NEAR-OPTIMAL INTEGRATION OF ORIENTATION INFORMATION ACROSS SACCADIC EYE MOVEMENTS

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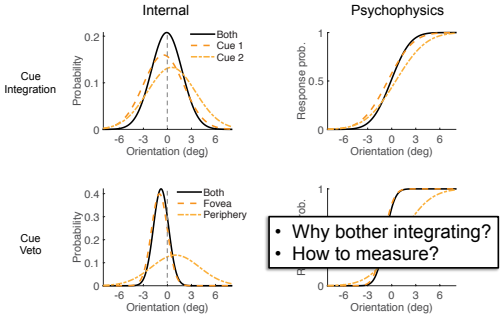
Vision Sciences Society Annual Meeting 2015

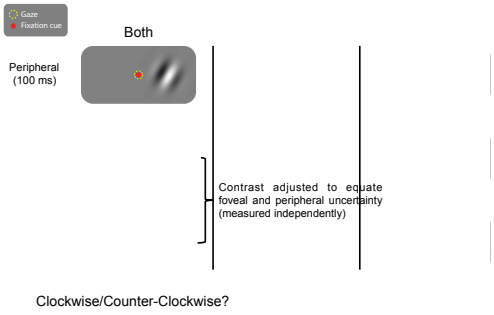
Do Humans Integrate Orientation Information?

- Why throw away information?
- People are good at cue combination
- We do it all the time

Theory: Optimal Cue Integration

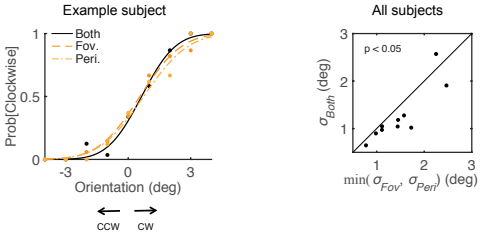


Task: Orientation Discrimination



Clockwise/Counter-Clockwise?

Result: Integration of Orientation Information

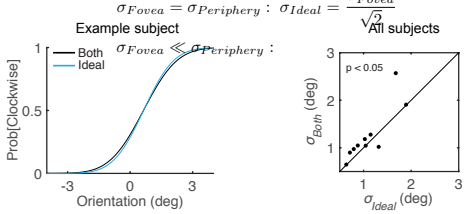


How Good are Humans at Integrating Orientation Information?

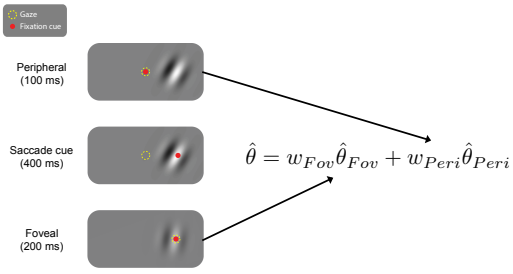
$$\frac{1}{\sigma_{Ideal}^2} = \frac{1}{\sigma_{Fovea}^2} + \frac{1}{\sigma_{Periphery}^2}$$

$\sigma_{Fovea} = \sigma_{Periphery}$: $\sigma_{Ideal} = \frac{\sigma_{Fovea}}{\sqrt{2}}$

$\sigma_{Fovea} \ll \sigma_{Periphery}$:



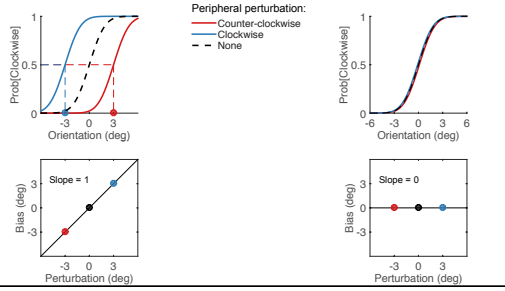
How do Humans Integrate Orientation Information?



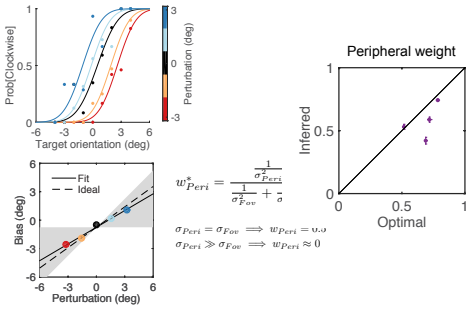
Theory: Perturbation Analysis

Periphery dominates ($w_p = 1$)

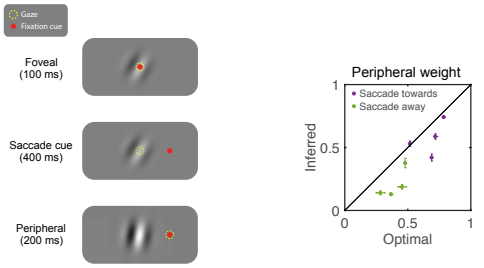
Fovea dominates ($w_p = 0$)



Result: Weighted Sum of Views



Fovea or Recency?



Conclusions

- Do humans integrate orientation information across eye movements?
  - Yes
- How good are humans at integrating orientation information?
  - Pretty good, not perfect
- How do humans integrate orientation information / what is the integration rule?
  - Well described by weighted sum
  - Fovea is overweighted

Thank You

- People:
  - Lab for Computational Vision
  - Michael Schemitsch
- Funding:
  - James S. McDonnell Foundation

- Questions/Comments:
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