

# Investigating Sex Differences in Mental Rotation and Visual Working Memory

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## Introduction

- Previous research has found sex differences for various cognitive abilities
- Sex differences are often found in mental rotation tasks (Vandenberg & Kuse, 1978; Linn & Petersen, 1985; Alington et al., 1992)
- There have been mixed findings about sex differences regarding color discrimination (Pérez-Carpinell et al., 1998; Bimler et al., 2004; Murray et al., 2012)

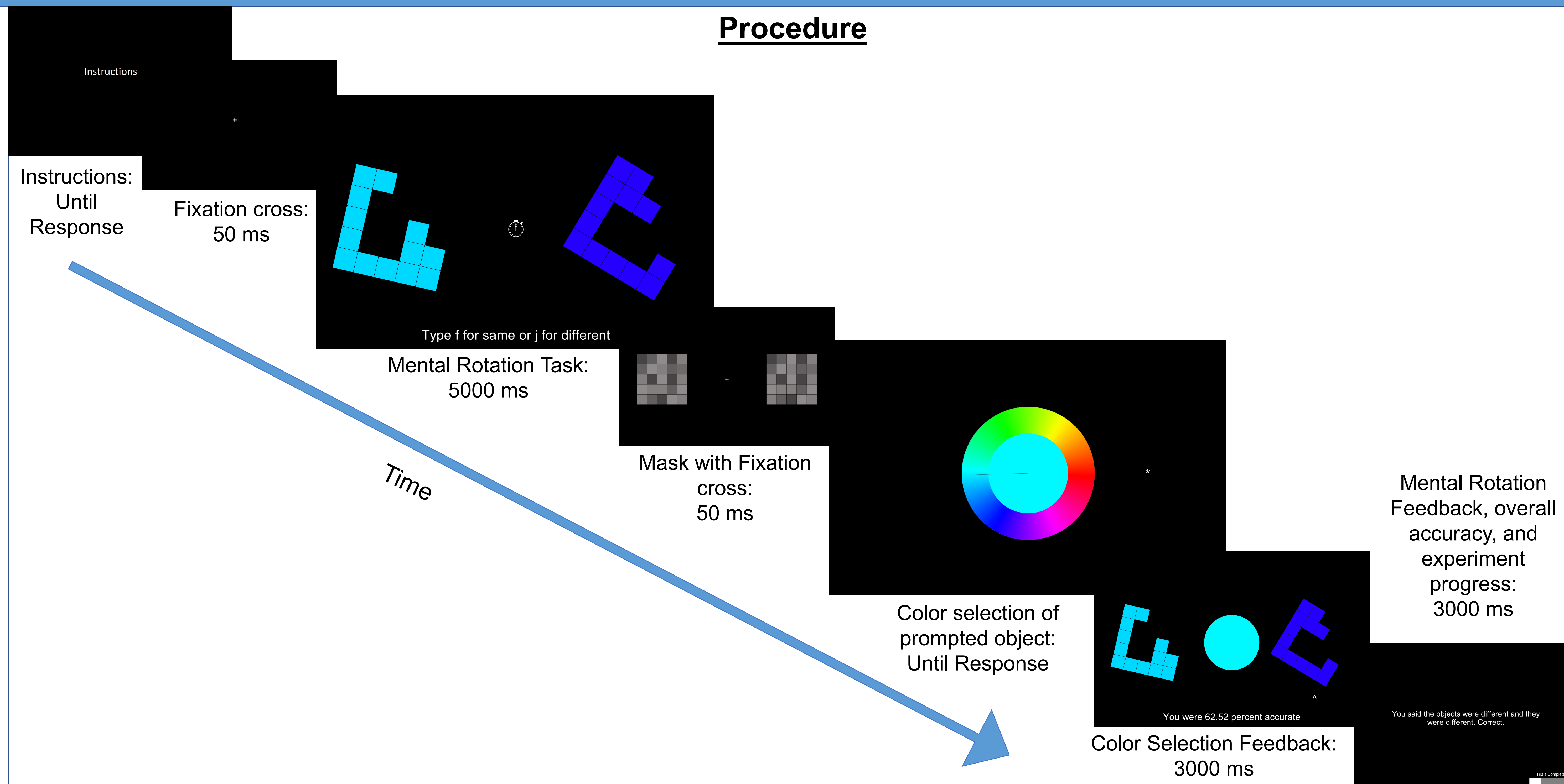
## Objective

- The purpose of this study was to investigate sex differences in mental rotation and color recall.
- Our hypotheses were that males would perform better at mental rotation and females would be more accurate at recalling color

## Method

- 43 females and 16 males were screened using Ishihara's Test for Color Deficiency
- They performed the mental rotation and color recall tasks sequentially on a computer
- The procedure consisted of being shown two colored shapes and determining if they were same or mirror rotations of one another
- They then had to recall the color of one of the two objects
- The color space used was HSV using full saturation and value with varying hues
- The experimental program was made in PsychoPy (Peirce et al., 2019)

## Procedure



## Discussion

- We did not find significant differences between sex for either mental rotation or hue recall error.
- Mental rotation response times increased linearly with degree of rotation when objects were the same, (similar to previous research Shepard & Metzler, 1971), but there was no effect of degree of rotation when the objects were different
- For hue recall error there were significant differences between 60 and 120 degrees of hue separation and 60 and 180 degrees of hue separation contrary to previous research that found that smaller differences in color led to greater errors in recall (Uchikawa & Shinoda, 1996)
- No effect of sex might be the consequence of a low male  $n$ .

## Results

### Mental Rotation Response Time

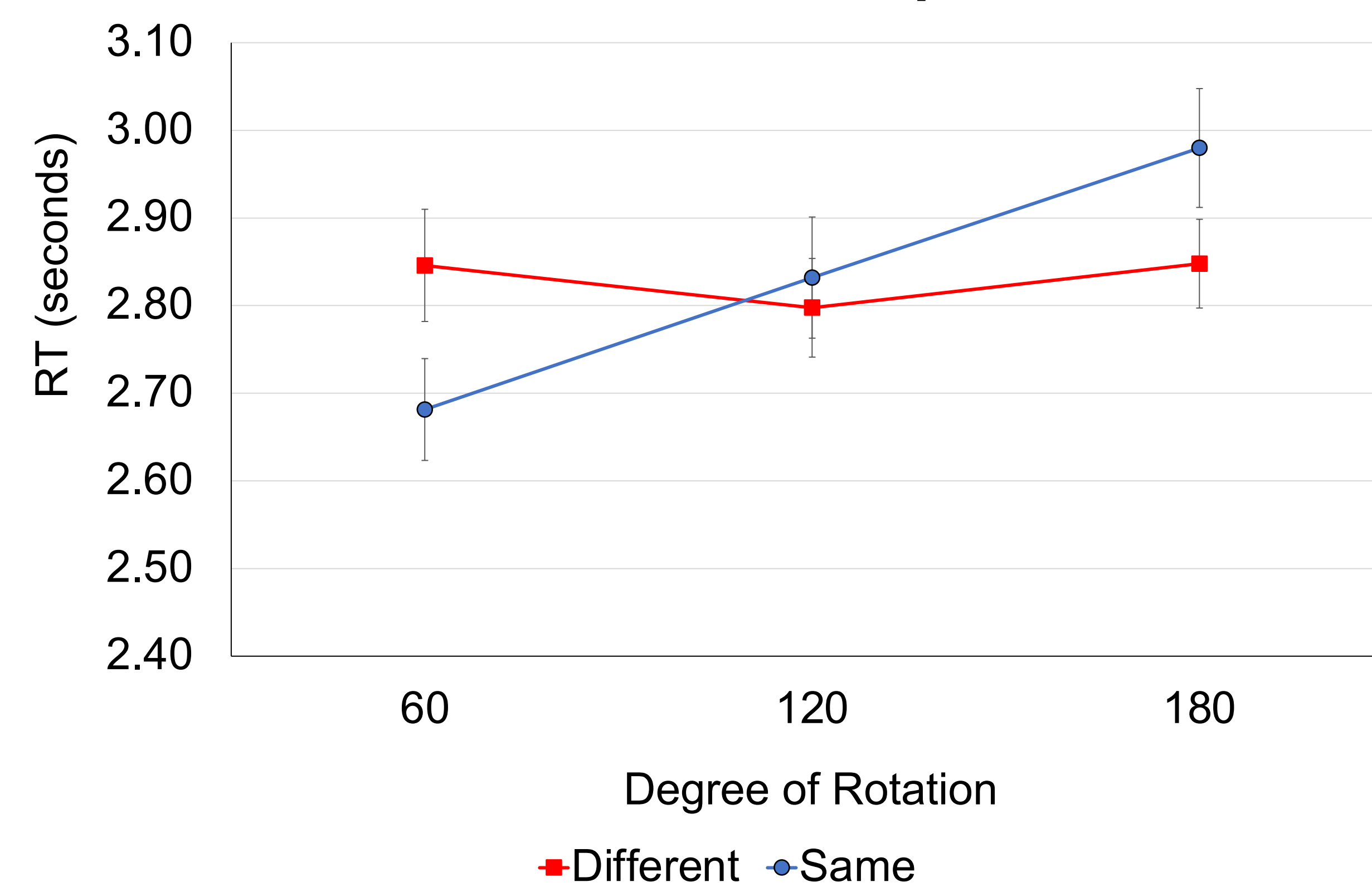


Figure 1. Mental rotation reaction times for degree of rotation and image similarity

### Hue Recall Error

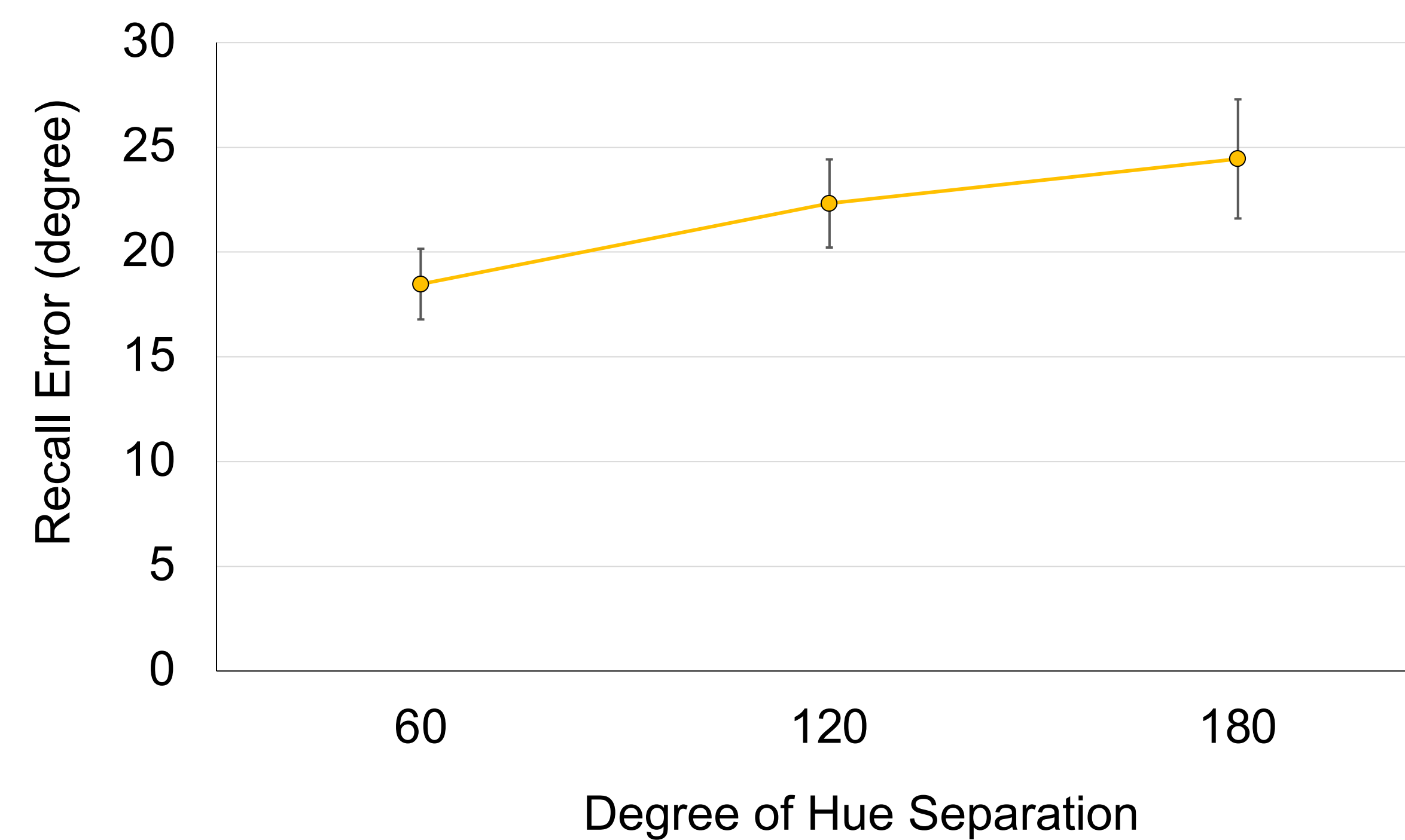


Figure 2. Hue recall errors for degree of hue separation

### Mental Rotation Response Time

2 (sex: female, male) x 2 (image similarity: same, different) x 3 (degree of rotation: 60, 120, 180) x 3 (degree of hue separation: 60, 120, 180) ANOVA  
Degree of rotation:  
 $F(2, 108) = 11.054, p < 0.000, \eta_p^2 = .170$   
Degree of rotation\*Image similarity:  
 $F(1.672, 90.301) = 14.165, p < 0.000, \eta_p^2 = .208$

### Hue Recall Error

2 (sex: female, male) x 2 (image similarity: same, different) x 3 (degree of rotation: 60, 120, 180) x 3 (degree of hue separation: 60, 120, 180) ANOVA  
Degree of hue separation:  
 $F(1.492, 80.583) = 6.991, p < 0.004, \eta_p^2 = .115$

## Conclusions

- We replicated previous findings for mental rotation response time.
- Recalling a specific hue resulted in lower precision when the to-be-remembered colors were more different from each other.
- We did not find an effect of participant sex for either mental rotation or color recall.

## References

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