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# The Role of Visual and Proprioceptive Limb Information in Object Size and Affordance Judgments

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## Introduction

- In cases of visual-proprioceptive conflict, perceived limb location can be strongly influenced by visual information (Hay et al., 1965).
- In the *mirror illusion*, an unseen hand position is reported to be in the location portrayed by the mirror reflection of a viewer's visible hand (See Figure 1).
- The influence of visual information on perceived limb location has been called *visual capture* (Hay et al., 1965).
- The effects of visual capture have been shown to influence participants' ability to point to locations within reachable space (Homes et al., 2004) and to physically represent object size with their hands when an object is presented straight on, perpendicular to their line-of-sight (Kunz et al., 2010).

### Present Research:

This experiment investigated the influence of visual capture on size judgments performed by matching the distance between hands to the width of an object that was presented outside the participants' line of sight and misaligned with their facing direction.

### Hypothesis:

We predicted that the visual capture of a mirrored hand position would significantly affect participants' ability to represent object size with their hands.

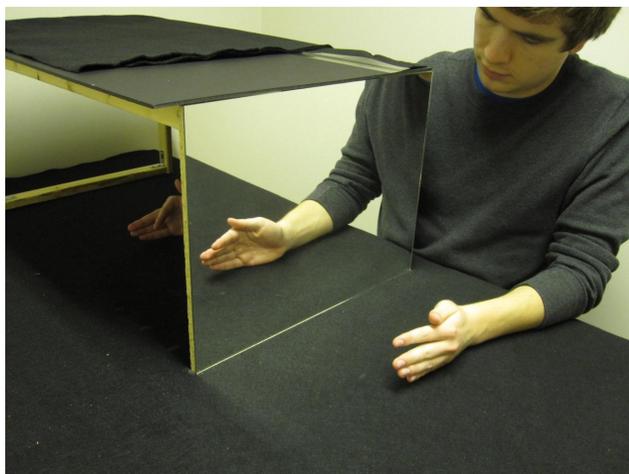


Figure 1

## Method

### Participants:

Fifteen undergraduate students from the University of Dayton (men = 10; women = 5) participated in the experiment (one participant's data was removed as an outlier).

### Materials:

- Wooden mirror box with felt curtain
- Wooden target block 28 cm in length
- Measuring tape

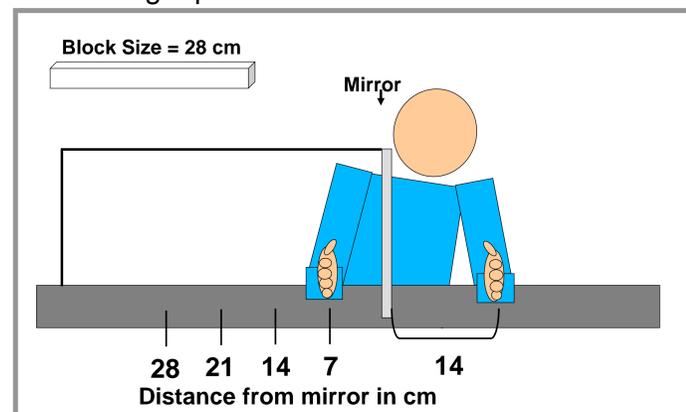


Figure 2

### Procedure:

- Participants were seated in front of the mirror box with their unseen hand positioned by the experimenter at 1 of 4 locations behind the mirror (See Figure 2).
- Participants' visible hand was always placed at a fixed location 14 cm in front of the mirror, such that there always appeared to be 28 cm between the two hands (as a result of the mirror reflection of the visible hand).
- Participants viewed their visible hand and its reflection while simultaneously flexing their index fingers on both hands for 8 seconds.
- When prompted, participants looked towards a wooden block, and immediately moved their unseen hand so that the distance between hands matched the size of the target block (See Figure 3).
- An identical "no-mirror" condition was conducted by repeating the size judgment task while the mirror was covered.

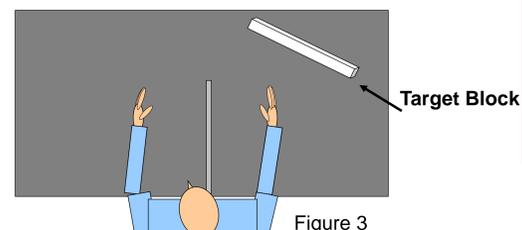
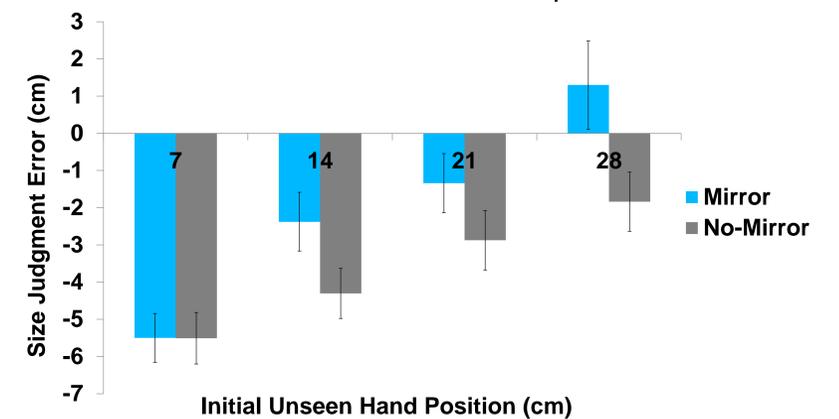


Figure 3

## Results

- Visual information influenced size judgments when there was a conflict between seen and felt position of the hands.



- Main effect of condition (mirror vs. no-mirror),  $F(1, 13) = 14.74, p < .001$ .
- Main effect of starting hand position,  $F(1.5, 19.53) = 33.41, p < .001$ .
- Interaction between condition and starting hand position,  $F(3, 39) = 6.21, p = .001$ .
- T-tests revealed significant differences between the mirror and no-mirror conditions at all hand positions except 7 cm.

## Discussion

- Results indicate that visual capture influenced participants' ability to represent object size with their hands.
- Starting hand position influenced the magnitude of size judgment errors.
  - Overall, participants tended to underestimate object size.
  - In both mirror and no-mirror conditions, participants' error was smaller when their unseen hand was initially positioned further from their visible hand.
- This suggests that vision acts as a primary source of information about bodily location and may influence other body-based spatial judgments, even those outside the space of the body
- Future research will examine the effects of visual capture in affordance judgments that involve both body and object awareness.

**References:** Available upon request.