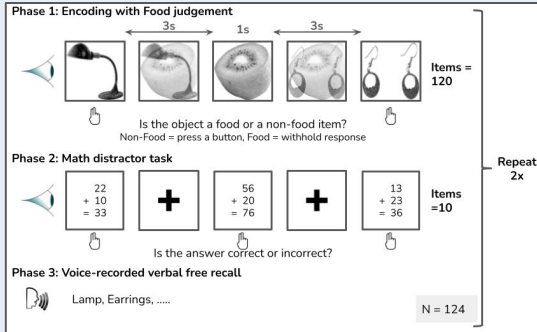


Introduction

Many factors contribute to the organization of memory.¹ One such type of organization is semantic organization of recall.² This means that items that are semantically related to each other are often recalled together.³ Here, we examined whether fluctuations in attention could be one factor impacting the semantic organization of memory.

How do attentional fluctuations during encoding influence the semantic organization of recall?

Methods



Attentional states:

→ based on response time variability

- “in the zone”
- “out of the zone”⁴

26 different categories:

→ based on the similarity of their meanings

Percentage of recalled items =

$$\frac{\text{number of recalled items}}{\text{number of studied items}} \times 100$$

References:

- ¹ Healey, M.K., Long, N.M. & Kahana, M.J. (2019) Contiguity in episodic memory. *Psychon Bull Rev* 26, 699–720.
- ² Morton, N. W., & Polyn, S. M. (2016). A predictive framework for evaluating models of semantic organization in free recall. *Journal of memory and language*, 86, 119-140.
- ³ Polyn, S. M., Norman, K. A., & Kahana, M. J. (2009). A context maintenance and retrieval model of organizational processes in free recall. *Psychological review*, 116(1), 129.
- ⁴ Jayakumar, M., Balusu, C., & Aly, M. (2022). Attentional fluctuations and the temporal organization of memory.
- ⁵ Manning, J. R., & Kahana, M. J. (2012). Interpreting semantic clustering effects in free recall. *Memory*, 20(5), 511-517.
- ⁶ Bousfield, W. A. (1953). The occurrence of clustering in the recall of randomly arranged associates. *The Journal of General Psychology*, 49(2), 229-240.
- ⁷ Cofer, C. N., Bruce, D. R., & Reicher, G. M. (1966). Clustering in free recall as a function of certain methodological variations. *Journal of Experimental Psychology*, 71(6), 858.
- ⁸ Polyn, S. M., Norman, K. A., & Kahana, M. J. (2009). A context maintenance and retrieval model of organizational processes in free recall. *Psychological review*, 116(1), 129.

Results

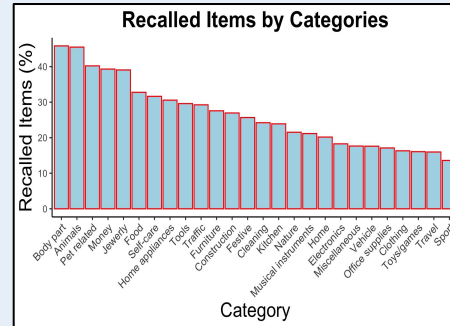


Figure 2
Percentage of recalled items calculated as the percent of recalled items out of the number of studied items.

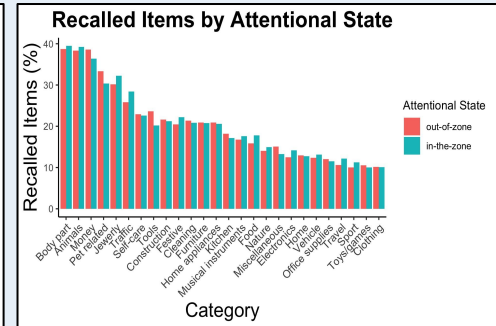


Figure 3
Percentage of recalled items in each category, separated by the attentional states: “in the zone” and “out of the zone”.

Future directions

When semantically related words (e.g. “cat” and “dog”) are embedded in a study list, these related words are often recalled successively.⁵ This tendency to successively recall semantically related words is termed **semantic clustering**.^{6,7}

One way to measure semantic clustering is using the **semantic clustering score**.⁸

- Use Latent Semantic Analysis (LSA) to get vectors for the items.
- Calculate the cosine distance between the vectors to get a semantic association value.
- Average of these semantic association values to get a semantic clustering score.
- Semantic Clustering Score from 0.5 to 1, where **1** means that the participant always chose the **closest semantic associate** and **0.5** indicates **no effect** of semantic clustering.

By measuring the semantic clustering score separately for each attentional state, we will be able to examine how the fluctuations in attention could impact the semantic organization of recall.

Creation of Word Association Spaces (WAS)

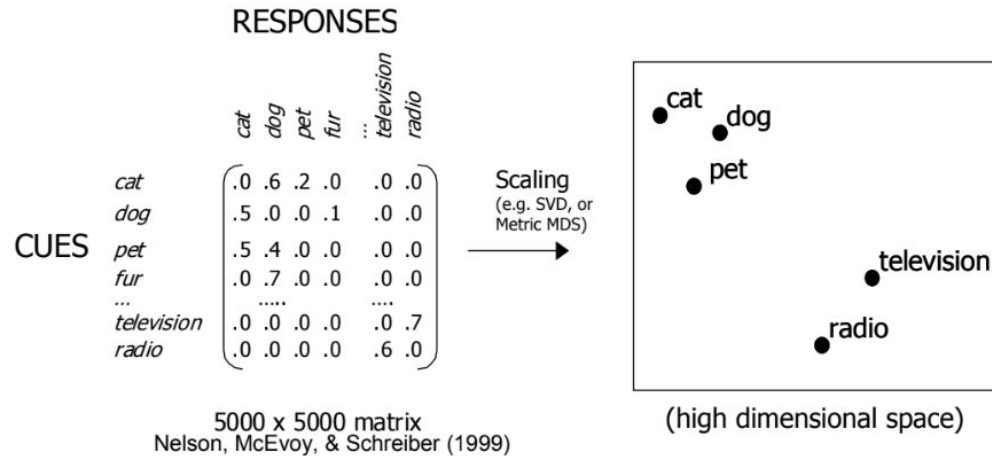


Figure 1. Illustration of the creation of Word Association Spaces (WAS). By scaling the word associations of a large database of free association norms, words are placed in a high dimensional semantic space. Words with similar associative relationships are placed in similar regions of the space.

Reference:

Steyvers, M., Shiffrin, R. M., & Nelson, D. L. (2005). Word Association Spaces for Predicting Semantic Similarity Effects in Episodic Memory.