

Integrated Representations of Shape, Color and Location in Stimulus-Response Mapping

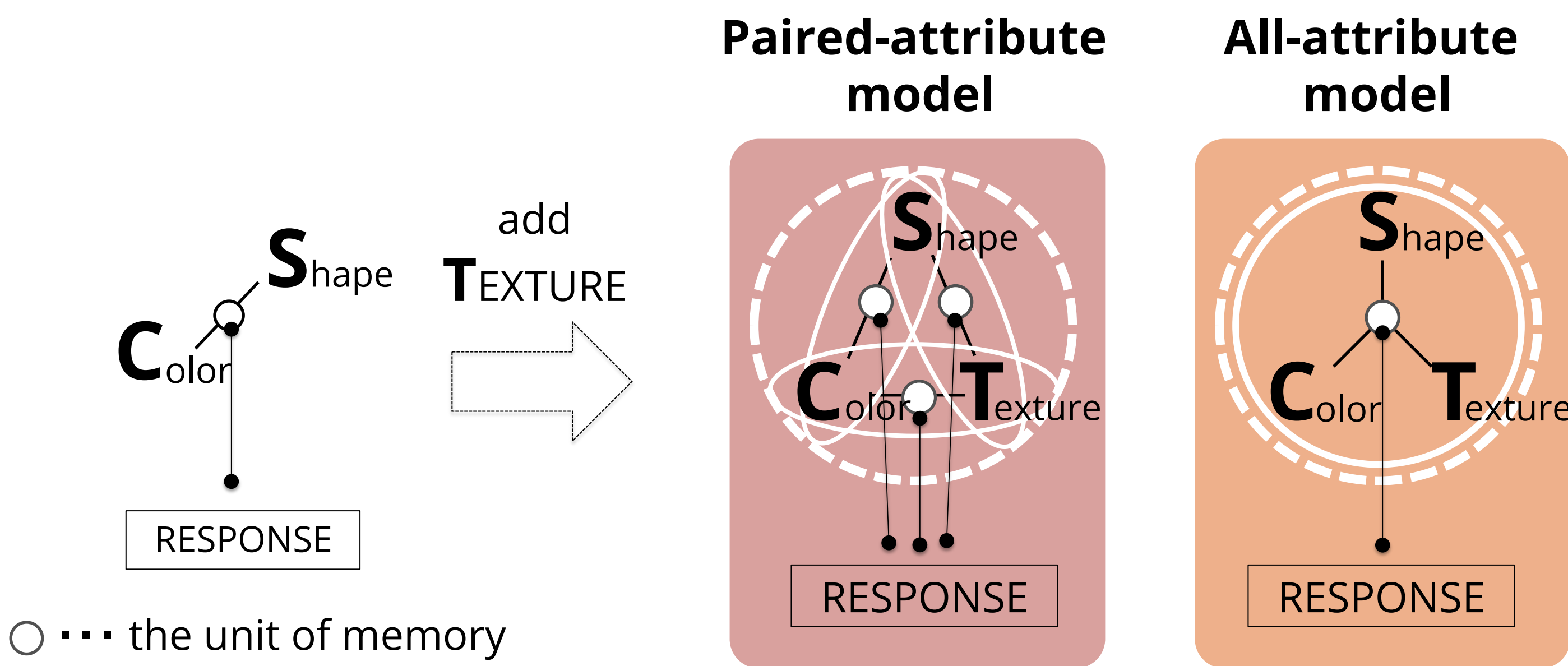
Yumiko Fujii, Masahiko Morita and Hiromi Morita, University of Tsukuba, Japan.

INTRODUCTION

In the human visual system, different attributes of an object are processed separately in different modules and then integrated to elicit a specific response. These attributes are written to the object file.

We investigated how these attributes are connected with each other in the object file and associated with the response by conducting **stimulus-response mapping experiments**. We have conducted S-R mapping experiments with the stimuli consisting of shape, color and texture (Ishizaki et al., 2015) and obtained the results supporting the **paired-attribute model** (Morokami et al., 2010).

Here we present the experimental results supporting the model with the stimuli consisting of shape, color and location in place of texture.



Purpose

- (1) “Paired-attribute model” works in general independent of the kind of attributes?
- (2) Location is combined with shape or color in the same way as the shape and color are combined?

METHOD

Participants

28 students aged 18-28 with normal or corrected vision.

Exp 1 : Stimulus-Response Mapping Task

Participants learn the mapping of eight stimulus items to four response keys.

Stimulus

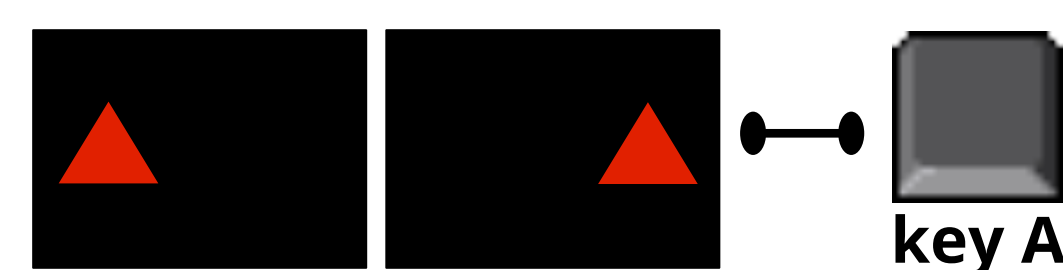
Eight types of items, made by combining one of two values of three attributes(**color**, **shape**, and **location**).

Response keys

Four keys arranged in vertical on the numeric keypad

2-attribute sets

SC(shape-color) set



CL(color-location) set



SL(shape-location) set



▷ Two attributes are relevant to the response.

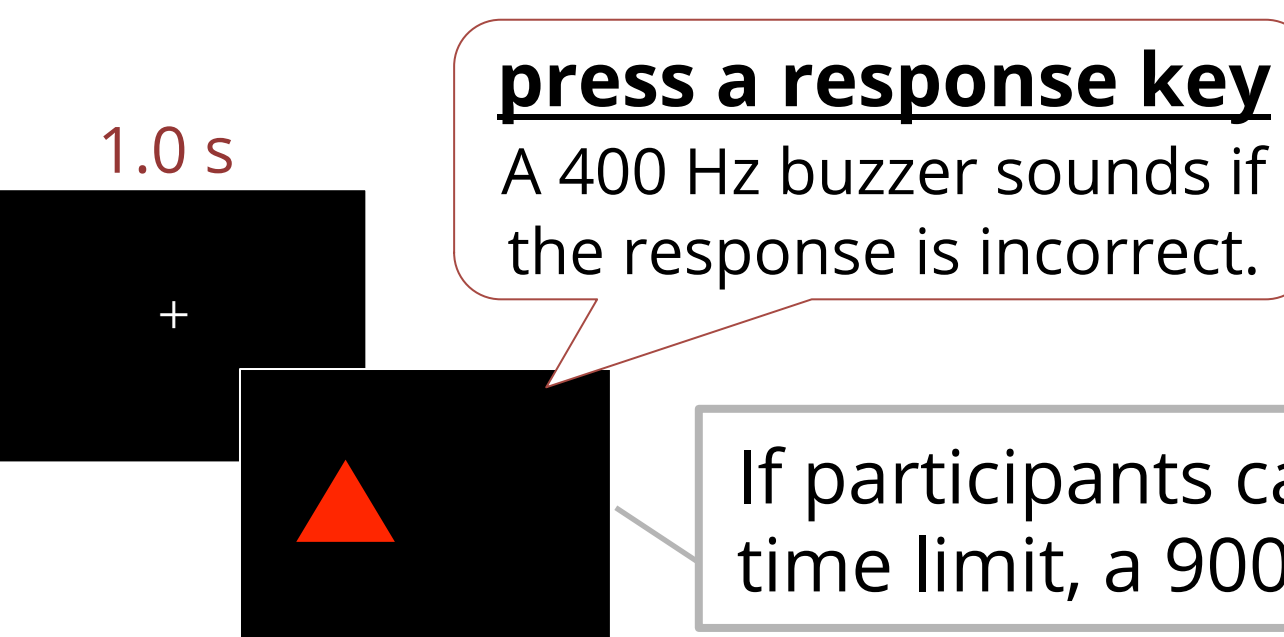
3-attribute set

SCL(shape-color-location) set



▷ All attributes are relevant to the response.

Procedure



Design

14 learning blocks with time limit
2 test blocks without time limit
■ 1 block comprises 80 trials

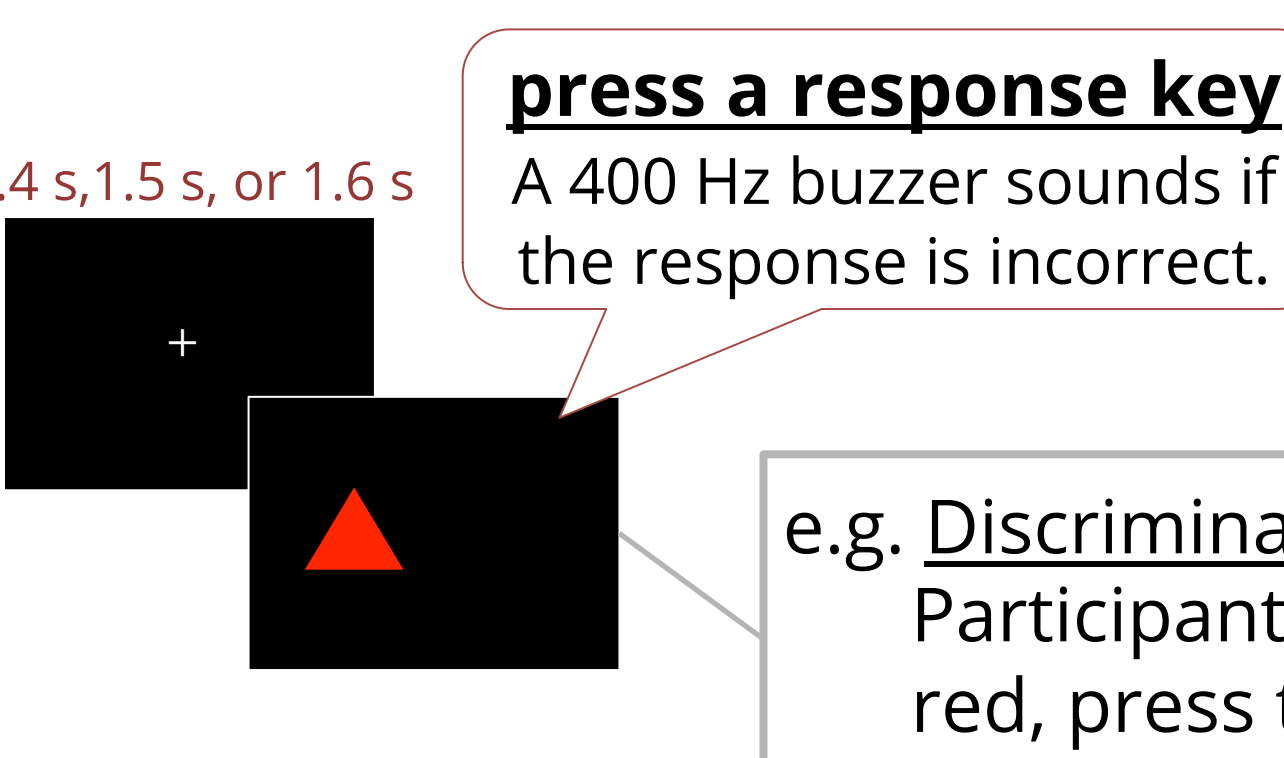
Exp 2 : Discrimination Task

Participants discriminate individual attributes of stimuli.

Stimulus The same eight items as used in Exp 1.

Response keys Two keys arranged in vertical

Procedure



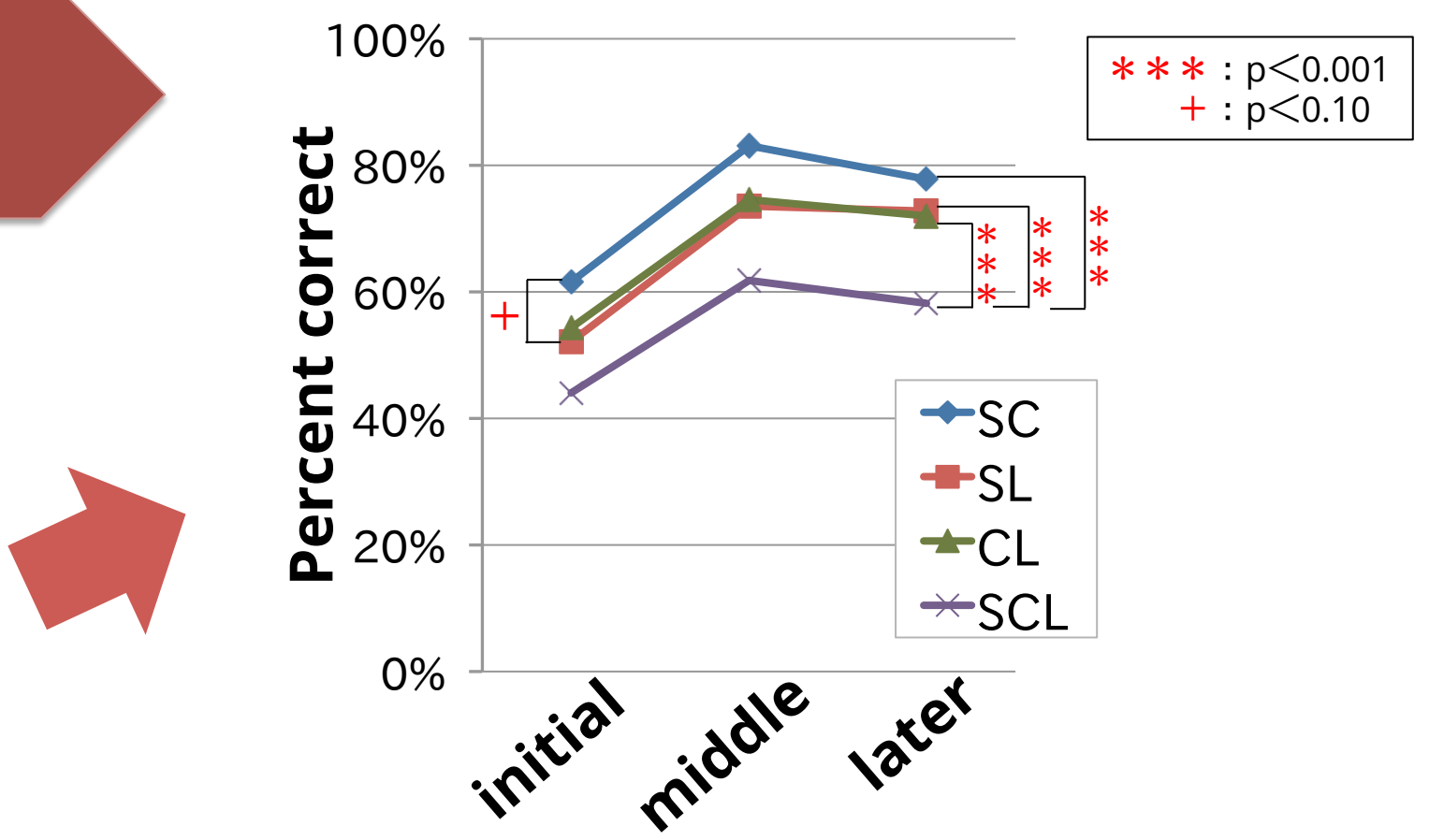
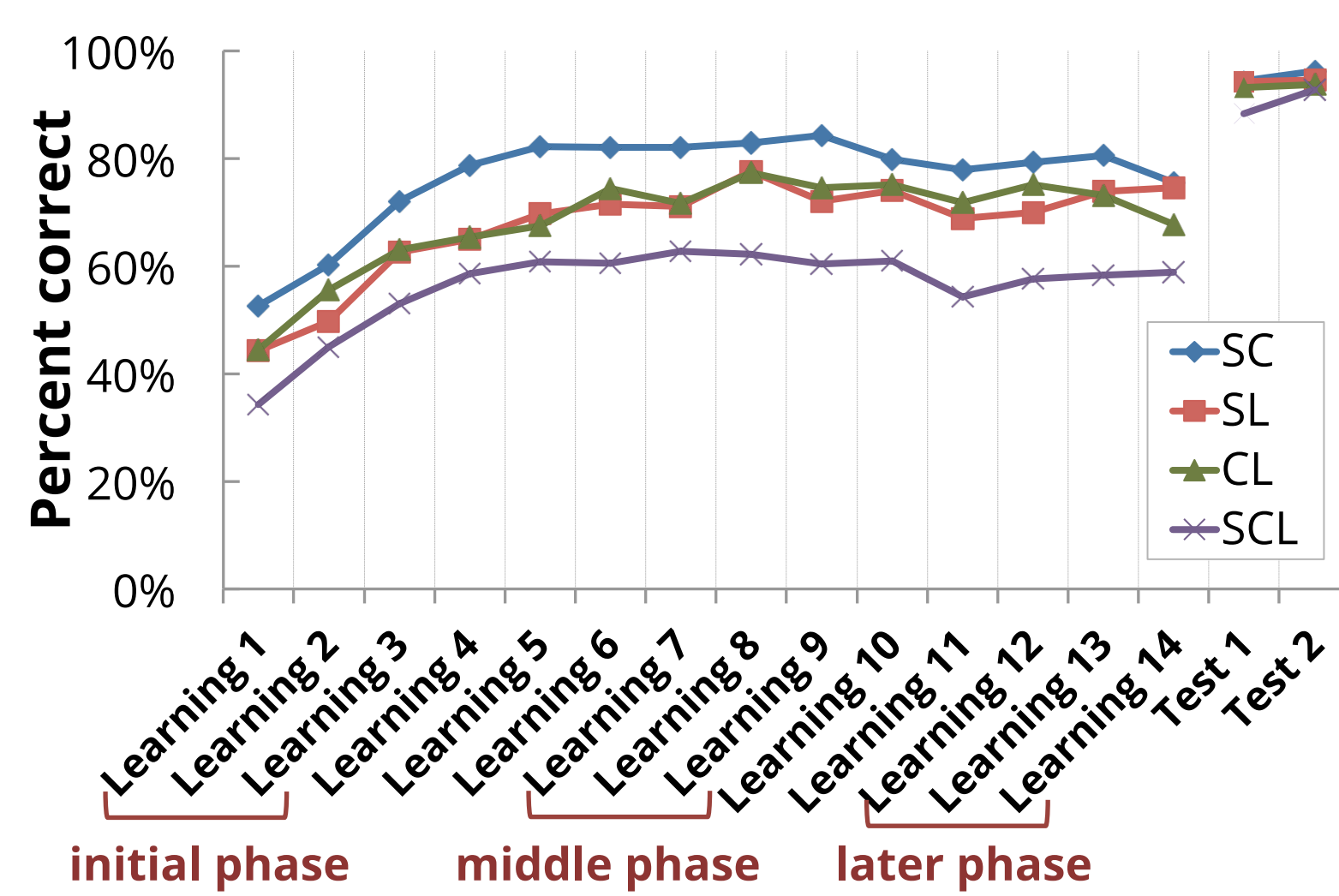
Design

1 block for each of three attributes
■ 1 block consisted of 96 trials.

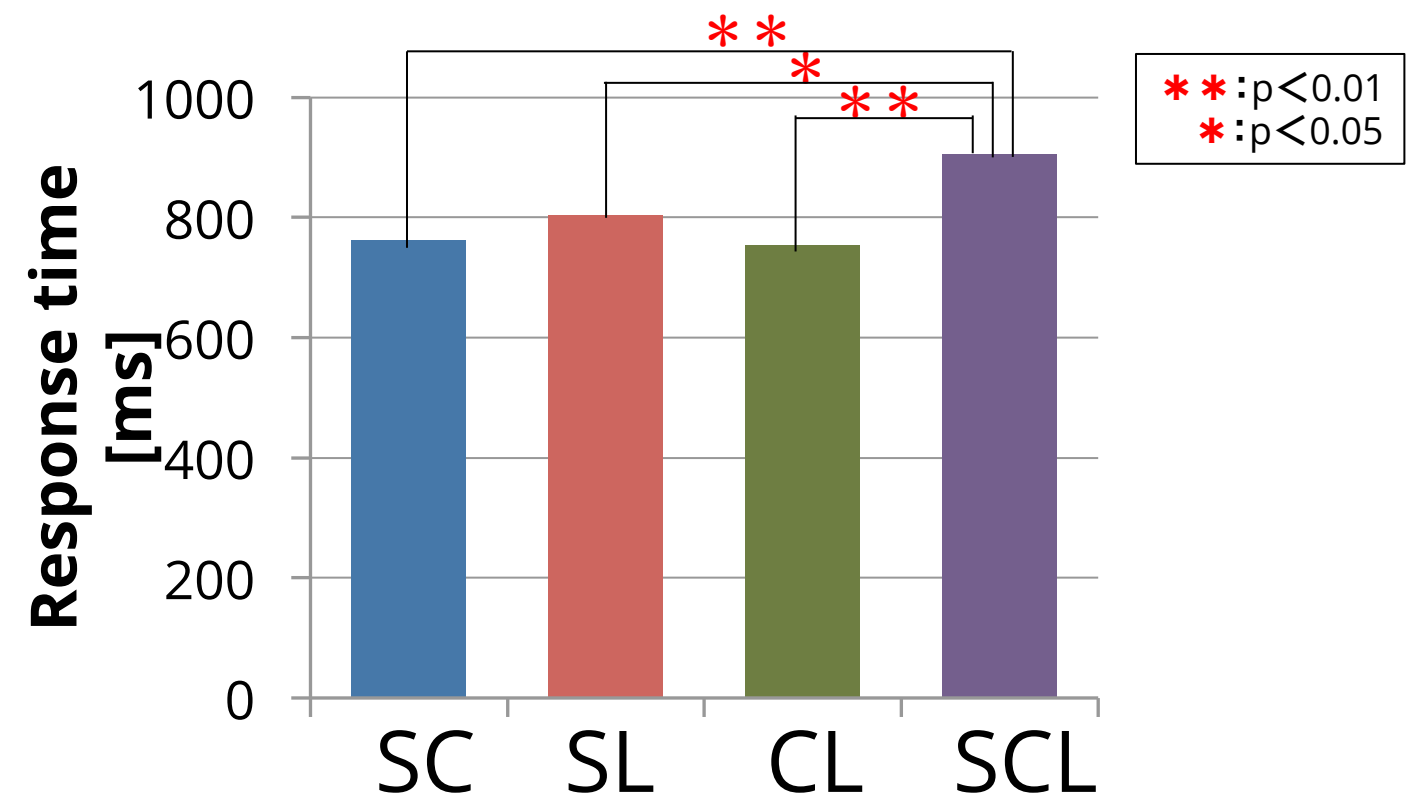
RESULTS & DISCUSSION

Exp 1 :

■ Percent correct versus block number



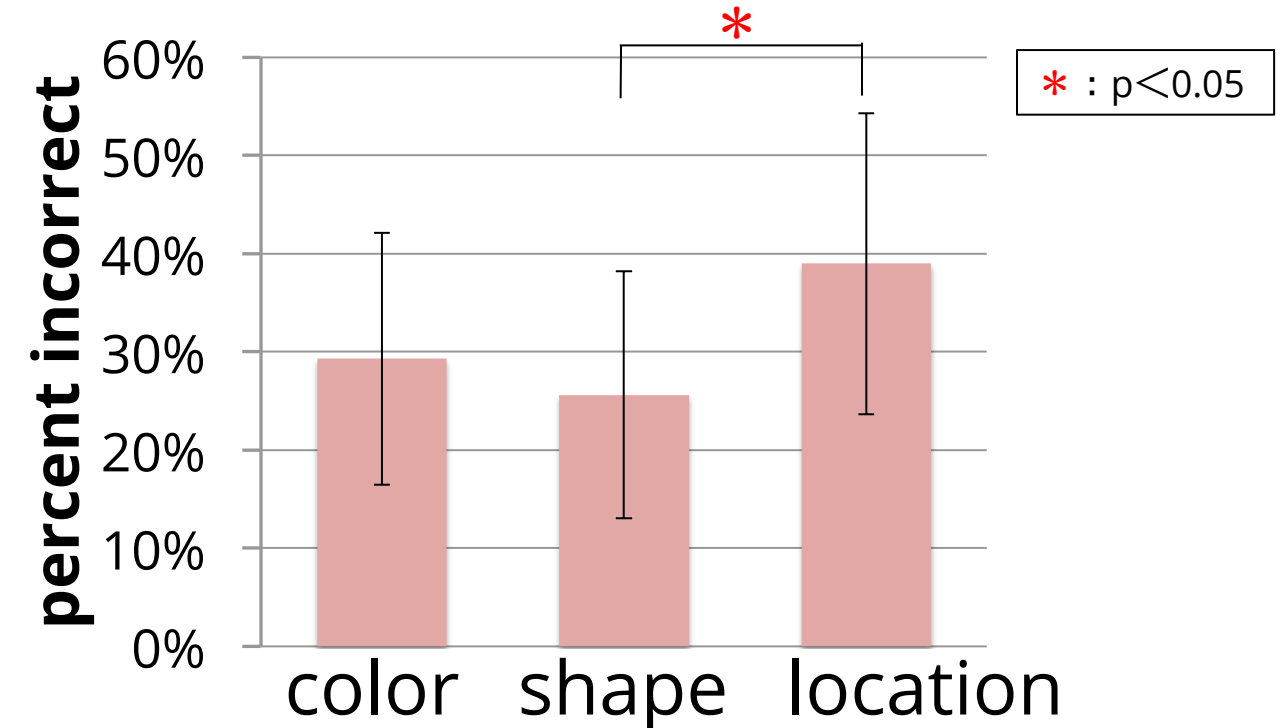
■ RT (2nd Test block)



(1) The date of percent correct of learning phase and RT of test phase means that mapping of SCL items to the response is more difficult than that of SC, SL and CL items.

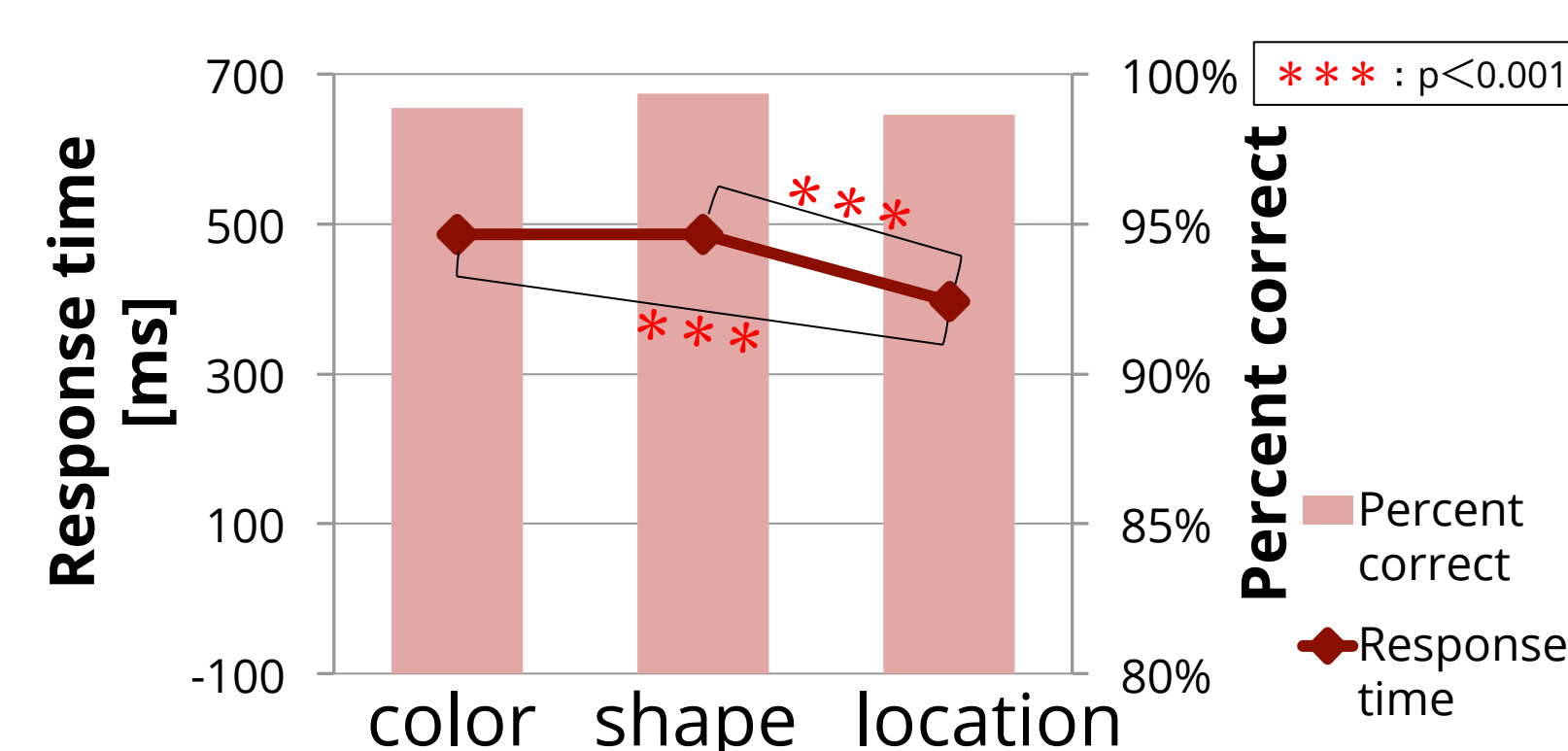
■ Which attribute might participants confuse? (average for blocks 10-14)

➔ Incorrect responses are considered to result from confusing one of the attributes. Thus the data might suggest that the participants tend to confuse or ignore location.



Exp 2 :

■ Is the latency of perceiving the same among these three attributes?



(2) The integrated representations of shape-location and color-location might have weaker binding strength than the integrated representations of shape-color.

CONCLUSION

- (1) The **paired-attribute model is supported**. Results suggest that integrated representations of shape-location and color-location as well as shape-color (but not shape-color-location) representations are formed to be associated with response.
- (2) Location is not dealt with differently from shape or color in the attribute integration process, but shape-location and color-location items are more difficult to associate with responses than shape-color item.

