Crossing Over: Different Visual Search Tasks Use Different Decision Rules

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I Introduction

How do observers decide if a target is present in a display? According to signal detection theory, they could base their decision on:

1. The biggest signal in the display (max rule)
2. The sum of all signals in the display (sum rule)
3. A subset of items in the display (limited capacity/signal rule)

Question: Do observers use different decision rules on different search tasks?

II Methods

2 Search Tasks

- Orientation Feature Search
  - 2 Among 5’s Search

Tasks run separately

Stimuli obscured by noise

Mixed blocks of set size 1, 2, 4, and 8

100 present trials, 100 absent trials per set size per task

Orientation Feature

Max Rule

Lim. Capacity 1 Item Rule

Max + Lim. Cap. Rules

 Novel Staircase Method

Noise staircased continuously across set size in each task

Time: 440 ms

Tasks run separately

All observers used an unlimited capacity max rule on the orientation feature search

5 out of 6 observers showed the "crossover" effect!

Conclusion:

Most observers used a limited capacity rule for 2 among 5’s search

Future Directions

Use this method to explore the effects of learning and experience on visual search task performance

Ill Data

Simulations

Used an iterative procedure to find the best-fitting rule

Look at all that crossover!

Dotted Lines: Denote Simulation Data

Solid Lines: Denote Observer Data

Results

4 out of 6 observers used a limited capacity rule on the 2 among 5’s task, though the actual capacity limit was variable

Most observers used an unlimited capacity max rule for orientation feature search

Future Directions

Use this method to explore the effects of learning and experience on visual search task performance