

Estimates of category means are biased away from the category boundary following an orientation-categorization task

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Introduction

Prior expectations influence perception.

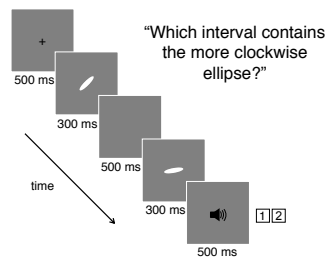
Q1: How do observers estimate category means after a sequence of categorization decisions?

Q2: What is the relationship between sensory uncertainty and estimation bias?

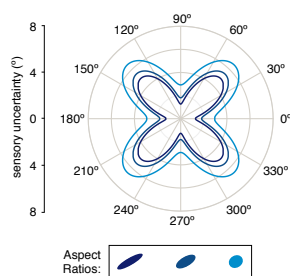
Tasks

Preliminary: Threshold measurement

Orientation discrimination (2IFC)

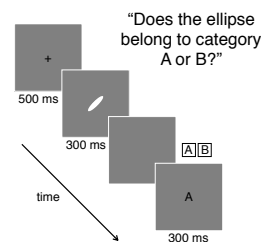


Sensory uncertainty as function of θ

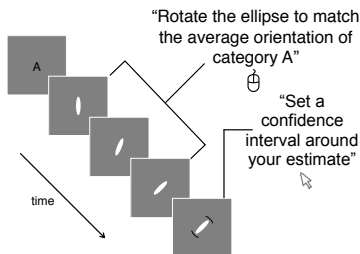


Main: Categorization & Estimation

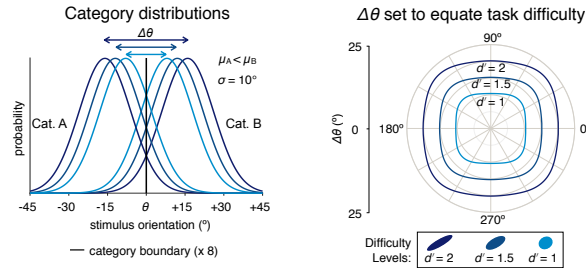
Part 1: Orientation categorization



Part 2: Mean estimation



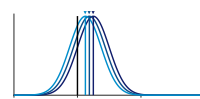
Stimuli



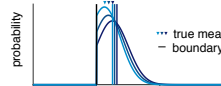
Modeling

Model

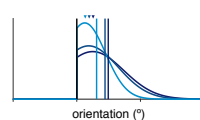
1. Ideal observer
Averages all stimuli from category



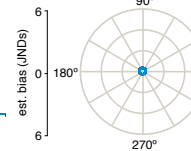
2. Conditional averaging
Averages correctly-categorized stimuli



3. Performance and variance dependent
Calculates mean from estimate of p(hit) and biased estimate of category variance

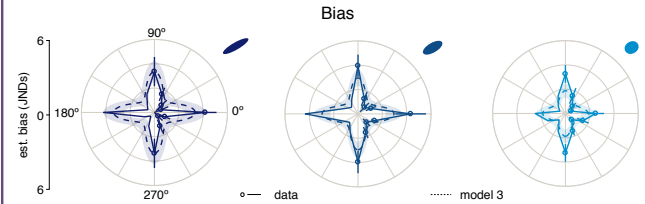


Prediction



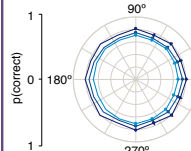
Results

Estimation data

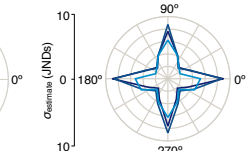


- Estimates of category means are repelled from the category boundary.
- Repulsive effects are greater at cardinal orientations.

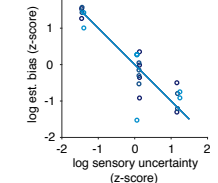
Categorization performance



Estimated* category variance



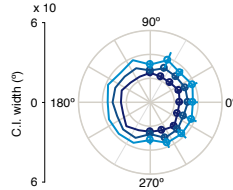
Bias & uncertainty



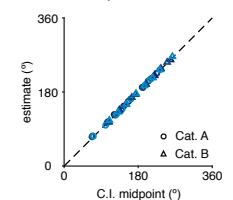
- Categorization performance is similar across orientations.
- Variance is overestimated with greater bias at cardinal orientations.
- Estimation bias is inversely proportional to sensory uncertainty.

Confidence data

Width of C.I.



Midpoint of C.I.



- Confidence interval widths are set based on categorization performance.
- Confidence intervals are set symmetrically suggesting no knowledge of bias.

Conclusions

A1: Estimation judgments are predicted by categorization performance and an overestimation of category variance.

A2: Estimation bias is inversely proportional to sensory uncertainty.