

Suboptimal Choice of Saccade Endpoint In Search With Unequal Payoffs

NYU/CNS
Center for Neural Science

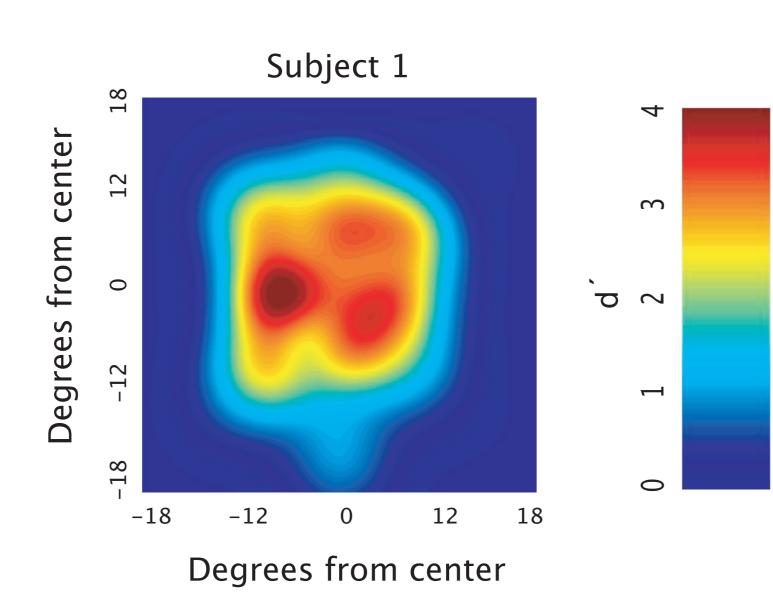
John F. Ackermann¹, Michael S. Landy^{1,2}
1: Dept. of Psychology, NYU 2: Center for Neural Science, NYU

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 endpoint¹.
- Do human searchers choose the saccade endpoint that maximizes expected gain when the rewards at potential target locations differ?

PRELIMINARY EXPERIMENT

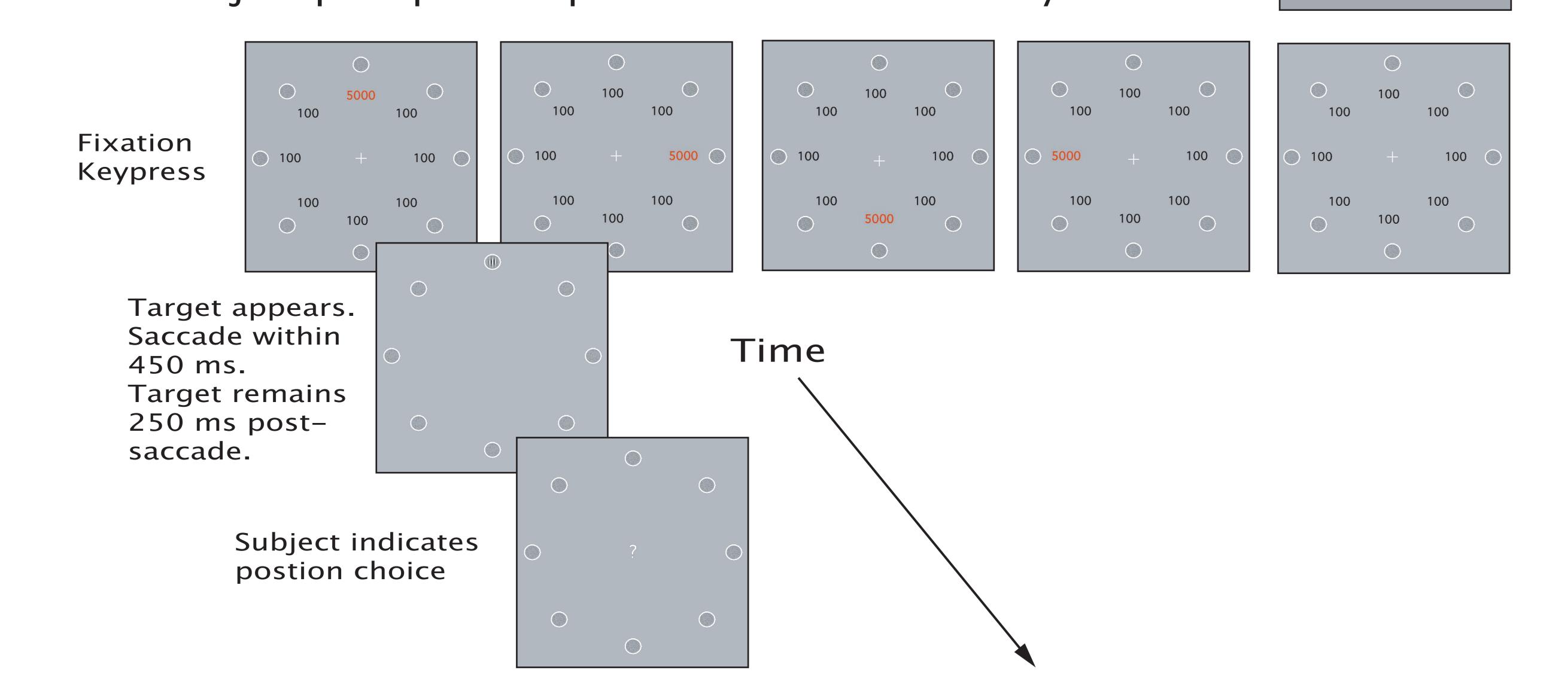
 Obtained a visibility map that gives d´as a function of eccentricity in an 8AFC detection task for a fixed target contrast



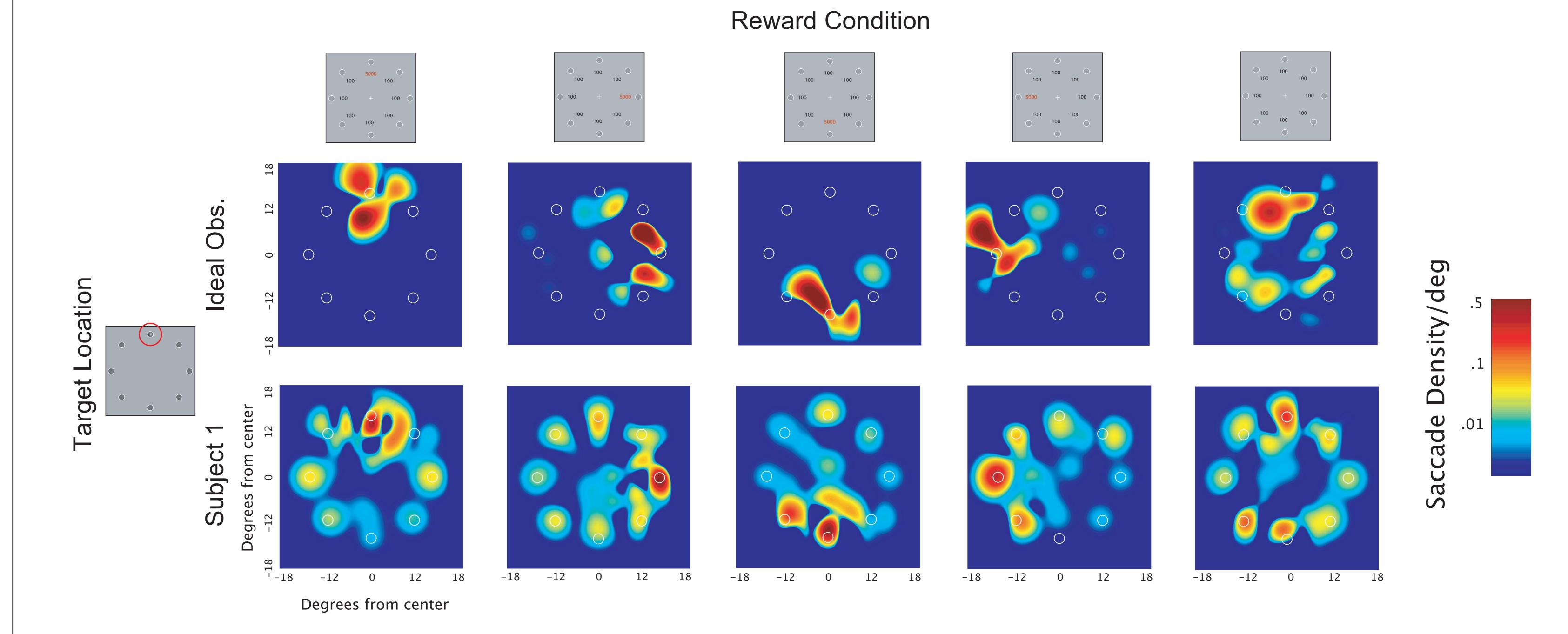
• This was used to constrain an ideal-observer model that chooses the saccade endpoint that maximizes expected gain given full knowledge of the visibility map.

MAIN EXPERIMENT

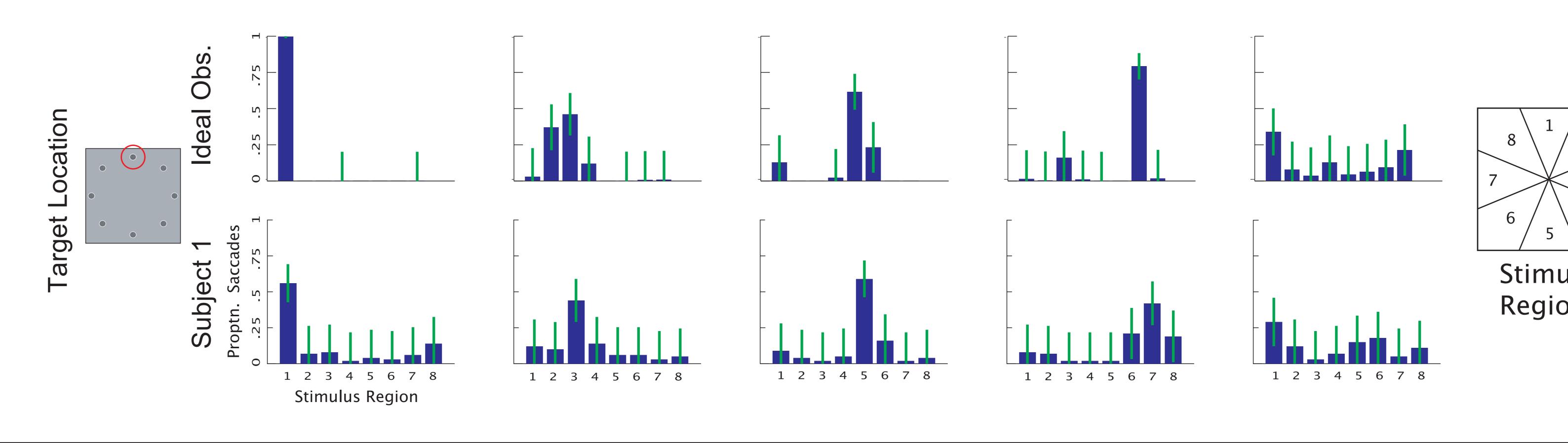
- 8AFC detection task with 5 reward conditions.
- Target: 3 cpd Gabor, 2 deg diam., at 16% contrast in 50% contrast white noise, 12 deg ecc.
- 3 subjects participated for performance-based monetary rewards.



RESULTS - Saccade Endpoints



Proportion of Saccades per Region in Each Reward Condition



CONCLUSIONS

- Human observers' choice of saccade endpoint differs significantly fom 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

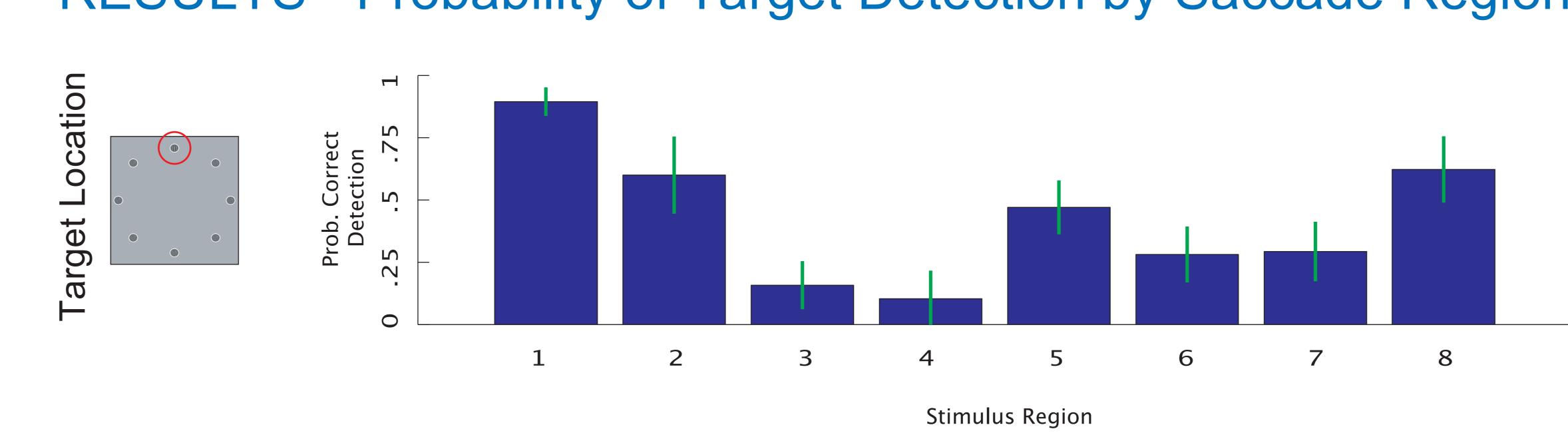
1: Najemnik, J. & Geisler, W.S. (2005). Optimal eye Movement strategies in visual search. Nature, 434, 387-391.

upport

NIH EY 16165

Contact jfa239@nyu.edu

RESULTS - Probability of Target Detection by Saccade Region



Efficiency By Reward Condition

