

Pantomime vs. Palpable:

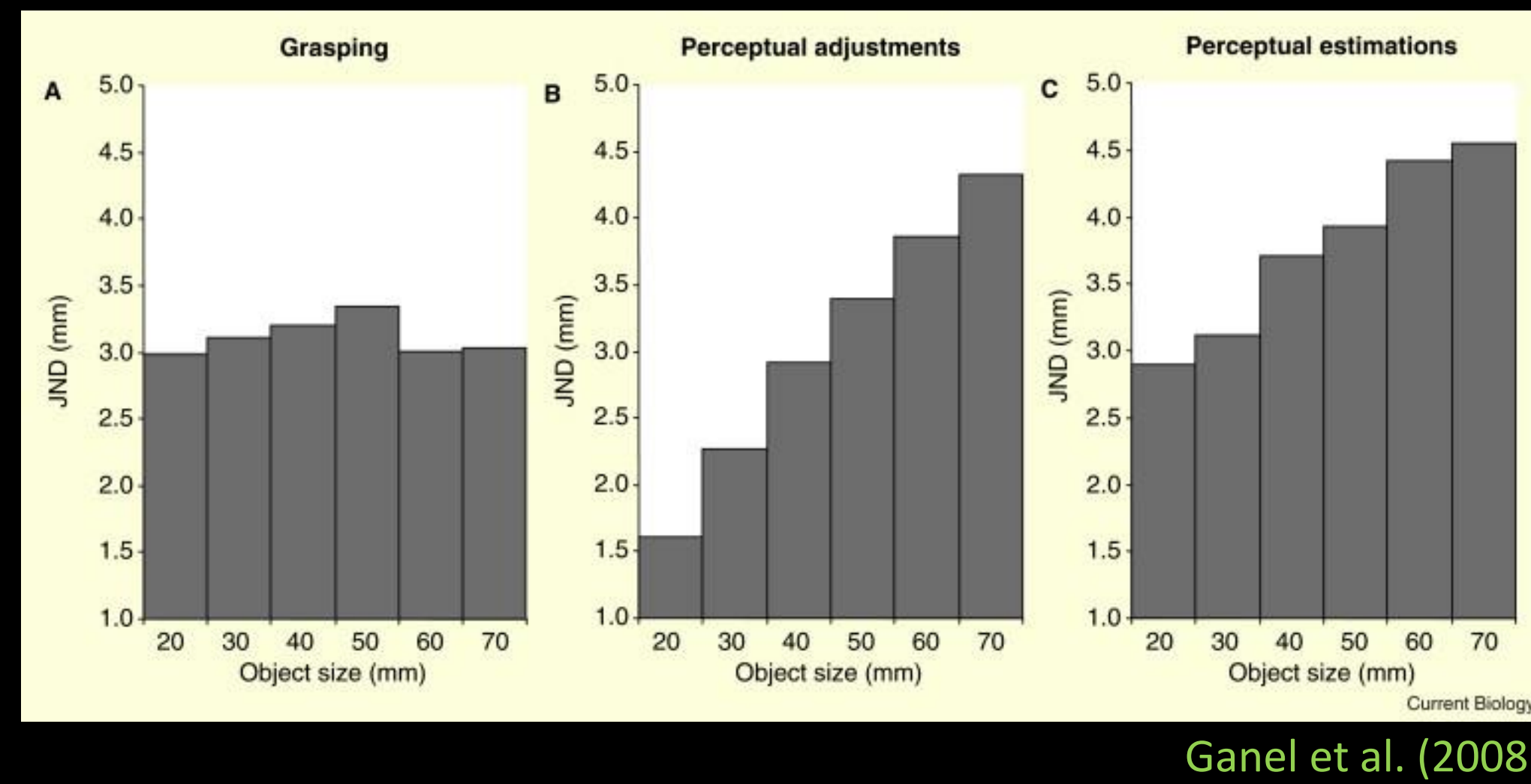
Applying Weber's Law to Haptically-Guided Action

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Introduction

Weber's law (WL): The amount of change necessary to be noticed is systematically related to the intensity of the original stimulus; the stronger the initial stimulus, the greater a change must be for the difference to be noticeable.

WL has been used as a psychophysical tool to study action and perception^{1,2,3}.



Question

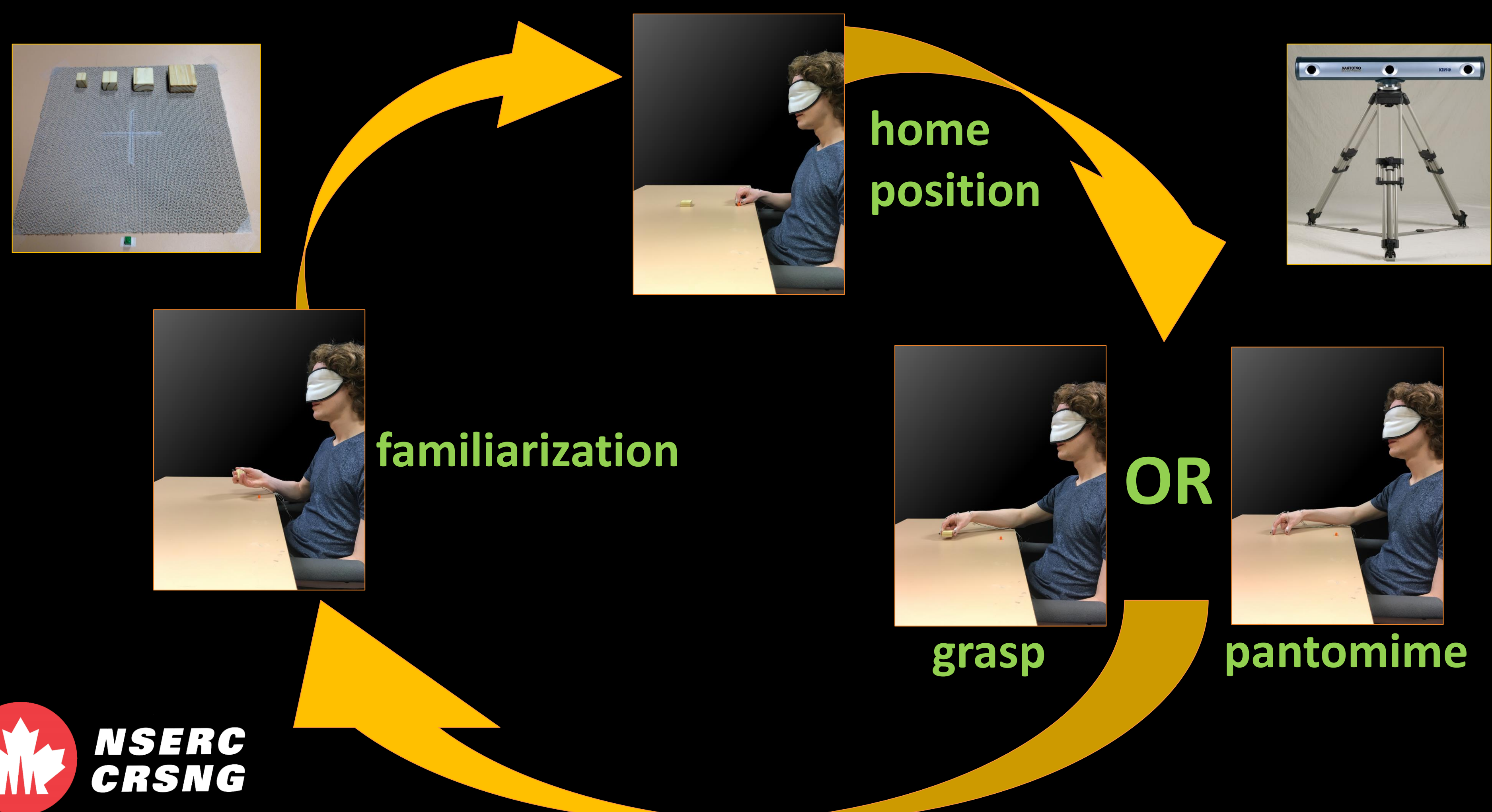
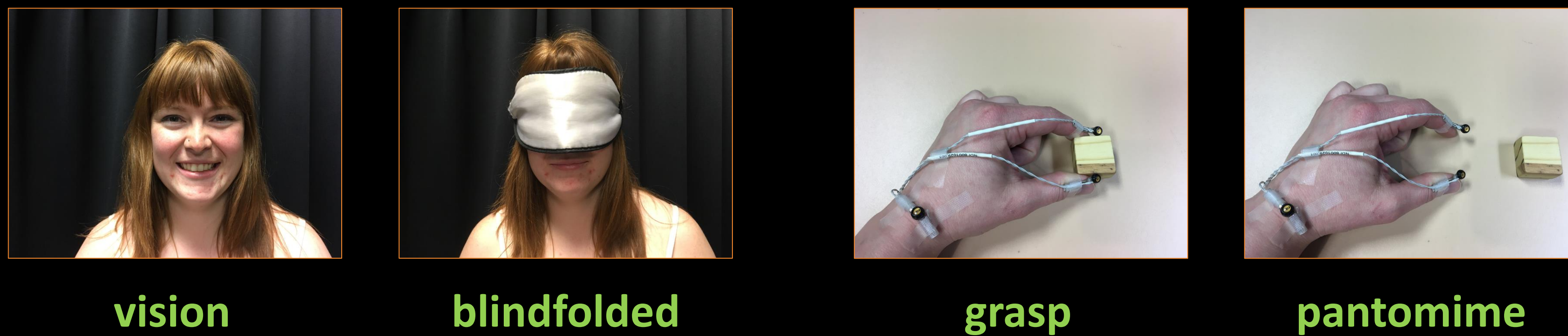
Do haptically-guided or pantomimed grasps (visual/haptic) follow WL?

Hypothesis

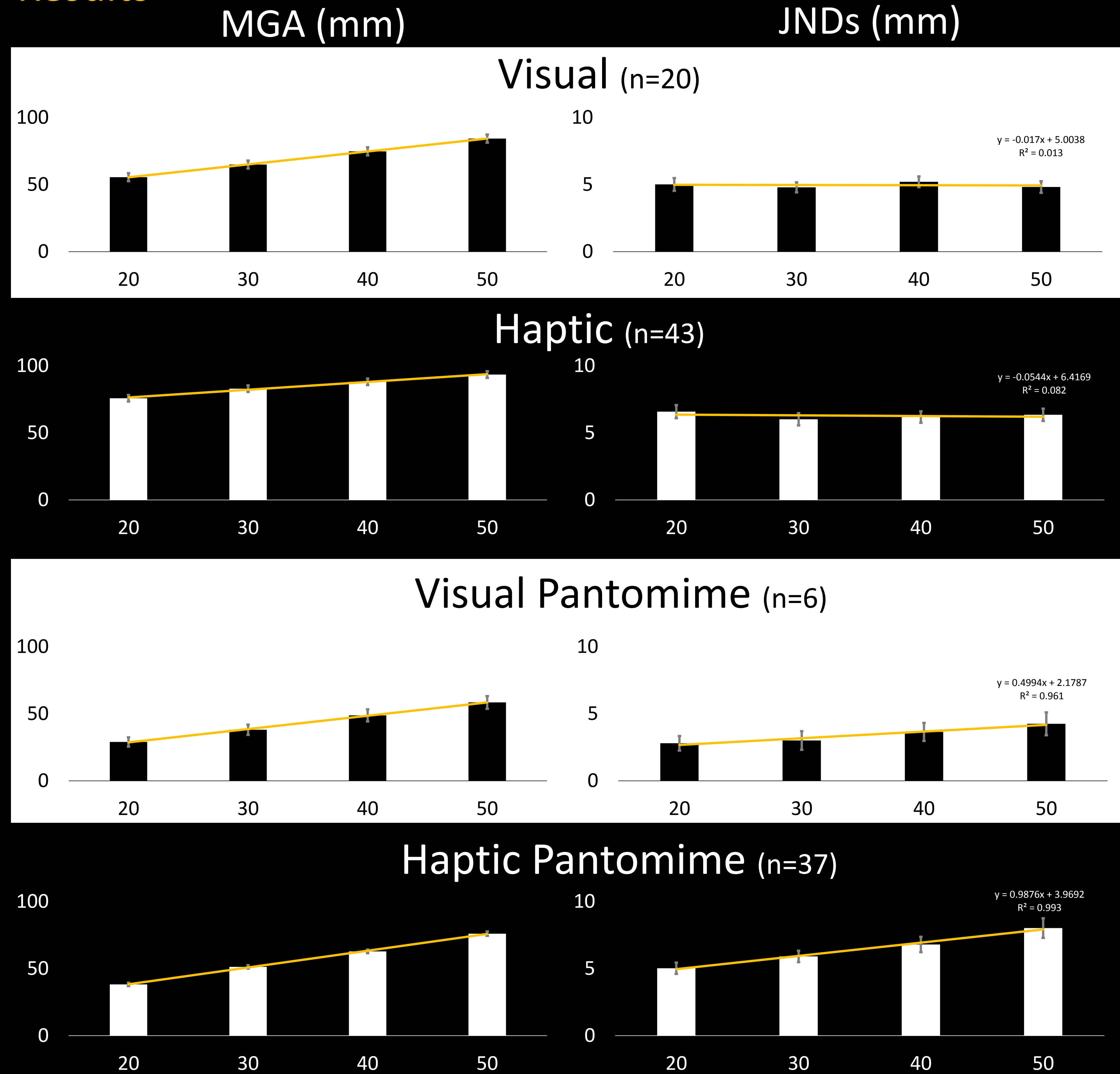
If the just-noticeable-differences (JNDs) remain invariant across the increasing object sizes for the action, then it will show a violation of WL; whereas if the JNDs increase with object size in a linear fashion, then it will demonstrate an adherence to WL.

Methods

- N=106 university students



Results



Discussion

- In all conditions MGA or GA scaled to object size, $p < 0.05$.
- The JNDs for the visual AND haptic conditions were invariant to changes in object size, demonstrating a violation of WL.
- The JNDs for the pantomime conditions, both visual and haptic, adhered to WL; JNDs increased with increased object size.

Conclusion

- Sensory-guided actions violate WL suggesting dorsal stream processing, whereas pantomimed actions adhere to WL suggesting ventral stream processing.

Future Direction

Our next study will involve a delay (memory) condition from the time the participant feels or sees the object to the time they perform a grasp or pantomime action.

1. Ganel, T., Chajut, E., & Algom, D. (2008). Visual coding for action violates fundamental psychophysical principles. *Current Biology*, 18(14), R599-R601.
 2. Jazi, S. D., & Heath, M. (2014). Weber's law in tactile grasping and manual estimation: feedback-dependent evidence for functionally distinct processing streams. *Brain and cognition*, 86, 32-41.
 3. Jazi, S. D., Hosang, S., & Heath, M. (2015). Memory delay and haptic feedback influence the dissociation of tactile cues for perception and action. *Neuropsychologia*, 71, 91-100.