Suboptimal Choice of Saccade Endpoint In Search With Unequal Payoffs

INTRODUCTION
- Human performance in search for a signal embedded in noise approaches that of a Bayesian optimal searcher in terms of efficiency and choice of saccade endpoint. Do human searchers choose the saccade endpoint that maximizes expected gain when the rewards at potential target locations differ?

PRELIMINARY EXPERIMENT
- Obtained a visibility map that gives $d'$ as a function of eccentricity in an 8AFC detection task for a fixed target contrast.
- This was used to constrain an ideal-observer model that chooses the saccade endpoint that maximizes expected gain given full knowledge of the visibility map.

MAIN EXPERIMENT
- 8AFC detection task with 5 reward conditions.
- Target: 3 cpd Gabor, 2 deg diam, at 16% contrast in 50% contrast white noise, 12 deg ecc.
- 3 subjects participated for performance-based monetary rewards.

RESULTS - Saccade Endpoints

RESULTS - Probability of Target Detection by Saccade Region

CONCLUSIONS
- Human observers’ choice of saccade endpoint differs significantly from that of an ideal observer when the rewards at potential target positions vary.
- Human observers saccade to regions far from the highest valued position with greater frequency than the ideal observer.
- Human observers’ suboptimal choice of endpoint results in a significant decrease in detection accuracy.
- Human observers’ efficiency approaches that of the ideal observer when the target is at the highest valued position and is lower at other positions.

Reference
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