

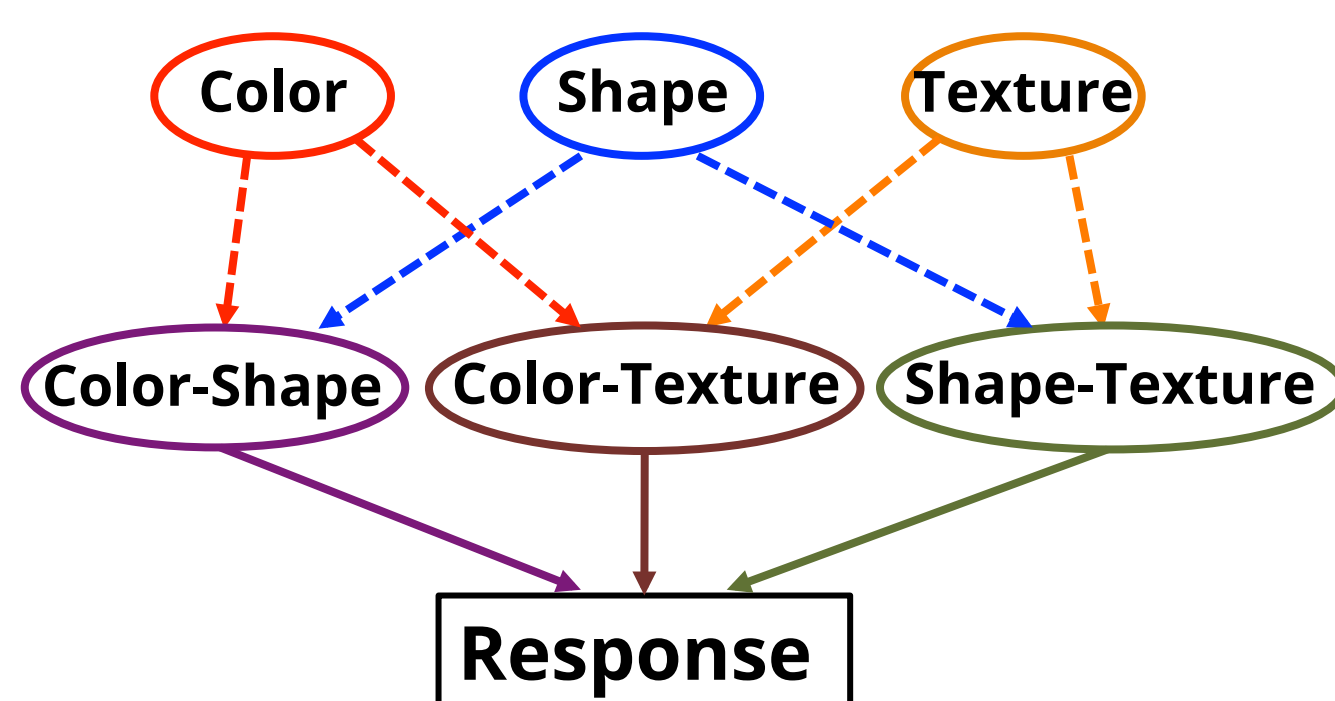
# Transfer of Multi-Attribute Stimulus-Response Mappings

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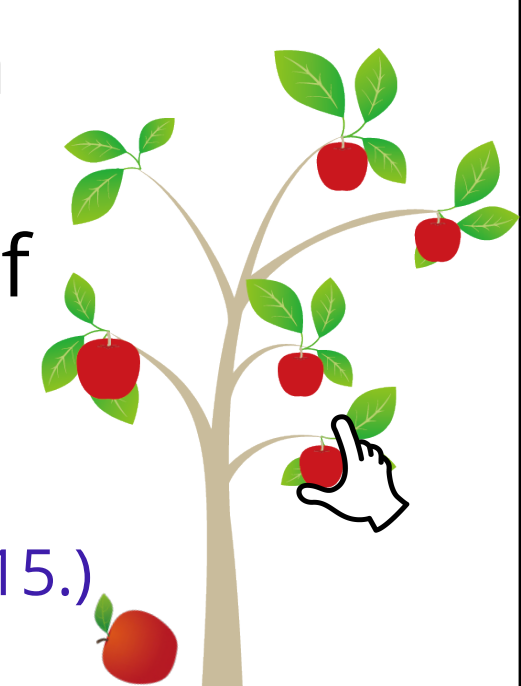
## INTRODUCTION

In the human visual system, different attributes are processed separately. Then the attributes of an object are integrated to elicit a response.

Based on the **paired-attribute model** (Morita et al., 2010), Ishizaki et al. (2015) suggested that **bound feature pairs** are units of **multi-attribute stimulus-response association**.



Our previous study confirmed the **superiority of color-shape pair** in **learning** multi-attribute Stimulus-Response mapping; Learning the association of a color-shape pair with a response is easier than that of a color-location pair or a shape-location pair. However, there is no significant difference in performance of these mappings after completion of learning the association. (We presented these results at APCV 2015.)



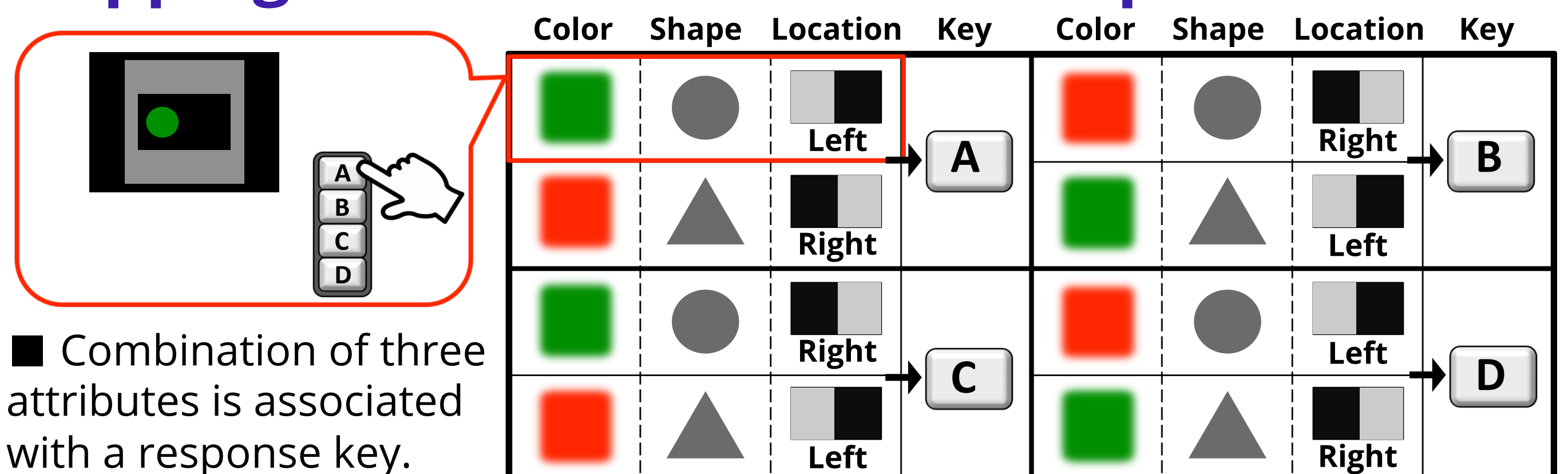
## Purpose

Is there a superiority of the color-shape pair in S-R mapping after completion of learning?

→ We examined whether it is difficult to recall a correct response, if the color and shape or the color and location are presented separately.

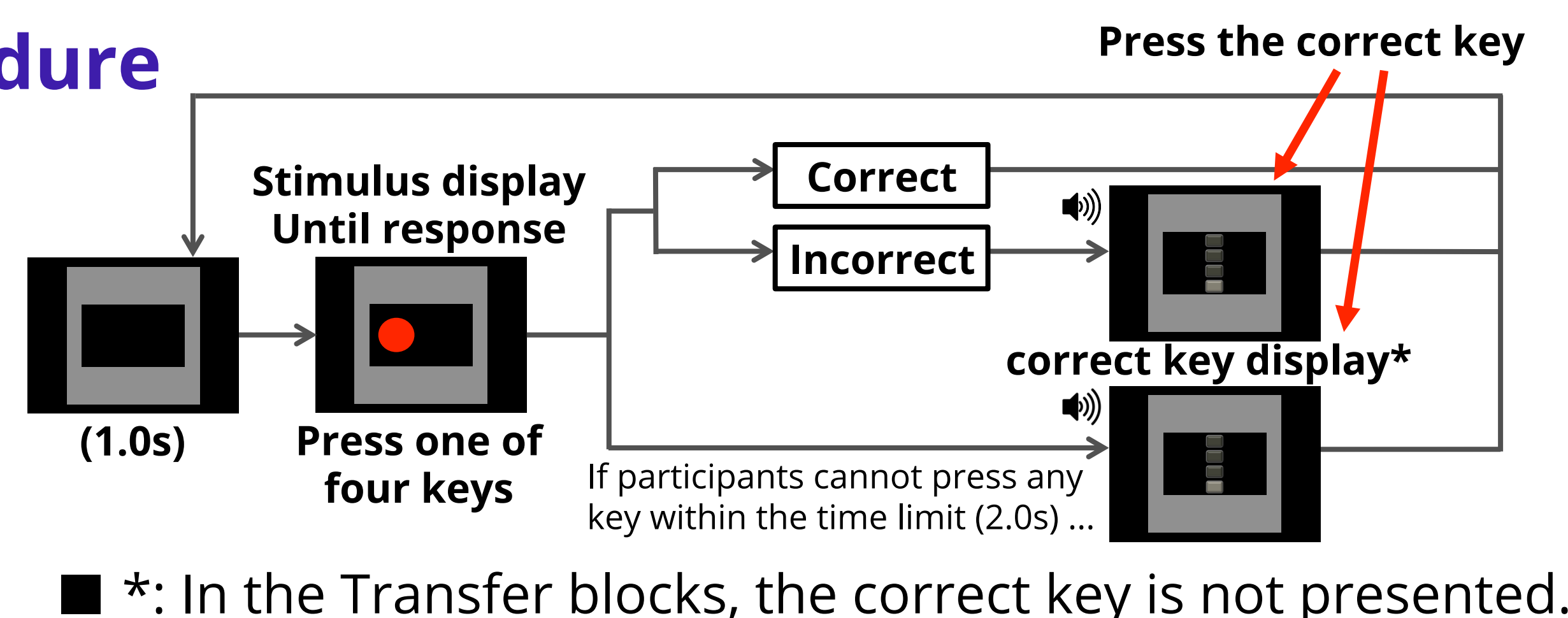
## METHOD Participants learn the mapping of 8 stimulus items to 4 response keys, and then are tested with Transfer blocks.

### Mapping between stimuli and responses



■ Combination of three attributes is associated with a response key.

## Procedure

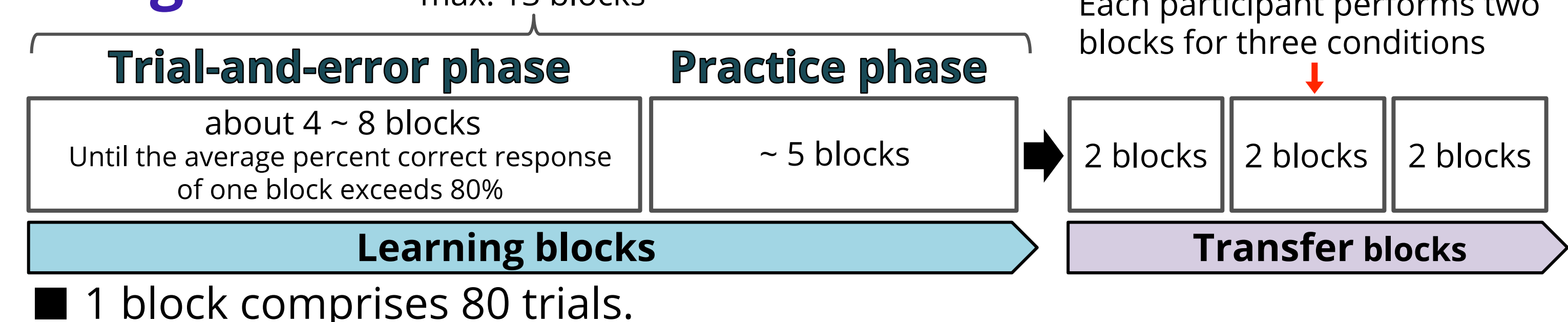


■ \*: In the Transfer blocks, the correct key is not presented.

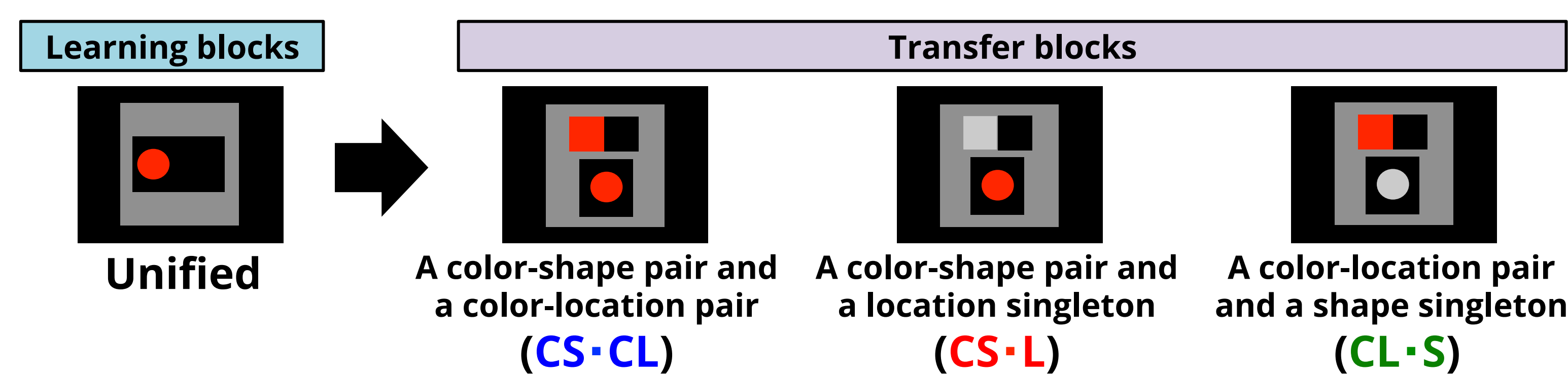
## Participants

24 students aged 19-27 with normal or corrected vision.

## Design

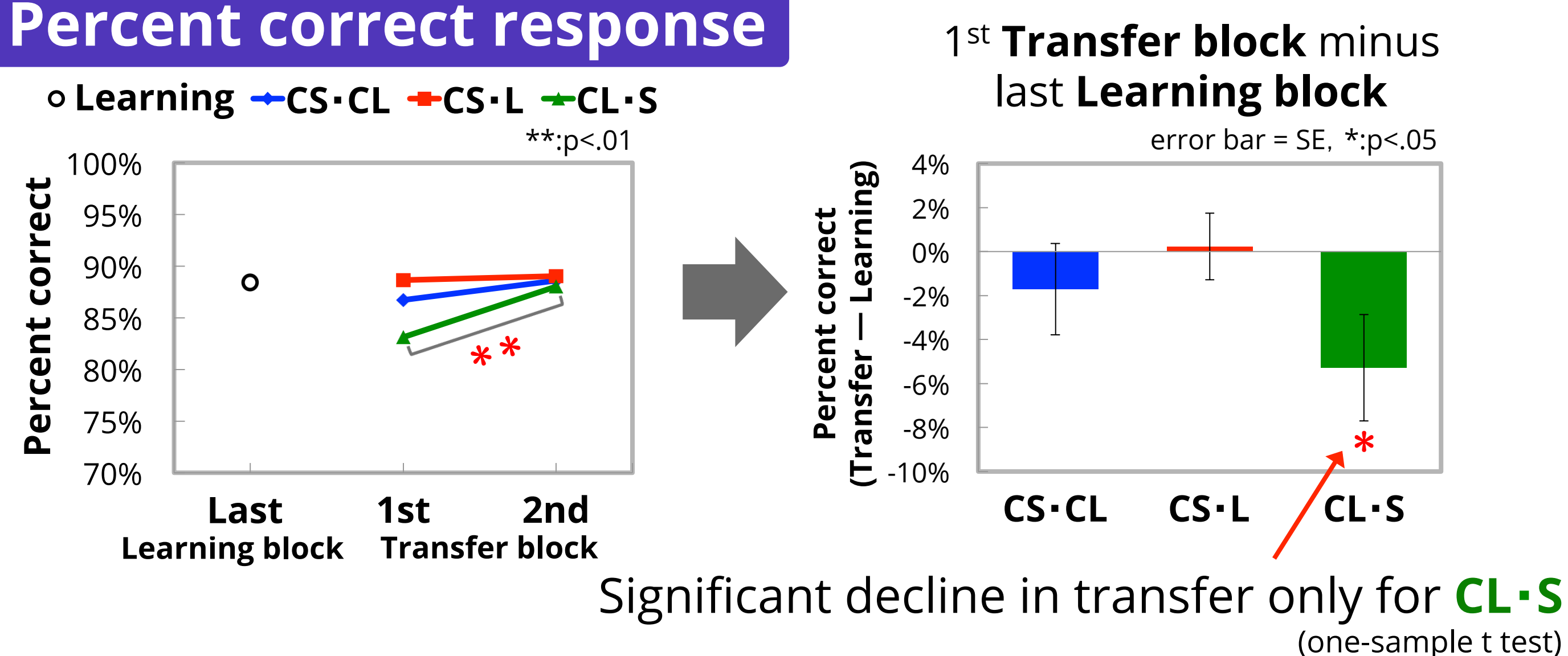


## Condition



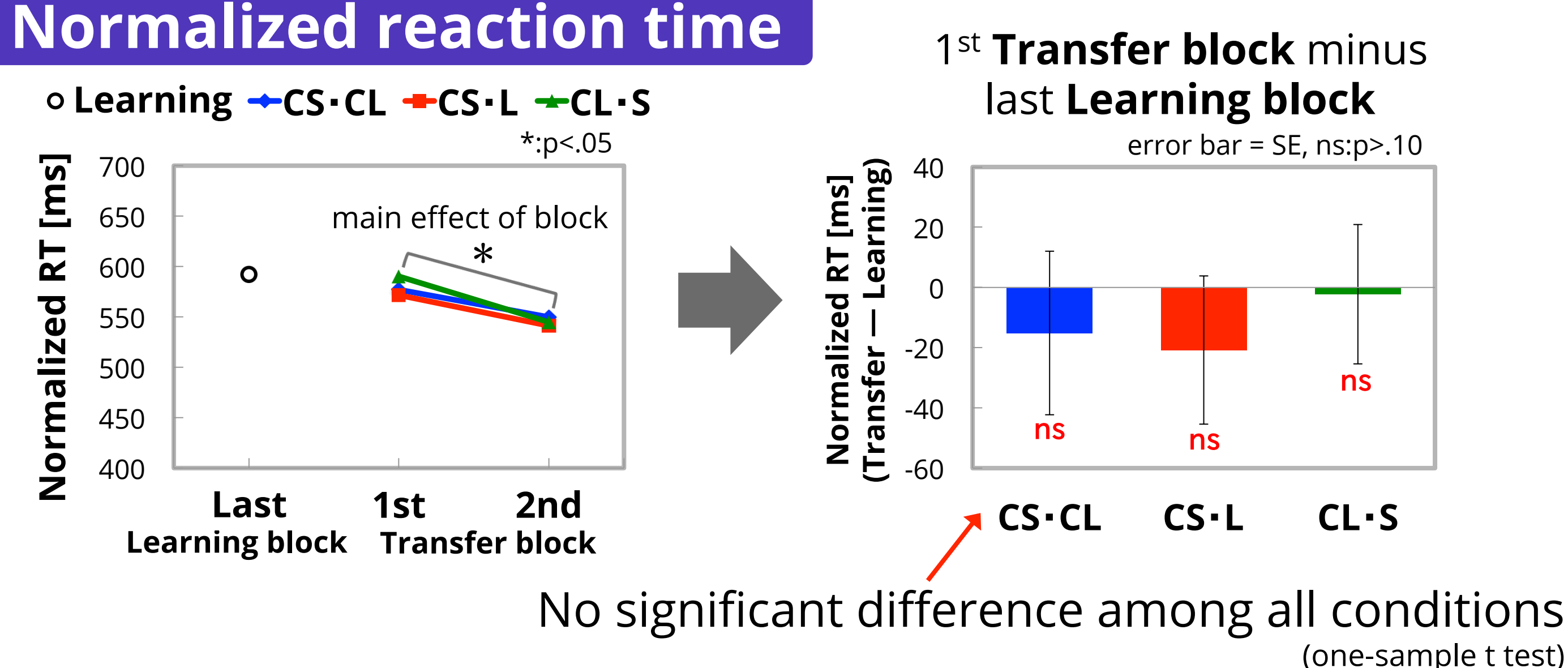
## RESULTS & DISCUSSION

### Percent correct response



Unless **color and shape** are derived from the same object, the rate of transfer declines. Separate presentation of color and location has no effect on the transfer.

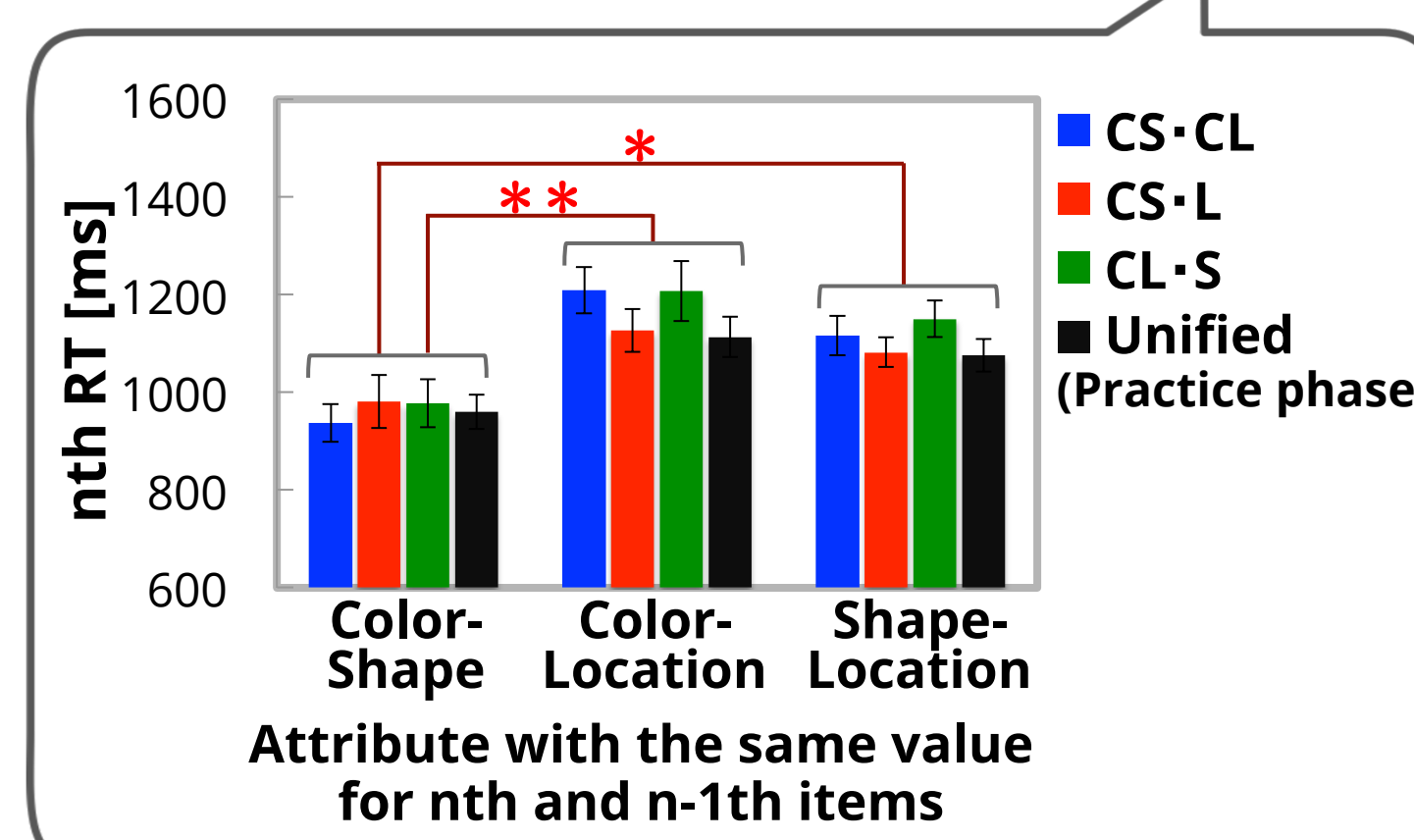
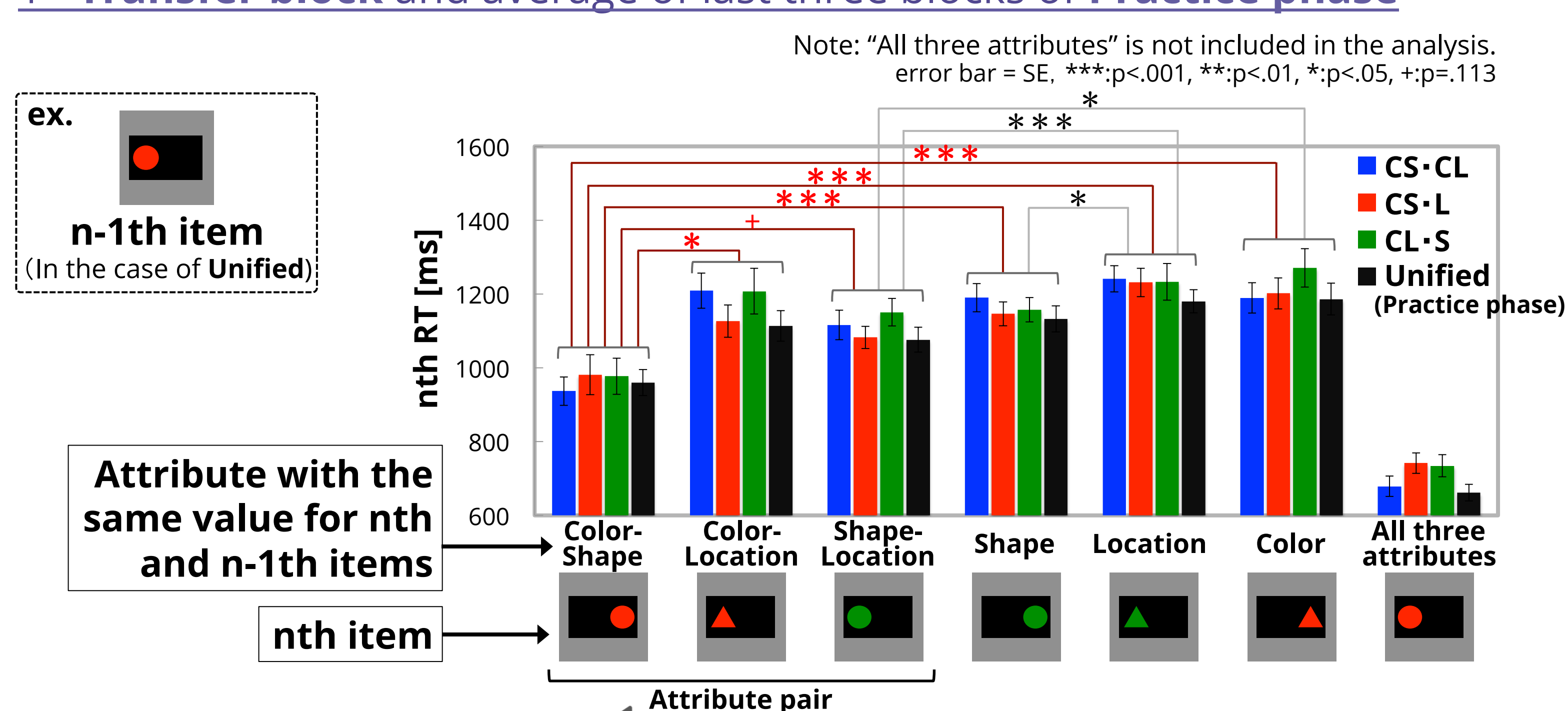
### Normalized reaction time



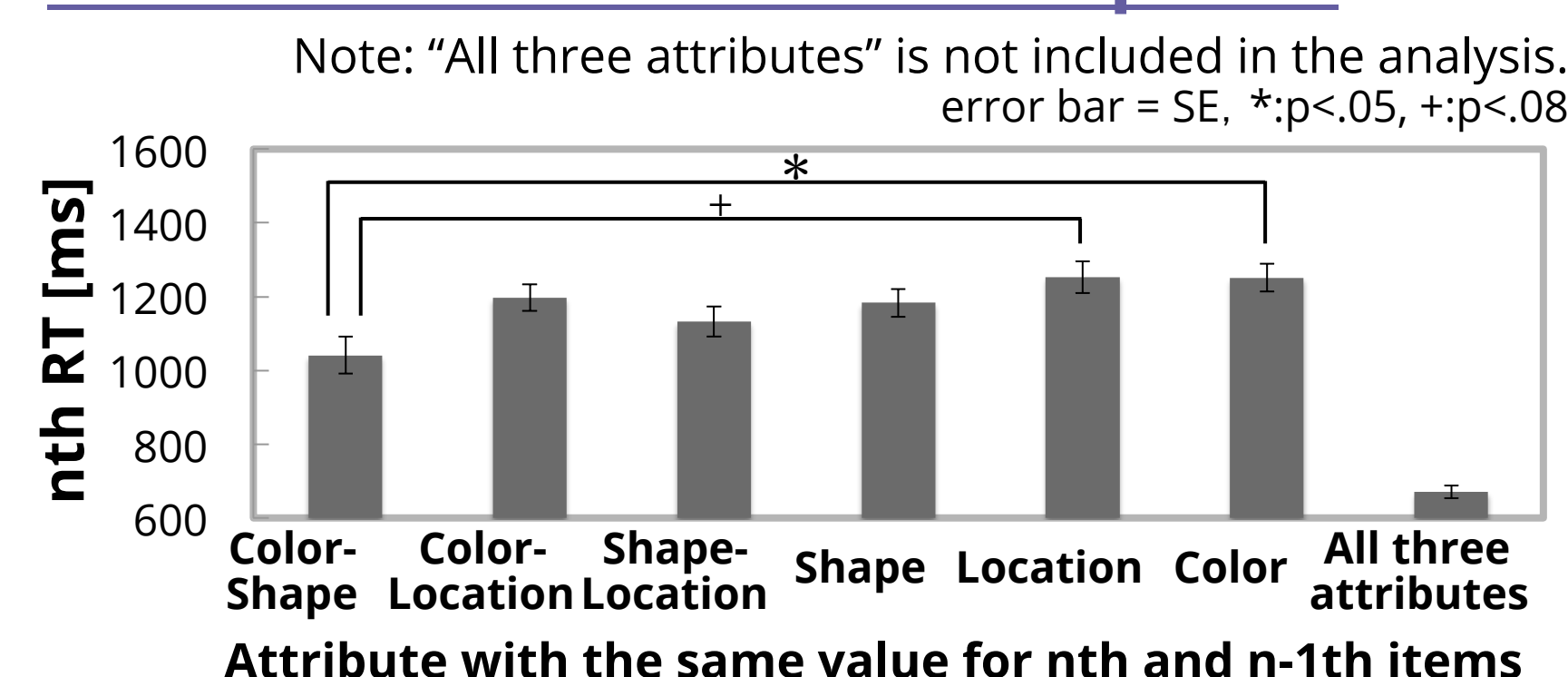
In every condition the response is elicited almost as fast as that in the Unified condition.

### Effect of features of n-1th item on nth RT

1st Transfer block and average of last three blocks of Practice phase



### Last block of Trial-and-error phase



Only after completion of learning, RT is shorter if nth item is presented with the **same color-shape** as n-1th item.

Activation of connection from the color-shape pair to the response tends to remain.

## CONCLUSION

- Spatially separate presentation of color and shape makes difficult to recall the response.
- Activation of connection from the **color-shape** pair to the response remains and **affects the subsequent response**.

→ In S-R mappings, **color-shape pair is considered to play an important role compared to color-location or shape-location pair.**

A neural net model modified from the one originally proposed by Ishizaki et al. (2015)

