Distractor Filtering and Working Memory: Effects of Saliency at Encoding and Maintenance

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Introduction

- Working Memory is the limited capacity temporary storage of information (Baddeley & Hitch, 1974).
- It has been shown to be vulnerable to the effects of distracting information during both encoding and maintenance (McNab & Dolan, 2014)
- McNab and Dolan (2014) have proposed separate mechanisms for distractor filtering at encoding and maintenance
- Previous research has revealed attention to be a key constraint on working memory capacity (Ricker et al., 2018)
- The allocation of attention to features of a scene is heavily influenced by saliency (Theeuwes, 1992)

Main Aims

- Replicate the finding that distractor filtering has a unique effect on working memory capacity at encoding vs maintenance
- Investigate whether saliency impacts working memory capacity differently at encoding vs maintenance

Method

Participants

41 participants aged 18-40

- Mean age 27.67 (SD 7.256)
- 29 Males, 12 Females

Design

Independent Variables

- Saliency (salient vs non-salient distractor)
- Distractor presentation period (encoding vs maintenance)

Dependent Variable

- Working Memory capacity (WMC) estimate (represented by Cowan's K value)

Procedure

- Participants memorised the location of the red circles (ignoring other colours)
- A yes/no response indicated whether the question mark was in the same location as a red circle (see figure 1)

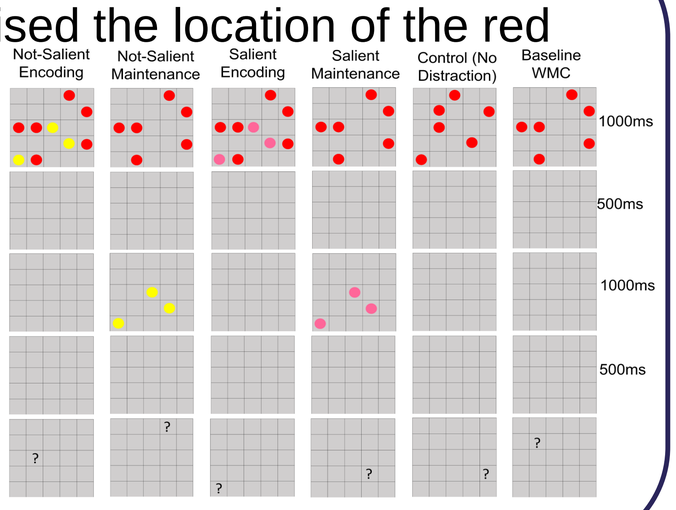

Figure 1. Visual depiction of the stimuli used for this experiment. Demonstrating conditions, and procedure.

Results

Data Analysis

- Data from 2 participants excluded as outliers
- Memory capacity represented by Cowan's K value

ANOVA

- No statistically significant differences between conditions
- F (2.76, 104.79) = 0.523, p = .652

Regression Analysis

- NSED uniquely predicted WMC (standardised β = .699, p = <.001)
- NSDD did not uniquely predict WMC (standardised β = .037, p = .845).
- SED and SDD uniquely and significantly predict WMC (SED: standardised β = .391, p = .010, SDD: standardised β = .401, p = .008).
- NSED uniquely predict WMC when controlling for SED (standardised β = .706, p = .001)

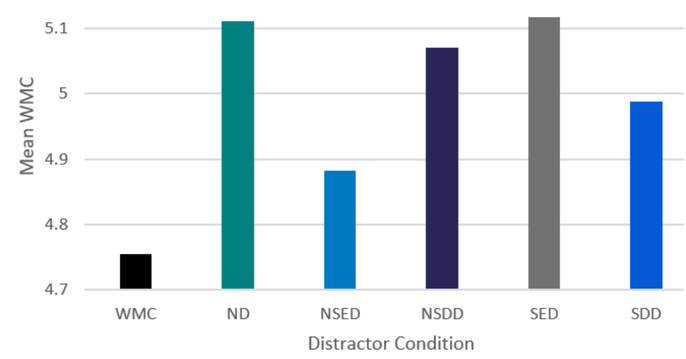

Figure 2. Graph showing the mean K values for each condition

Discussion

- Correlation between WMC, encoding, and distraction supports dual basis for WMC
- Failure to replicate previous results regarding not-salient delay distraction. Could be related to uncertainty surrounding distractor expectation
- Unique contribution to WMC of encoding and maintenance for salient distractors
- Suggests separate mechanisms for encoding and maintenance of salient distractors
- Unique contribution of non-salient but not salient encoding distraction to WMC

Future Research

- Separate tasks for salient and non-salient distractors
- Repeat experiment using different colours. Yellow and pink could both be considered salient depending on definition

Conclusions

- Current study demonstrated mixed support for previous literature
- Further research is necessary to clarify the proposed mechanisms

References:
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