



SUB-OPTIMAL INTEGRATION OF ORIENTATION INFORMATION ACROSS SACCADES

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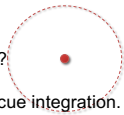
OSA Fall Vision Meeting 2015



Do Humans Integrate Orientation Across Saccades?

Why we expect integration:

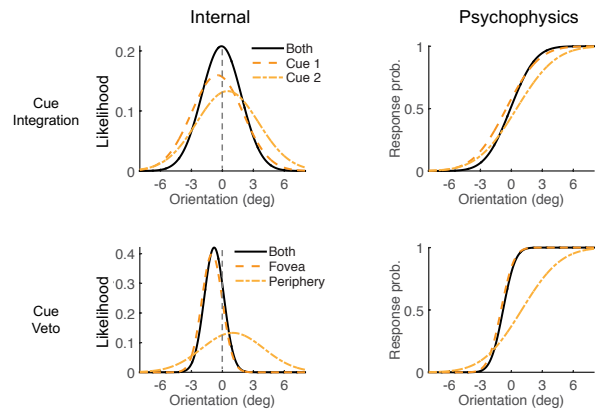
- Why throw away information?
- People are typically good at cue integration.
- We make saccades all the time.



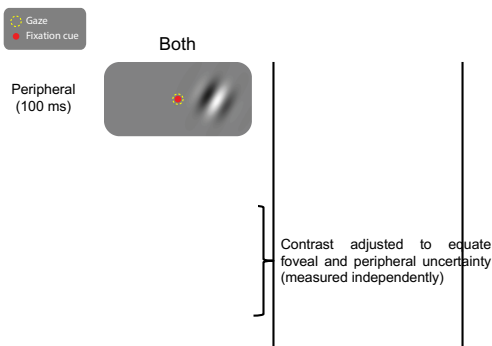
Pre-saccadic view



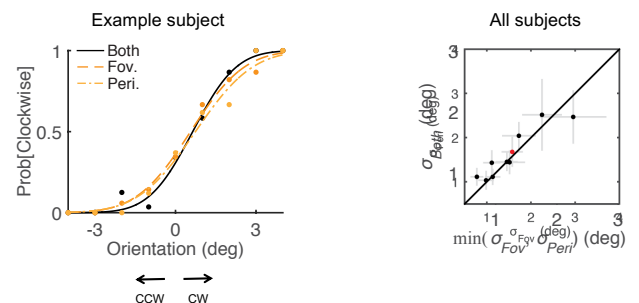
Theory: Optimal Cue Integration



Task: Orientation Discrimination

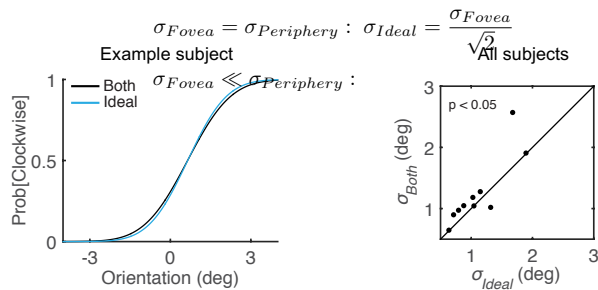


Result: Integration of Orientation Information

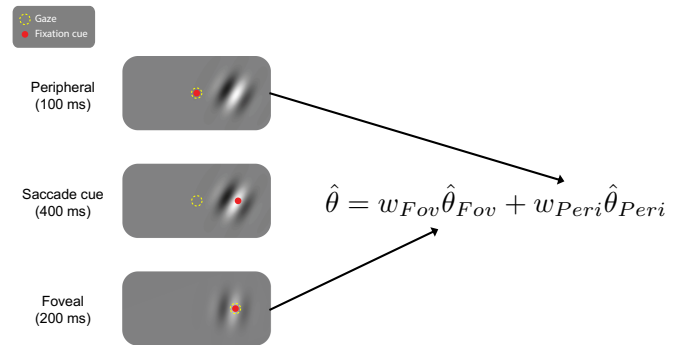


How Good are Humans at Integrating Orientation Information?

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



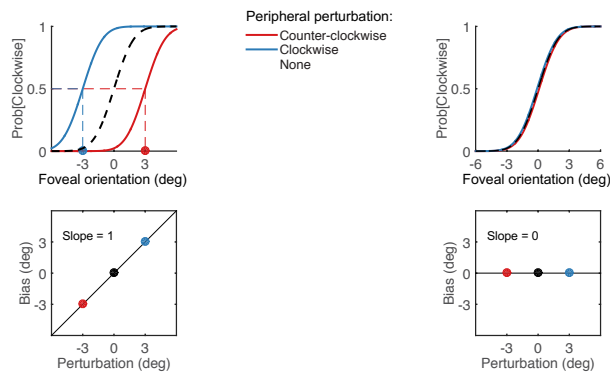
How Do Humans Integrate Orientation Information?



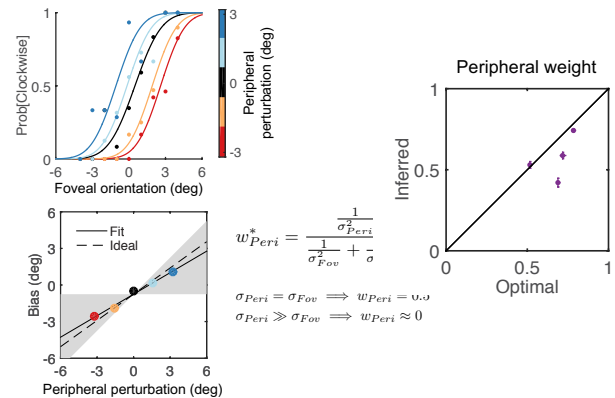
Theory: Perturbation Analysis

Periphery dominates ($w_p = 1$)

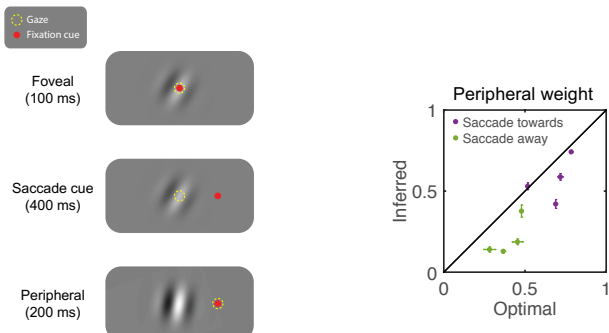
Fovea dominates ($w_p = 0$)



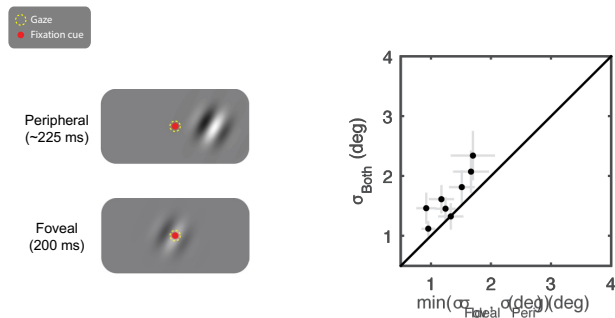
Result: Weighted Sum of Views



Fovea or Recency?



Is Saccade Necessary for Integration?



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
 - Only when a saccade indicates they are the same object
- A similar result was found (independently, simultaneously) by Alexander Schütz and Christian Wolf

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