Interactive Effects of Hand-Proximity and Emotion on Vision

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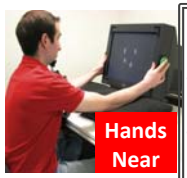

Introduction

- Many changes in vision have been reported when evaluating stimuli near the hands (e.g., slower rates of search[1], improved visual short term memory[2], impaired semantic processing[3], biased figure-ground assignment[4])
- Some visual changes suggest an enhanced role of magnocellular processing (temporal sensitivity is improved near the hands while spatial sensitivity is impaired[5])
- In these experiments we further explored the possibility that proximity to the hands leads to enhanced processing by magnocellular mechanisms

References

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[4] Cosman, J. D. & Vecera, S. P. (2010). Attention affects visual perceptual processing near the hand. *Psychological Science, 21*, 1254 – 1258.
[5] Gozli, D. G., West, G. L. & Pratt, J. (2012). Hand position alters vision by biasing through different visual pathways. *Cognition, 124*, 244-250.
[6] e.g., West, G., Anderson, A., Bedwell, J. S., & Pratt, J. (2010). Red diffuse light suppresses the accelerated perception of fear. *Psychological Science, 21*, 992-999.
[7] Bocanegra & Zeelenberg (2009). Emotion improves and impairs early vision. *Psychological Science, 20*, 707-713.
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[10] Lang, P. J., Bradley, M.M., & Cuthbert, B.N. (2008). *International affective picture system (IAPS): Affective ratings of pictures and instruction manual. Technical Report A-8.* University of Florida, Gainesville, FL.

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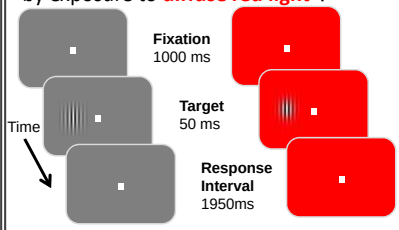
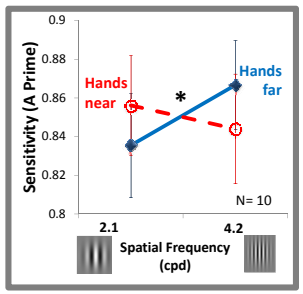
Experiment 1

- Does **proximity to the hands increase sensitivity to low spatial frequencies** (a known property of magnocellular mechanisms)?
- If LSF sensitivity is increased for stimuli near the hands, can it be **eliminated when magnocellular processes are suppressed** by exposure to **diffuse red light**[6]?

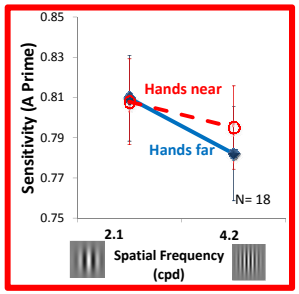


On each trial gabor patch either:
- LSF (2.1 cpd) or HSF (4.2 cpd)
- Left or right side
- Tilted (-4.8◦ or 4.8◦) or straight

Task = Are lines tilted or straight?



Hand proximity and SF interacted against a grey background. Having hands near the stimuli increased LSF sensitivity

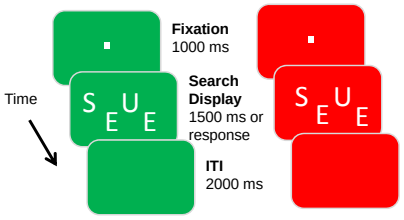


The effect of hand proximity was eliminated against a red background

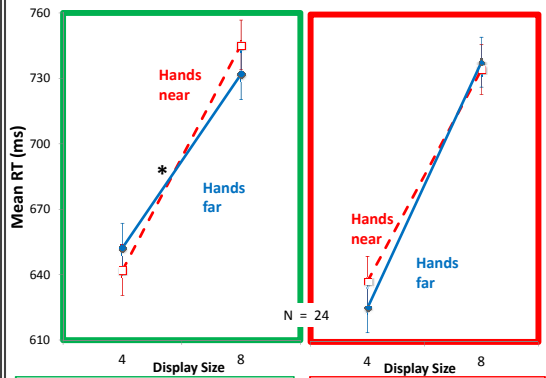
These results support the idea that magnocellular processing is enhanced for stimuli near the hands

Experiment 2

Can enhanced magnocellular processing explain other changes in vision for stimuli near the hands?



- One target and 3 or 7 distractors on each trial
- Background color blocked within each hand posture
- **Task =** Is S or H present in display?



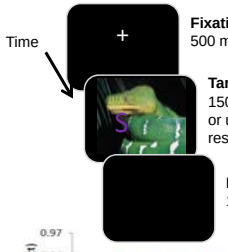
The typical finding of slower search rates for stimuli near the hands was replicated against a green background

However, the effect was eliminated against a red background

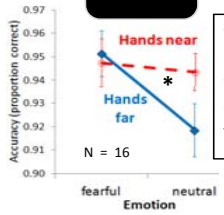
Experiment 3

Do hand-proximity and fearful stimuli exert their effects through a shared mechanism?

- Exposure to fearful stimuli and nearby hands both increase sensitivity to LSF stimuli[7]
- The amygdala, which responds to emotional stimuli, receives primarily magnocellular input[8]
- Objects near the hands might be dangerous - enhanced processing could be beneficial



- Fearful[9] or neutral IAPS[10] image as background on each trial
- Single letter superimposed in random location
- **Task =** Is S or H present in display?



- The effects of emotion and hand proximity interacted
- With hands nearby, benefit of fearful stimuli extended to neutral stimuli

- Further support that **magnocellular processing is enhanced for stimuli near the hands**:
  - Increased LSF sensitivity
  - When magnocellular processing suppressed, no evidence for LSF sensitivity or slower search rates
- **First direct evidence that hand nearness and processing of emotional stimuli interact** – may operate through common mechanism