Odd One Out: Young Children Fail to Display Memory Benefits for Conceptually and Perceptually Distinct Information

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Introduction

•The isolation effect occurs when individuals process differences (i.e., distinctive processing) between unique items relative to similarly organized background items (i.e., organizational processing, Hunt & Lamb, 2001).

•The few studies on the isolation effect in childhood suggest a weak and inconsistent effect (e.g., Howe, Courage, Vernescue, & Hunt, 2000):

- ○Seven-year-olds demonstrate a perceptual (e.g., item on a different background), conceptual (e.g., item from a different category), and weaker numerical (e.g., number in a list of words) isolation effect.
- ○The isolation effect in 5-year-olds appears limited to perceptual isolates.

•However, child studies differ methodologically from adult studies because they often present multiple isolates per list, compare isolate recall to recall of background items rather than control targets (see Figure 1 & 2), and have focused on long term retention over a span of weeks.

•In the present study we examined recall for perceptual and conceptual isolates with a traditional isolation paradigm (i.e., one type of isolate per list compared to control target recall) in 4- to 8-year-olds. We also examined output order in recall, as isolates are hypothesized to result in stronger memories that are recalled at an earlier output position (Jou, 2008).

Experiment 1

•In Experiment 1, we examined whether 4- to 6-year-olds showed the perceptual isolation effect in a traditional isolation paradigm.

Method

Participants

•Ninety-five children (*M* age = 5.00 years, SD=.65, range 3.97-6.80) participated in this study.

Design and Procedure

•Children were presented with two 6-item picture lists from the categories of animals, body parts, furniture, and foods.

- ○In the isolation list, the target item was perceptually different compared to background items (see Figure 1).
- ○In the control list, all items including the target were perceptually similar (see Figure 2).

•The order of list presentation was counterbalanced with one child's isolated item presented as another child's control item. Categories were not repeated between lists for an individual child. Target items were always presented in the fifth position.

•For each list, the experimenter presented the picture card one at a time and asked children to name the picture.

•After presentation of list 1, there was a 5-minute delay followed by a free recall period.

•There was a delay of at least 5 minutes before the presentation of list 2.

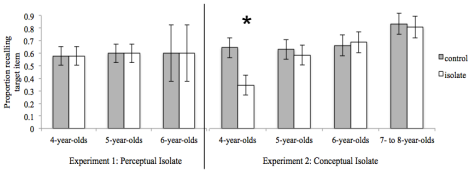
Results

- A repeated measures logistic regression was conducted on children's recall of the critical target item with list type (control vs. isolate) as a within subjects variable and age (centered) as a between subjects variable.
  - ○Figure 3 depicts no isolation effect or interaction between the isolation effect and age, Wald $\chi2(1)$s<.22, ps>.64.
- A general linear model was also conducted on recall position of the target item with list type as a within subjects variable and and age as a between subjects variable.
  - ○Output position of the target item did not depend on list, age nor was there a list by age interaction, Fs<.46, ps>.50, see Figure 4.

Figure 1. **Perceptual and Conceptual Isolation Lists**

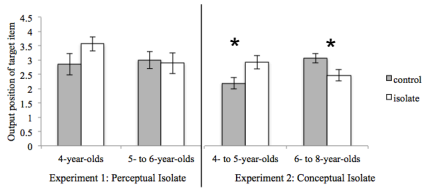
Figure 2. **Perceptual and Conceptual Control Lists**

Figure 3. **Proportion recalling target item by age**



* $p < .05$

Figure 4. **Output position of target item by age**



* $p < .05$

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Experiment 2

•Unlike previous studies (Howe et al, 2000), we failed to find a perceptual isolation effect in preschoolers. The goal of Experiment 2 was to determine if young children would show a conceptual isolation effect with this same paradigm.

•We also examined a wider age range (4- to 8-year-olds), as a conceptual effect has been demonstrated in older children (i.e., 7-year-olds, Howe et al., 2000) and categorical processing is developing into early school age (e.g., Brainerd & Reyna, 2001).

Method

Participants

•One-hundred and eighty-three children (*M* age= 5.96 years, *SD*=1.18, range 4.04-8.98) participated in this study.

Design and Procedure

•Methodology was identical to Experiment 1, except that children were presented with two different 6-item picture lists from the categories of animals, vehicles, clothes, and food.

- ○In the isolation list, the target item was conceptually different compared to background items (see Figure 1).
- ○In the control list, all items including the target were conceptually similar (See Figure 2).

Results

•A repeated measures logistic regression was conducted on children's recall of the critical target item with list type (control vs. isolate) as a within subjects variable and age (centered) as a between subjects variable.

- ○Figure 3 depicts a marginally significant age by list type interaction Wald(1)=2.80, p=.09, in which 4-year-olds surprisingly recall conceptual isolates less often than the control target, McNemar $\chi2(1)$ =5.33, p=.02.
- ○Children older than 5 did not show an isolation effect, McNemar $\chi2(1)$s <.06, p>.81.

•A general linear model was also conducted on recall position of the target item with list type as a within subjects variable and age as a between subjects variable.

- ○The output position of the target was different for the isolate and control target, and this varied by age, F(1, 67)=8.06, p=.01.
- ○Figure 4 shows that 4- and 5-year-olds recalled the isolate target later than the control, t(25)=2.51, p=.02, whereas 6- to 8-year-olds recalled the isolate target earlier, t(42)=2.47, p=.02

Discussion

•There was little evidence for a perceptual or conceptual isolation effect in a traditional isolation paradigm. In fact, 4-year-olds demonstrate the opposite of a conceptual isolation effect.

- ○Although the failure to find a perceptual isolation effect was surprising, it is possible that the perceptual difference was not as strong as previous work contrasting the perceptually distinct isolate against a white background (Howe et al., 2000).
- ○The lack of a conceptual isolation effect is consistent with research demonstrating that the necessary categorical organizational (e.g., Schwenck, Bjorklund, & Schneider, 2009) and distinctive processing strategies (e.g., Ornstein, Hale, & Morgan, 1977) are developing in early preschool.

•Younger preschoolers show late output for the conceptual isolate target, and this effect reverses for 6- to 8-year-olds.

- ○Late isolate output may reflect effortful organizational processing in young children (Schwenck et al., 2009), suggesting children may first focus efforts on grouping background items categorically allowing isolation recall only as an afterthought.
- ○Although older children fail to show a conceptual isolation effect in recall, earlier recall of the isolate may suggest a stronger memory trace for the isolate compared to the control target.