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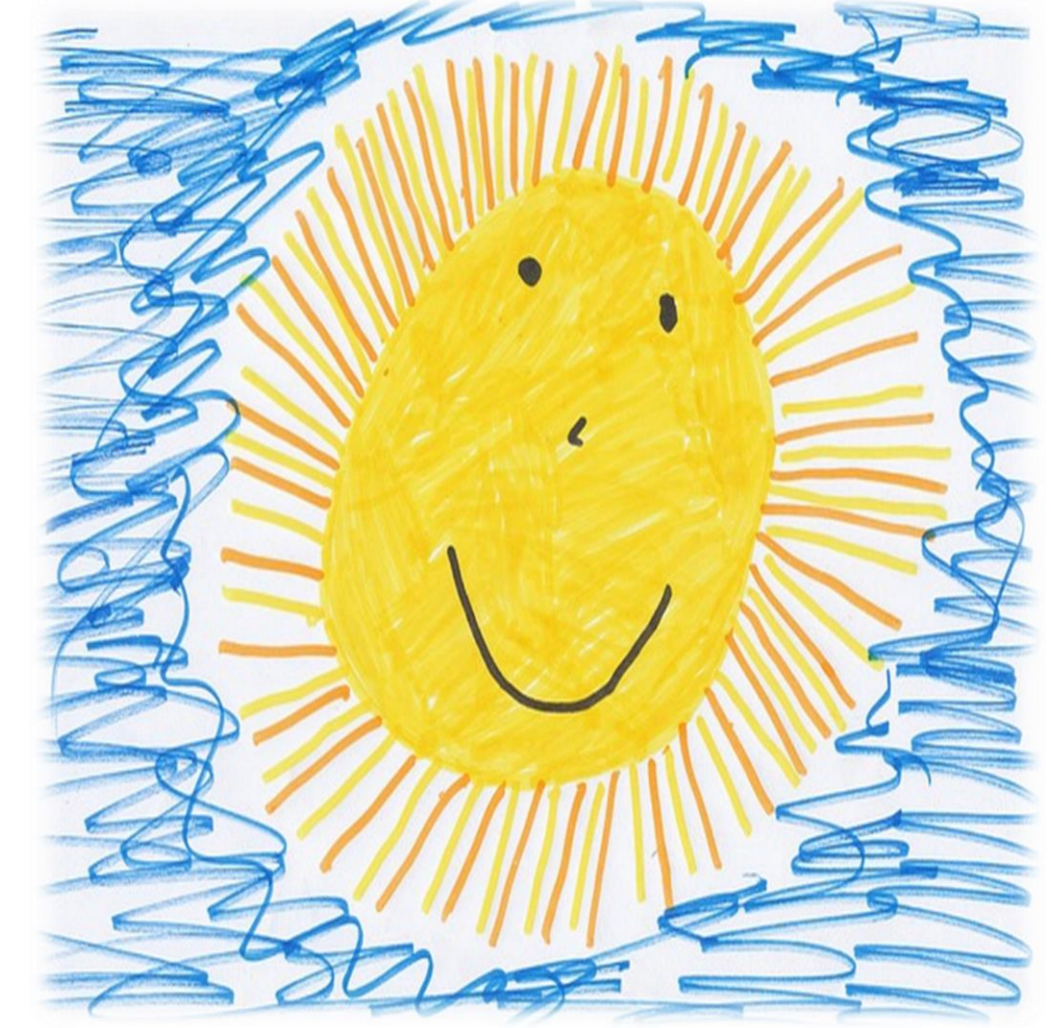
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# Drawing as an Encoding Strategy in Young Children

Lauren Taylor and Anna Macklin

## 1 Introduction

- Children's working memory (WM) is limited compared to adults (Alloway, Gathercole, & Pickering, 2006). Lower memory loads and span levels are reported (Towse, Hitch, & Hutton, 1998).
- WM is crucial for storing and retaining material and is implicated in educational success (Gathercole et al., 2016); techniques to enhance WM could be educationally beneficial.
- A variety of strategies focusing on enhancing children's memory at the encoding stage have been investigated: semantic encoding (Schleepen & Jonkman, 2012), mnemonic encoding (Hashimoto, 1991) and relational encoding (Fletcher & Bray, 1997). However, these techniques can lead to cognitive overload in young children and are difficult to integrate into standard classroom lessons.

### Drawing as an Encoding Technique

- Drawing can be an effective encoding technique for adults (Wammes, Meade, & Fernandes, 2016).
- Drawing during recall has been found to increase the amount of information children report (Patterson & Hayne, 2011); however, drawing as an encoding technique has received limited attention.
- Expected that drawing may act as a simple but deep encoding strategy which evokes verbal and nonverbal cues ( Craik & Tulving, 1975).

### Aims

The study investigated whether drawing could be an effective encoding strategy for children aged between 5 and 8 years. It was predicted that:

- There would be a significant difference between the two encoding conditions; children in the drawing condition would recall more than children in the verbal rehearsal condition.
- There would be a significant difference between the two age groups; regardless of condition older children would recall more than younger children.

## 2 Method

- Twenty eight participants aged between 5 and 8 years ( $M=6.97$ ,  $SD = 0.16$ ) recruited from a primary school.
- Consent was obtained from the school, the parents and assent from the children.
- Participants were randomly allocated to the draw or verbal rehearsal group.
- Children aged 5;0 to 6;6 were allocated to the younger age group and children 7;0 to 8;6 were allocated to the older age group.

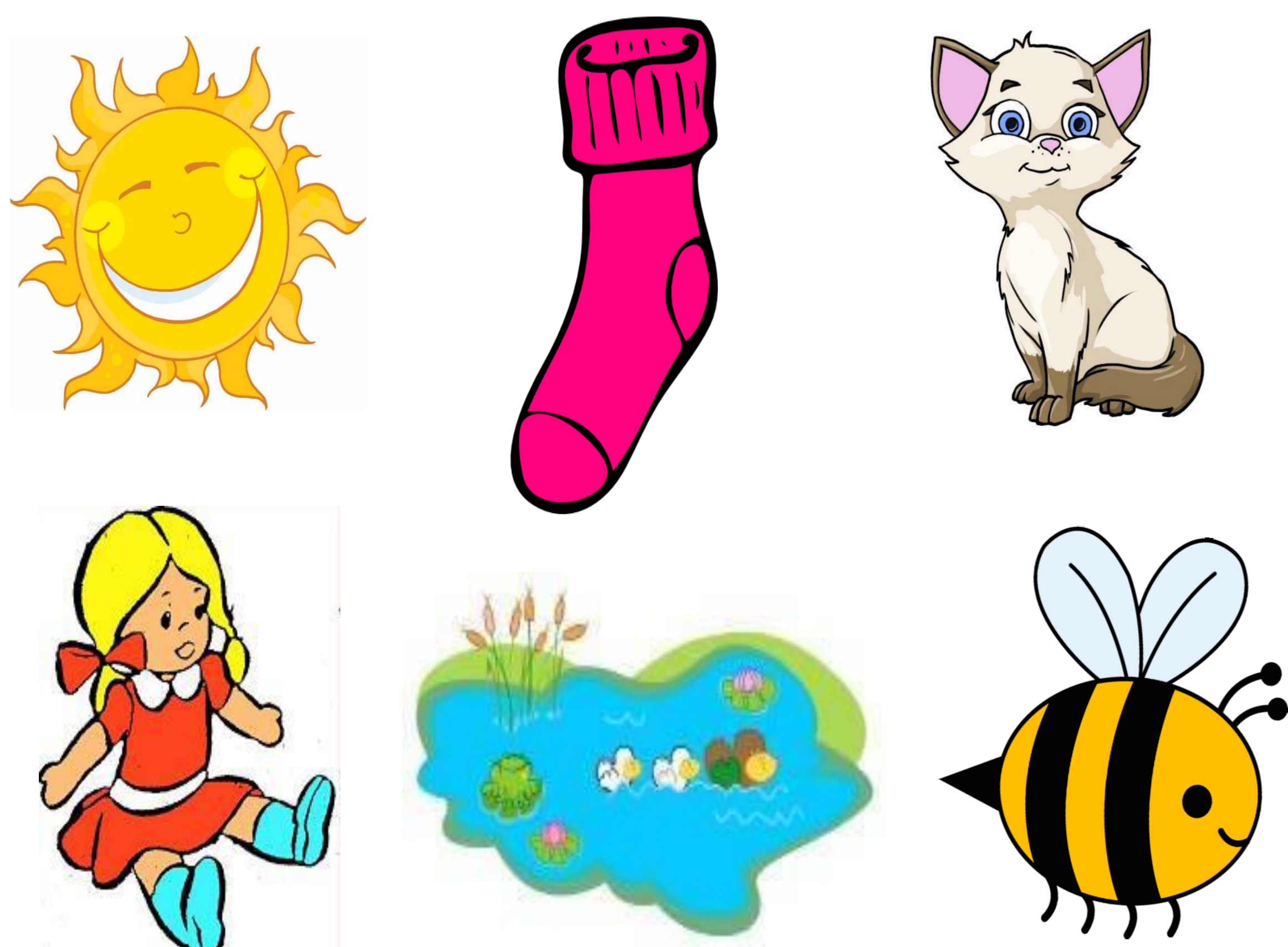


Figure 1: Six target pictures to be encoded and recalled

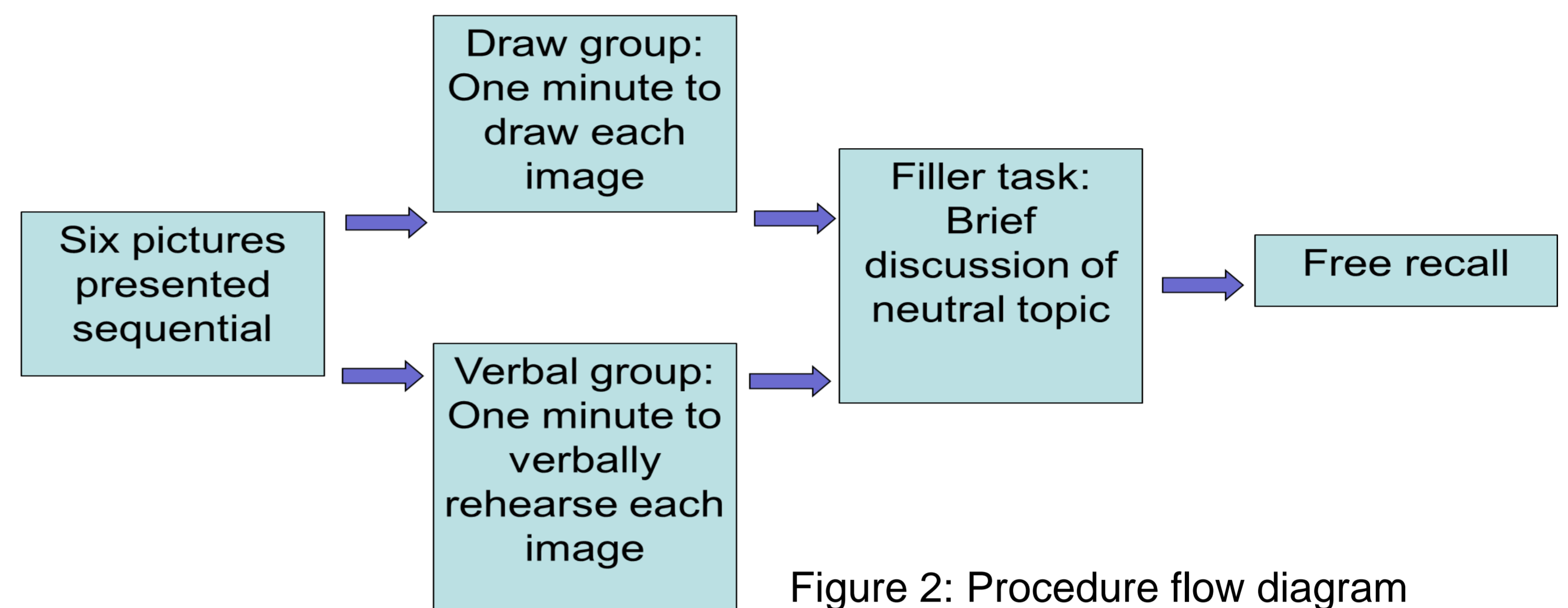


Figure 2: Procedure flow diagram

## 3 Results

Table 1. Mean (SD) recall scores by encoding condition and age.

	Drawing	Verbal	Overall Mean
Younger Children	3.63 (.52)	3.00 (.63)	3.36 (.63)
Older Children	4.33 (1.03)	3.50 (.93)	3.86 (1.03)
Overall Mean	3.93 (.83)	3.29 (.83)	3.61 (.88)

- 2 x 2 between subjects ANOVA.
- Significant main effect for encoding condition,  $F(1,24) = 5.753$ ,  $p < 0.05$ ,  $n_2 = 5.75$ , post hoc power = 0.634.
  - Children in the drawing group recalled significantly more than children in the verbal rehearsal group.
- There was no main effect for the age condition  $F(1,24) = 3.95$ ,  $p=ns$ ,  $n_2 = 0.141$ , post hoc power = 0.479.
- There was no significant interaction  $F(1,24) = 0.117$ ,  $p=ns$ ,  $n_2 = 0.005$ , post hoc power = 0.063.

## 4 Discussion

- Memory recall was superior, regardless of age, when children were encouraged to draw during the rehearsal phase; supports first hypothesis.
- No significant age differences reported which was unexpected. Adds to the utility of drawing as it negates age differences evident in other memory research.
- Supports previous research (Engle & Nagle, 1979; Fletcher & Bray, 1997; Summers & Craik, 1994); deep encoding strategies do lead to improved memory recall compared to shallow encoding strategies such as verbal rehearsal.
- Drawing as an encoding technique for young children has not been extensively researched; results found support research conducted with adults and drawing as an encoding technique (Wammes et al., 2016).
- Theoretical explanations as to why drawing is an effective technique not fully explored.
- Dual-coding hypothesis (Mayer & Anderson, 1991), picture superiority effect (Paivio, Rogers, & Smythe, 1968) and greater reliance on visual rather than verbal cues (Conrad, 1971) have been considered but do not explain the enhanced performance of the drawing group; both groups had the target picture present during the rehearsal phase.
- Depth of processing (Wammes et al., 2016) and a constructivism approach (Piaget, 1964) more robust explanations. The action of drawing may lead to participants strengthening and consolidating memory at encoding (Papert, 1980). Interconnected memory cues make retrieval easier.
- Promising educational application; simplicity of drawing means it could be easily integrated into classrooms.