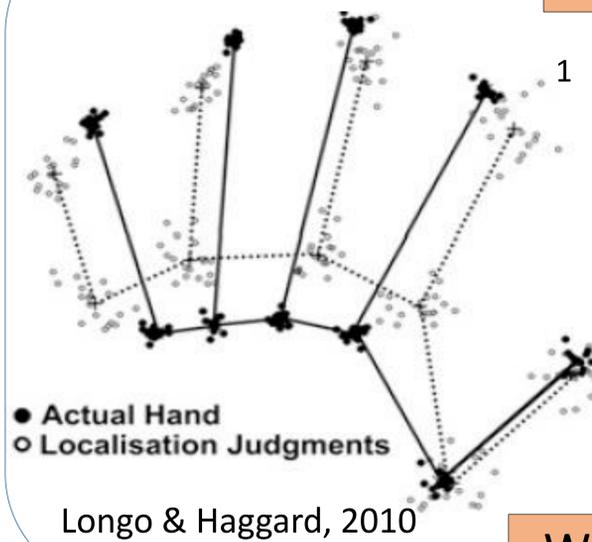


# The Contributions of Vision and Proprioception to Hand Perception

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## Introduction

- Previous research has found that the perception of our hands is inaccurate.
- A different study found that in a tactile two-point discrimination task, performance was altered with non-informative vision. This suggests that tactile and visual information might have interfered with each other<sup>2</sup>
- Could the inaccurate hand representation be as a result of conflicting sensory modalities?



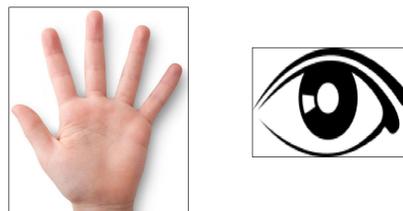
What role do vision and proprioception play in the perception of our hands?

## Methods

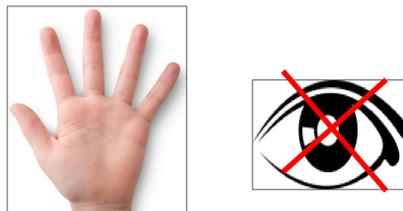


Participants pointed 5 times to 10 different landmarks on the hand.

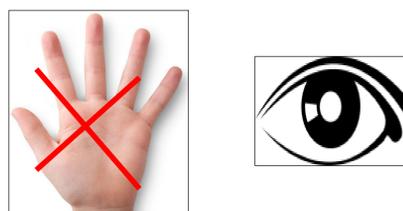
### Proprioception + Vision



### Proprioception

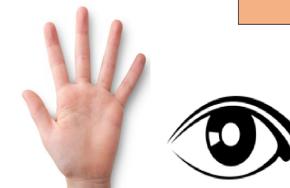


### Vision



There were 17 participants in each group

## Results



Hand Width  
Finger Length  
Thumb Opposition  
Thumb Length

### Proprioception + Vision

Left Hand      Right hand

↑                      ↑

↓                      ↓

-                      -

-                      -



Hand Width  
Finger Length  
Thumb Opposition  
Thumb Length

### Proprioception

Left Hand      Right hand

-                      ↑

-                      -

-                      -

-                      -



Hand Width  
Finger Length  
Thumb Opposition  
Thumb Length

### Vision

Left Hand      Right hand

-                      -

↓                      ↓

↓                      ↓

↓                      ↓

## Discussion & Conclusion

In the proprioception + vision group hand width was overestimated and finger length was underestimated when compared to the real hands. For the proprioception group only right hand width was significantly overestimated. The vision group significantly underestimated finger length, thumb opposition and thumb length. Perception of hand size is accurate when derived from a proprioceptive map; when vision is used it interferes with the generation of an accurate map.

1. Longo, M. R., & Haggard, P. (2010). An implicit body representation underlying human position sense. *Proceedings of the National Academy of Sciences*, 107(26), 11727-11732.  
2. Kennett, S., Taylor-Clarke, M., & Haggard, P. (2001). Noninformative vision improves the spatial resolution of touch in humans. *Current Biology*, 11(15), 1188-1191