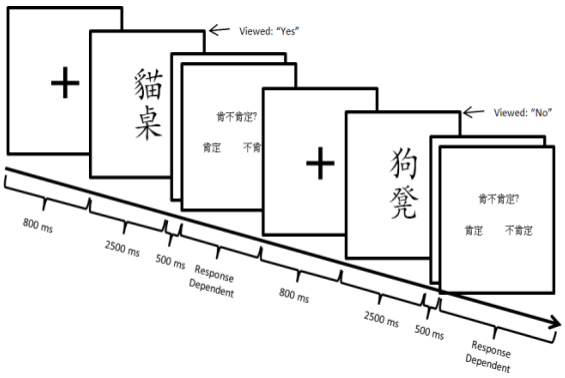
The Chinese character stimulus materials were gathered based on Kuo, Liu, Ting, and Chan (2014). The paradigm (see *Figure 1*) was modelled after Kuo et al. (2014) and a study by Bonner-Jackson and Barch (2011). There were three conditions, neutral, semantic and associative. In each condition, there were two phases, study and recognition. The participants completed neutral condition before moving onto the other conditions. The sequence of semantic and associative conditions was counterbalanced across the participants.

Encoding/Study Phase



Note: 貓桌 means cat-desk; 錶鐘 means watch-clock; neutral condition did not require a response; in the semantic condition, only one Chinese Character was displayed

Recognition Phase



Note: Note: 貓桌 means cat-desk; 狗凳 means dog-stool; 肯不肯定 means how sure are you?; 肯定 means rather sure; 不肯定 means not sure; in the semantic condition, only one Chinese Character was displayed

Figure1. *Schematic view of 2 trials in the study and recognition phases.*

In the study phase, participants were instructed to memorize the characters in the neutral condition. A semantic trial required the participant to view a Chinese character and judge whether a Chinese character was related to the animal category. An associative trial required the participant to view the two Chinese characters and judge whether they were strongly associated. The participants completed 35 trials in the study phase and 50 trials in the recognition phase of each condition. The recognition trials involved a participant viewing character or character pairs and judging whether they had been previously viewed in the study phase. A response will terminate the screen and a confidence rating prompt will then be shown: 'How sure are you?' Participants responded by pressing assigned buttons on the keyboard.

Data analysis

The Statistical Package for the Social Sciences software package version 21 (IBM, Chicago, Illinois, USA) was used to analyse the behavioural data. The behavioural data consisted of the reaction times (RTs, in milliseconds) and accuracy of the responses (percentages) obtained from the recognition phase. Based on the responses, the recognition trials were categorised as 'correctly identified' (identifies previously seen item correctly) or 'false alarm' (identifies previously unseen item incorrectly). The performances of participants on the recognition trials were estimated using the d-prime (d') measure (Neath & Surprenant, 2003). To compare the between-condition differences in d', one-way repeated measure ANOVA was used. To check whether gender affected d' results, the same one-way repeated measure was tested with a between-group factor *gender* (2 levels). To test retrieval RTs, two-way repeated measure ANOVAs were conducted with factors *condition* (3 levels) and *RT types* (2 levels).

Results

Table 1 shows results in the 3 conditions. One-way ANOVA conducted on d' was significant ($F(2, 84)=17.0$, $p<0.001$). Post hoc tests indicated that both semantic and associative strategies were more superior to the neutral condition (p's≤ 0.003). There is also some evidence that associative strategy is more effective than the semantic strategy ($p=0.02$). Gender did not affect results in d'. RT analysis indicated significant *condition* x *RT type* effect ($F(2, 84)=3.5$, $p=0.03$) which was a result of larger differences between correctly identified RTs and false alarm RTs in both semantic and associative conditions than the neutral condition.

Table1. *Behavioral results from the 3 conditions. Standard deviations are shown in the parenthesis*

	Neutral	Semantic	Associative
d'	1.89 (0.65)	2.36 (0.77)	2.71 (0.60)
Correct RT	807.74 (210.50)	778.96 (169.06)	878.07 (198.85)
False alarm RT	954.45 (345.39)	1106.41 (510.78)	1237.16 (529.05)

Discussions

This study compared semantic and associative memory strategy in the Chinese character context. Both semantic and associative strategies have been found to be effective previously (e.g., Kuo, Liu, Ting, & Chan, 2012; Kuo et al., 2014; Weyerts, Tendolkar, Smid, & Heinze, 1997). Results from this study did not deviate from previous study and, in addition, showed that associative strategy could even be more effective than the semantic strategy. This was the case for participants of both genders. Semantic strategy required participants to process the meaning of each Chinese character individually. Associative strategy required these participants to process the meaning of the characters as well as their implicit relationship. These results indicated that associative strategy seemed to allow stronger memory formation which aided performance in retrieval. The results should have educational and clinical implications.

Acknowledgement

This study was supported by a College Research Grant (reference no.: 2015-00-55-R150201) awarded to Dr. Michael Kuo.

References

[1] Bonner-Jackson, A., & Barch, D. M. (2011). Strategic Manipulations for Associative Memory and the Role of Verbal Processing Abilities in Schizophrenia. Journal of the International Neuropsychological Society, 17(5), 796-806.

[2] Kuo, M. C. C., Liu, K. P. Y., Ting, K.-H., & Chan, C. C. H. (2012). Differentiation of perceptual and semantic subsequent memory effects using an orthographic paradigm. Brain Research, 1486, 82-91. doi: 10.1016/j. brainres.2012.10.005

[3] Kuo, M. C. C., Liu, K. P. Y., Ting, K.-H., & Chan, C. C. H. (2014). Age-related Effects on Perceptual and Semantic Encoding in Memory. Neuroscience, 261, 95-106. doi: 10.1016/j. neuroscience.2013.12.036

[4] Neath, I., & Surprenant, A. M. (2003). Human memory: An introduction to research, data, and theory (2nd ed.). Pacific Grove, CA: Brooks/ Cole.

[5] van Hulle, A., & Hux, K. (2006). Improvement patterns among survivors of brain injury: Three case examples documenting the effectiveness of memory compensation strategies. Brain Injury, 20, 101-109.

[6] Weyerts, H., Tendolkar, I., Smid, H. G., & Heinze, H. J. (1997). ERPs to encoding and recognition in two different inter-item association tasks. Neuroreport, 8, 1583-1588. doi: 10.1097/00001 756-199705060-00007

Citation: *Kuo, M.C.C.,et.al, "Semantic and Associative Memory Strategies in Young Adults". International Journal of Research Studies in Medical and Health Sciences. 2018; 3(6):19-21.*