

Testing the Negative Priming Account of Perseverative Sorting in the Pre-School Years



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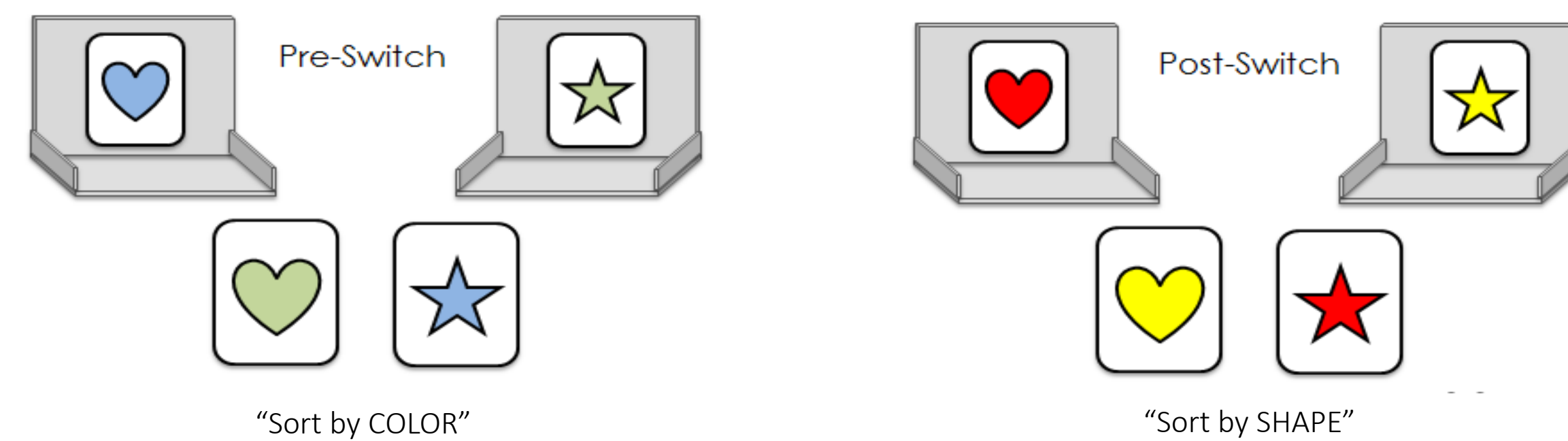


Introduction

- The Dimensional Change Card Sort (DCCS) is commonly used to assess the development of cognitive flexibility during the preschool years (Zelazo, 2006).
- Children first sort cards by one dimension (e.g., color) and then are instructed to switch to sorting by a second dimension (e.g., shape).
- Majority of 3-year-olds fail to sort the cards by the second dimension and instead perseverate on the first, pre-switch dimension.
- On some accounts, perseveration has been attributed to both the **activation** of the pre-switch features (e.g., blue and green) and the **inhibition** – or, **negative priming (NP)** – of the post-switch features (e.g., hearts and stars; Müller, Dick, Gela, Overton, & Zelazo, 2006; Zelazo, Müller, Frye, & Marcovitch, 2003).

Negative Priming DCCS

- Müller et al. (2006) used a NP version of the DCCS in which the features relevant to sorting in pre-switch (e.g., blue and green) are replaced in the post-switch phase by new features of the same dimension (e.g., red and yellow).



- The majority of 3-year-olds still perseverated on the post-switch phase, even though the pre-switch-relevant features were removed. Müller et al. concluded that this is because the shape dimension was negatively primed (see Figure 1).

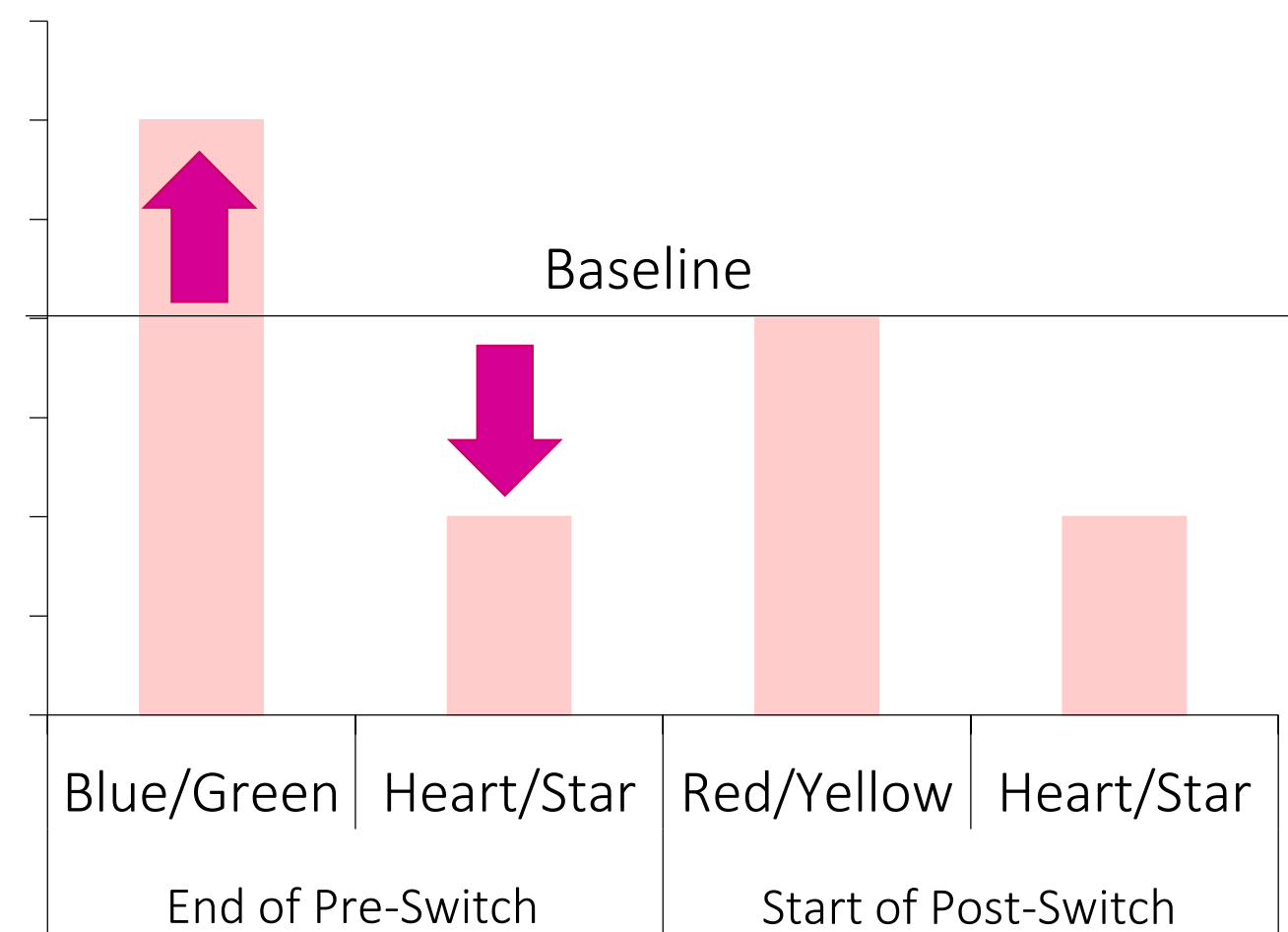
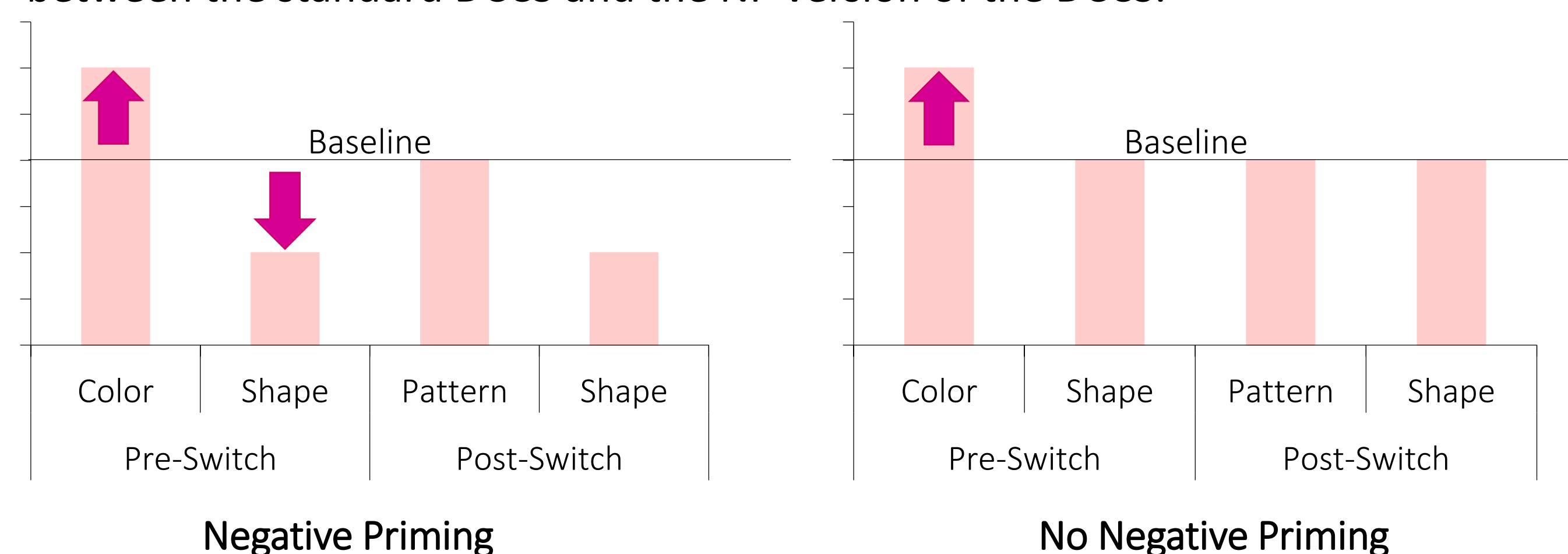


Figure 1. Activation pattern hypothesized by the NP account

- Potential issue:** Are particular features (e.g., blue and green) being activated in the post-switch phase? Or, is the entire dimension (e.g., color) being activated?
 - If the pre-switch dimension (rather than features) is activated, then replacing specific features does not rule out the possibility that children perseverate on dimension.

Current Study: Test the negative priming account by controlling for the activation of the pre-switch dimension, rather than the pre-switch feature

- If NP does not occur:** We expect a higher proportion of children will pass post-switch on the NP version of the DCCS (i.e., the pre-switch sorting dimension is removed in the post-switch trials).
- If NP does occur:** We expect performance on the post-switch trials will not differ between the standard DCCS and the NP version of the DCCS.



Method

Participants

- 48 3-year-old children (M age = 42 months, $s = 3.6$); 28 girls

Materials

- Three separate decks of DCCS cards: Color/Shape, Shape/Pattern, Color/Pattern (see Figure 2)
- Target cards were placed on two boxes and always created conflict with the sorting cards (see Figure 3)

Procedure

- Experimental Condition:** NP version of the DCCS (i.e., replace the pre-switch dimension by changing card decks, see Figure 3)
- Control Condition:** Standard DCCS (same deck of cards for pre- and post-switch)

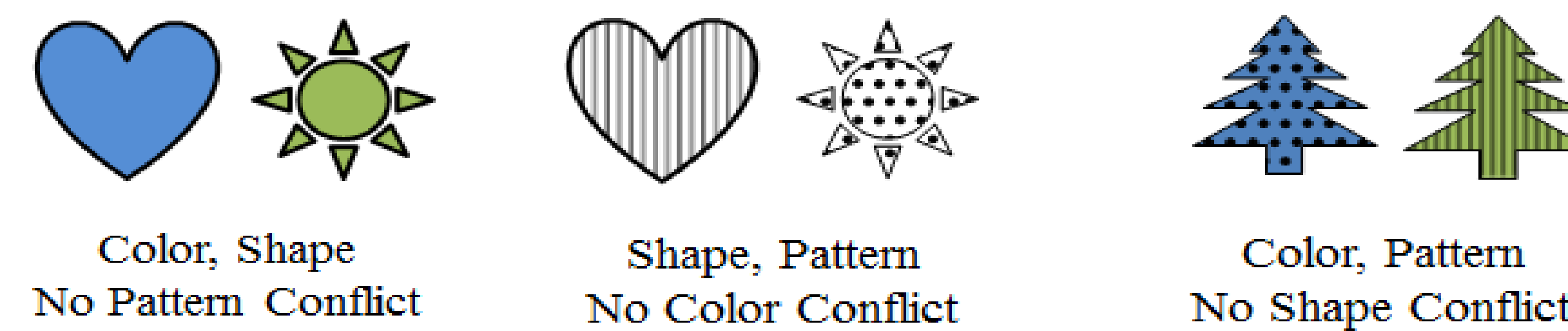


Figure 2. The three different decks of DCCS cards

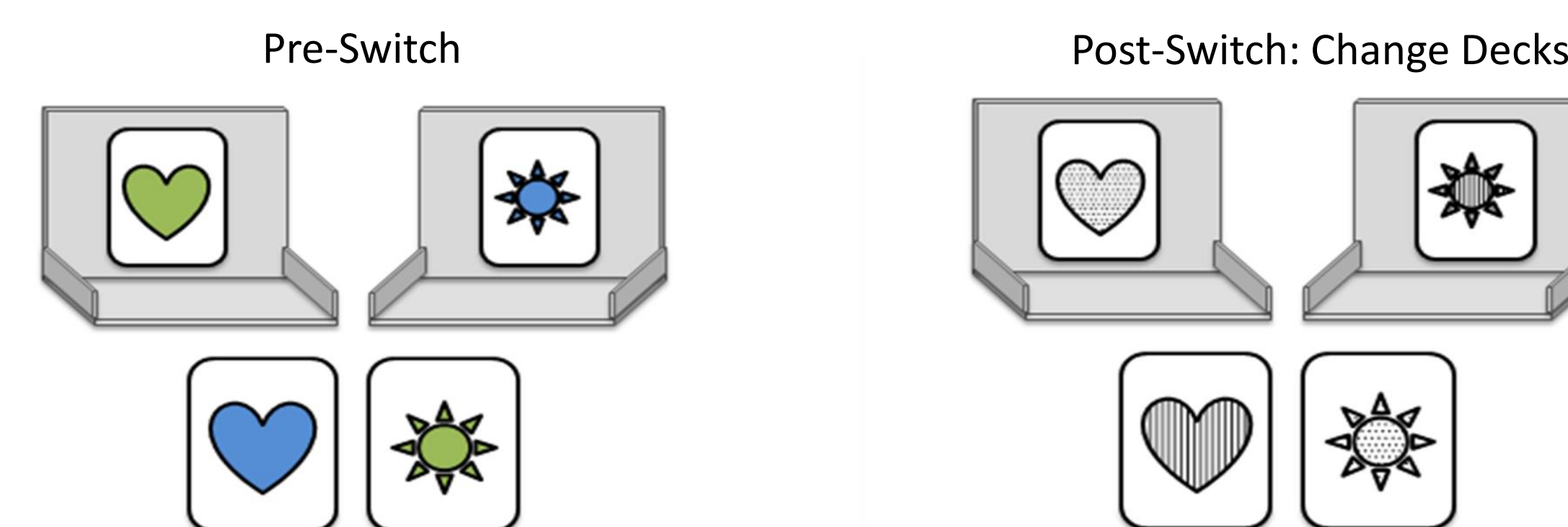


Figure 3. Experimental condition- color/shape to shape/pattern

Results

Chi-square analyses revealed that a significantly greater proportion of participants sorted the post-switch cards correctly in the experimental condition (66.7%) than in the control condition (37.5%, see Figure 4), $\chi^2(1, 47) = 4.09, p = .04$.

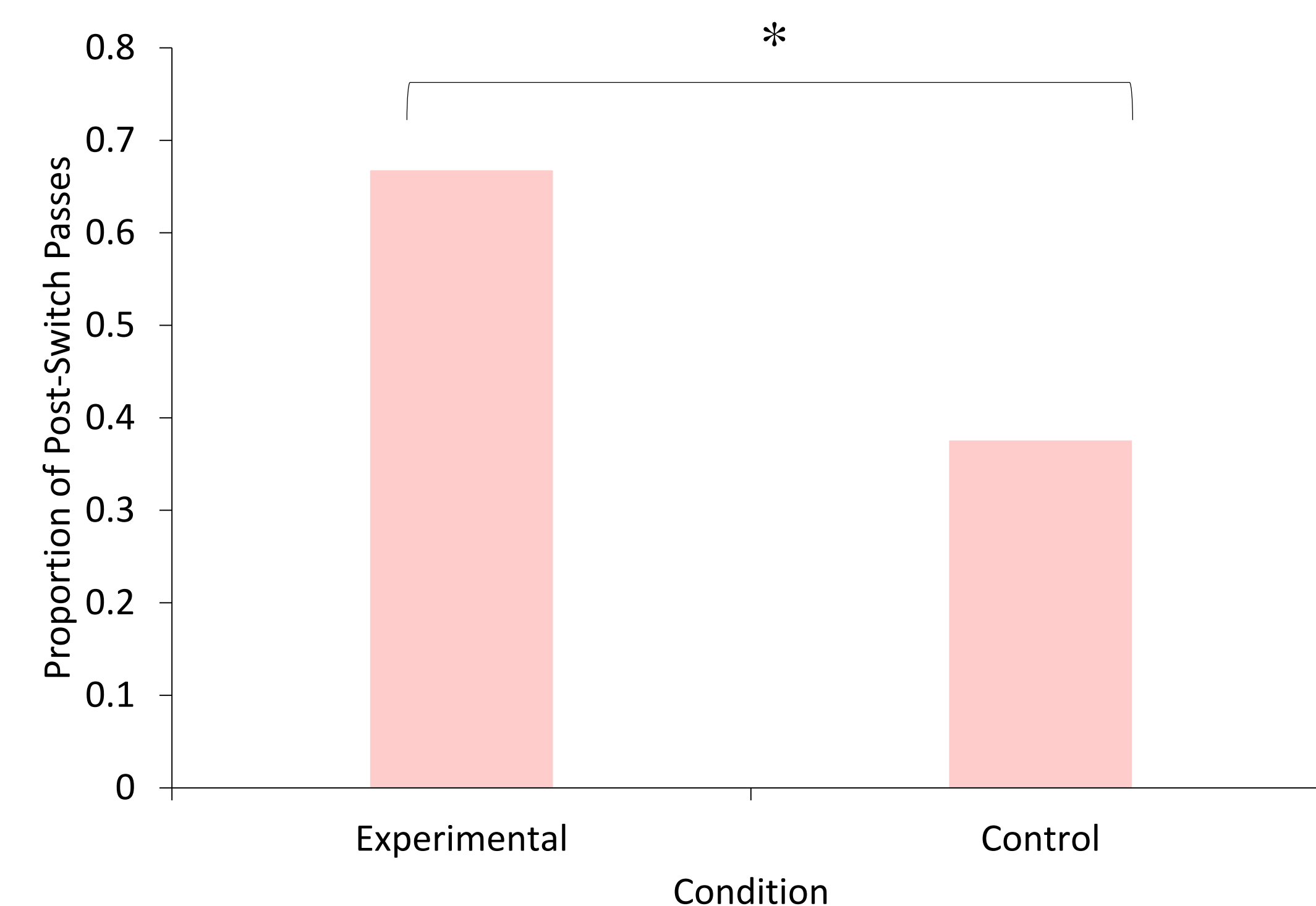


Figure 4. Proportion of participants that passed post-switch by condition

Results- Cont.

However, sorting by pattern post-switch in the experimental condition and pre-switch in the control condition produced results opposite of the overall trend (see Figure 5).

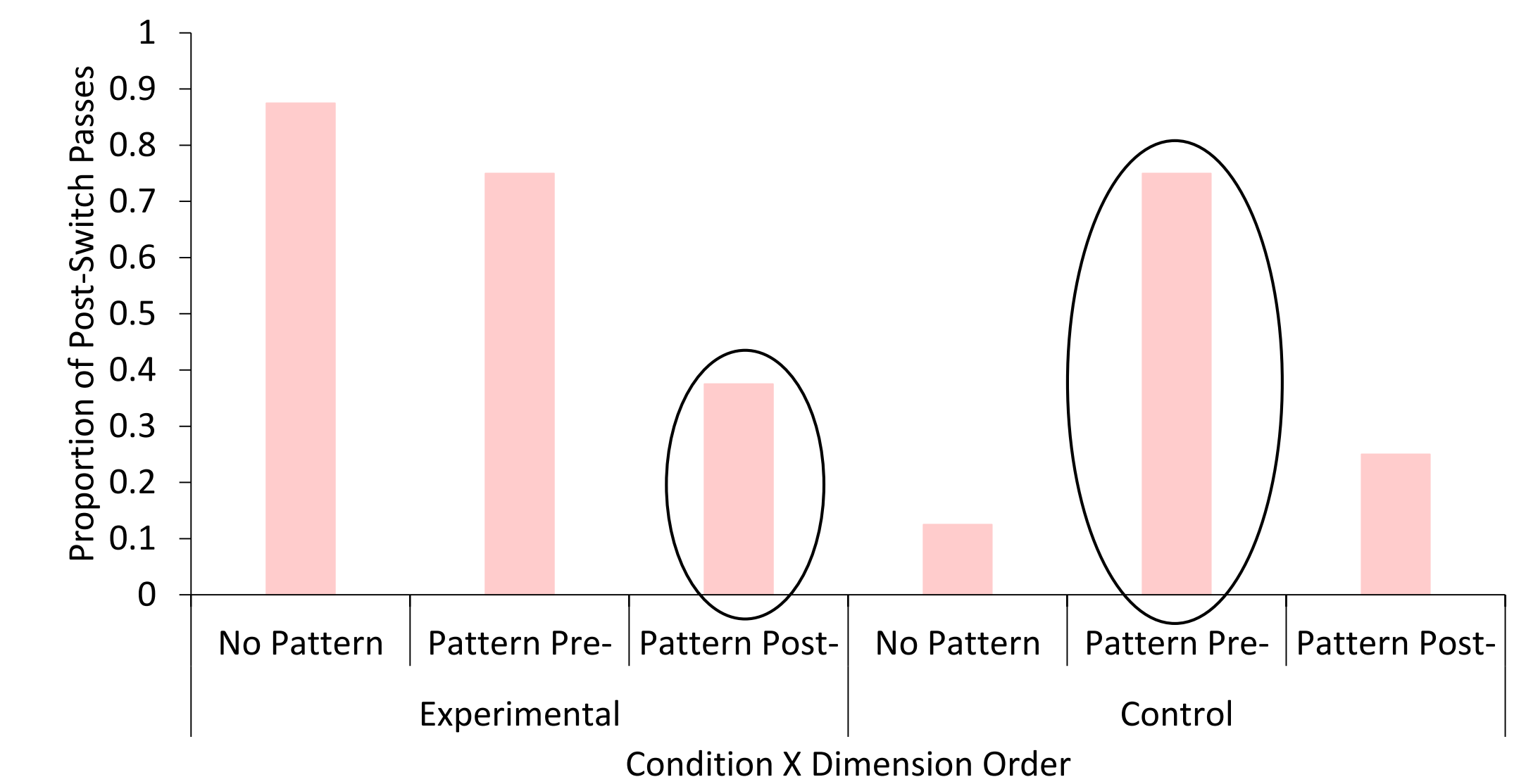


Figure 5. Proportion of participants that passed post-switch by condition and dimension order for pattern

Discussion

- The results indicate that perseverative sorting in the DCCS is driven in large part by difficulties overcoming the activation of the pre-switch dimension during the post-switch phase.
 - These results do not rule out the possibility that negative priming also contributes to children's perseverative sorting, but it may play a smaller role than is commonly held.
- The dimension-specific findings for pattern suggests that not all dimensions are equal in difficulty.
 - Preliminary results from a follow up study with size as the third dimension look similar to the pattern findings (see Figure 6).
 - It appears that sorting by a "difficult" dimension during pre-switch facilitated performance on post-switch, while sorting by a "difficult" dimension during post-switch hindered performance.
 - Indeed, Fisher (2011) found that 3-year-old children performed better on the DCCS when the features for post-switch dimension were more salient than the pre-switch features.

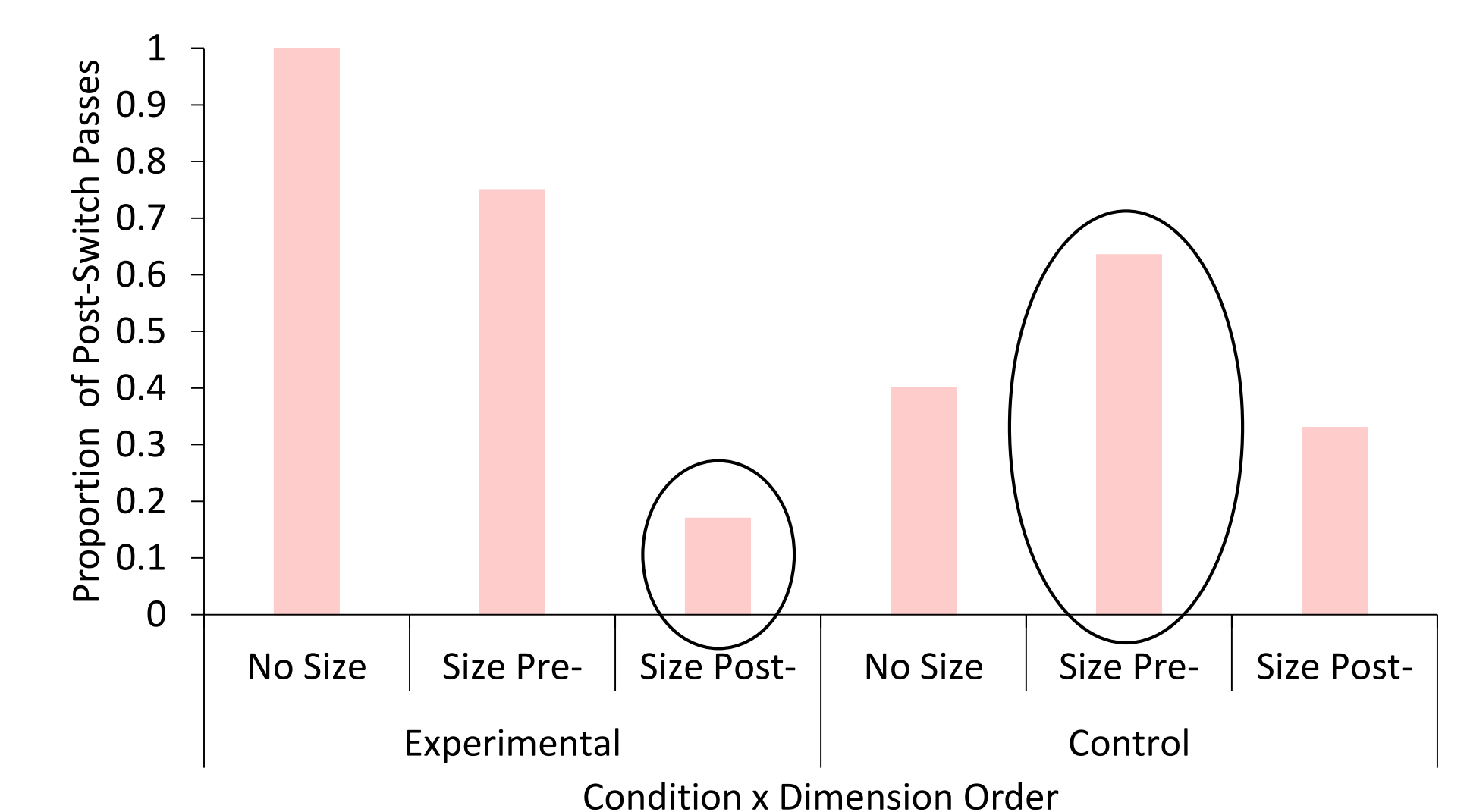


Figure 6. Proportion of participants that passed post-switch by condition and dimension order for size

References

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