

# Exploration strategies in human decision making

— horizon 1

horizon 6

unequal, [1 3]

unequal, [1 3]

horizon 11

equal information [2 2]

difference in means [points]

decision noise

information condition

optimal decision noise

information condition

horizon 1

horizon 6

horizon 11

equal, [2 2]

equal, [2 2]

Robert C. Wilson, Andra Geana, John M. White, Elliot A. Ludvig

Choice 0.4 0.2

[points]

noise

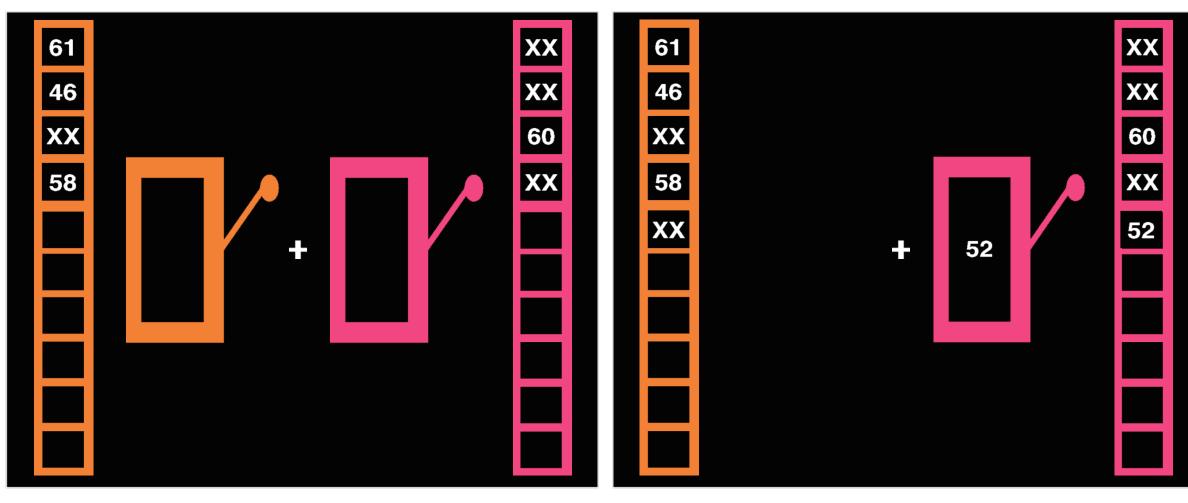
and Jonathan D. Cohen

## Introduction



What strategies do we use handle the exploreexploit tradeoff?

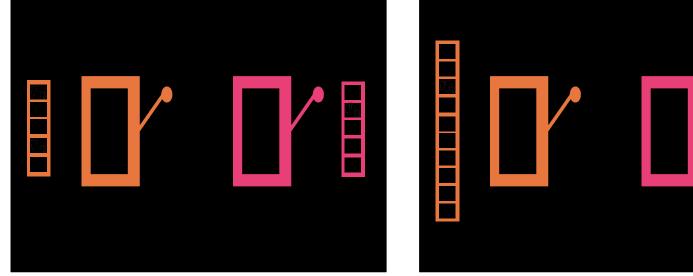
# Task



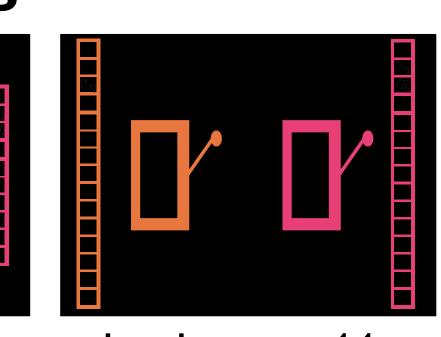
Game starts with four example rewards

Subjects try to maximize reward over all choices

#### Three horizon conditions

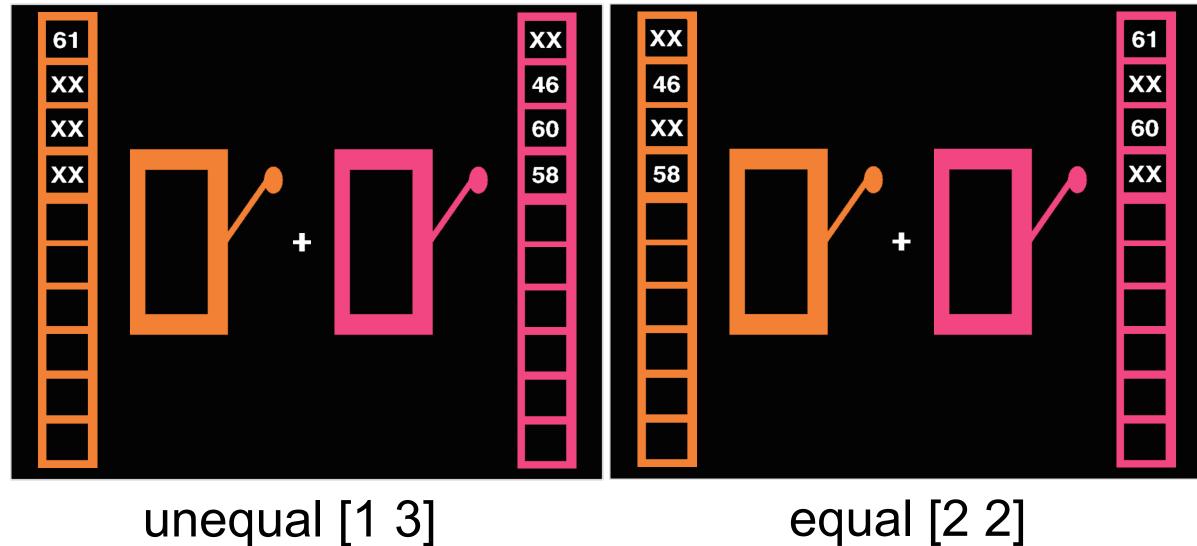


horizon = 6horizon = 1



horizon = 11

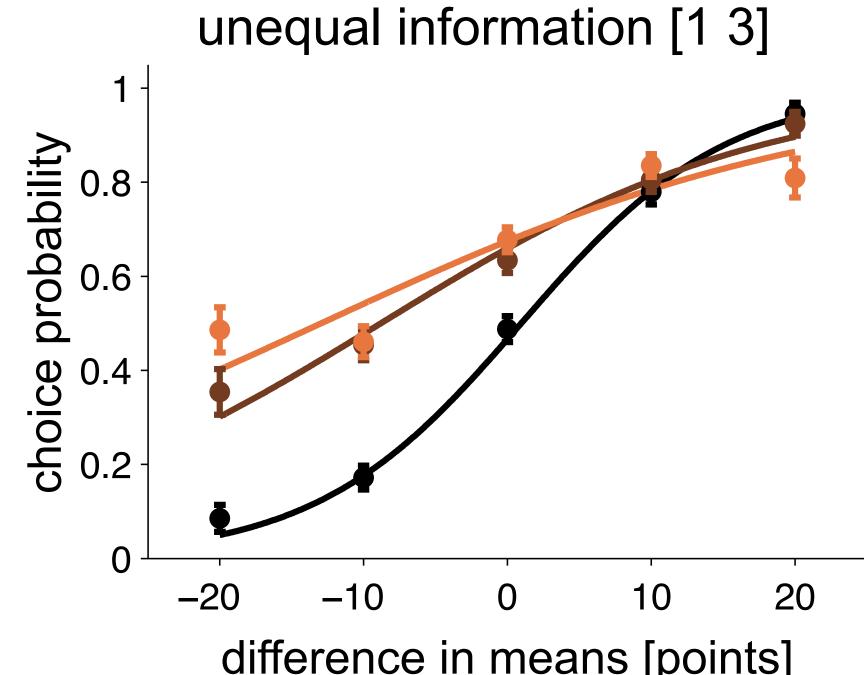
#### Two information conditions



equal [2 2]

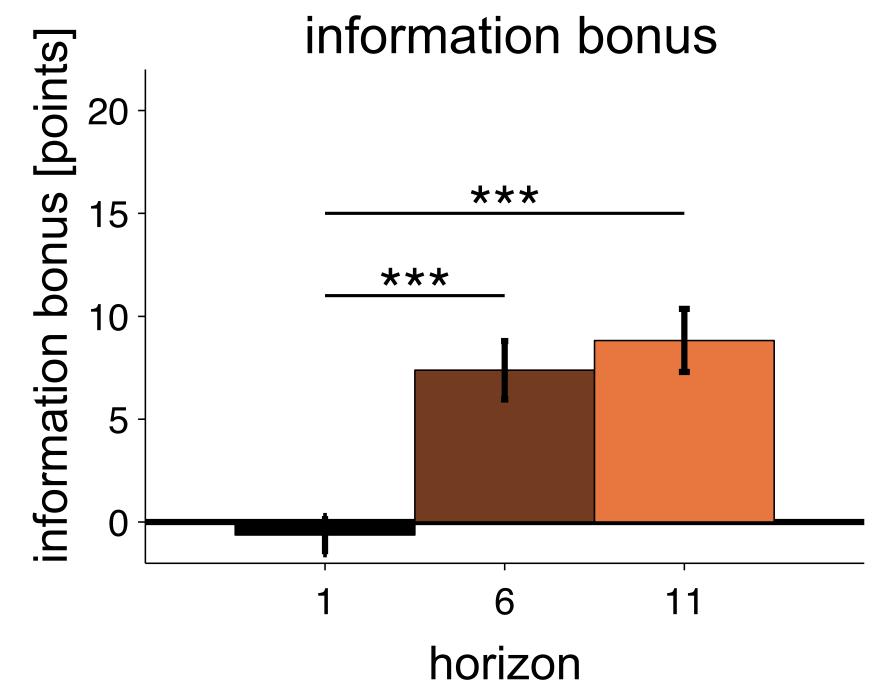
## Results

#### Choice curves (n = 33)

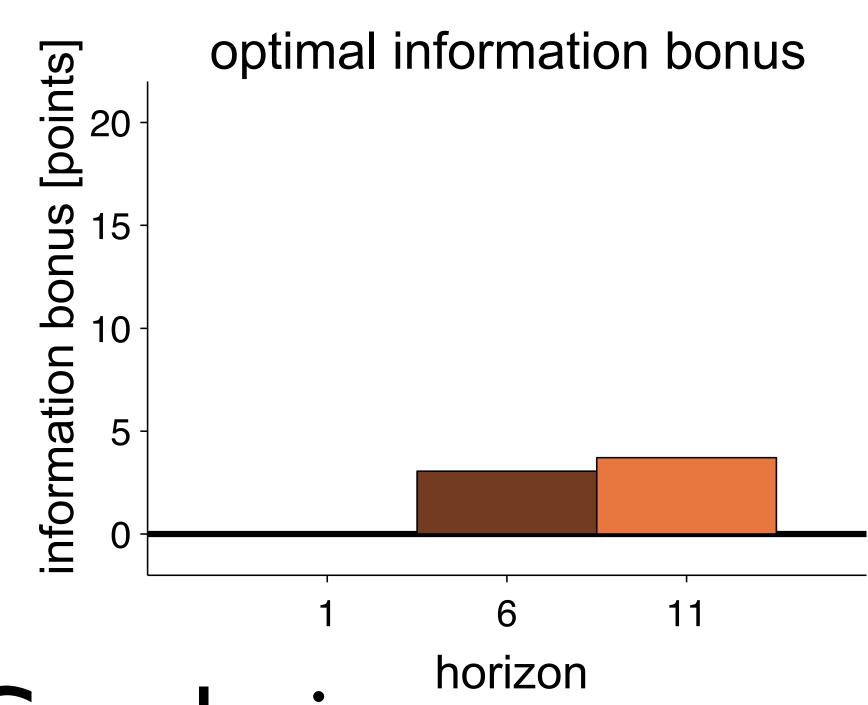


difference in means [points]

# **Model fits**







Conclusions

Exploration in humans is driven by:

- an information bonus that is consistent with directed exploration of optimal models
- adaptive noise consistent with undirected exploration of practical models

## Model

#### Choice probabilities

$$p = \frac{1}{1 + \exp\left(-\frac{\Delta\mu + A\Delta I + b}{\sigma}\right)}$$

difference in information (-1, 0 or 1)

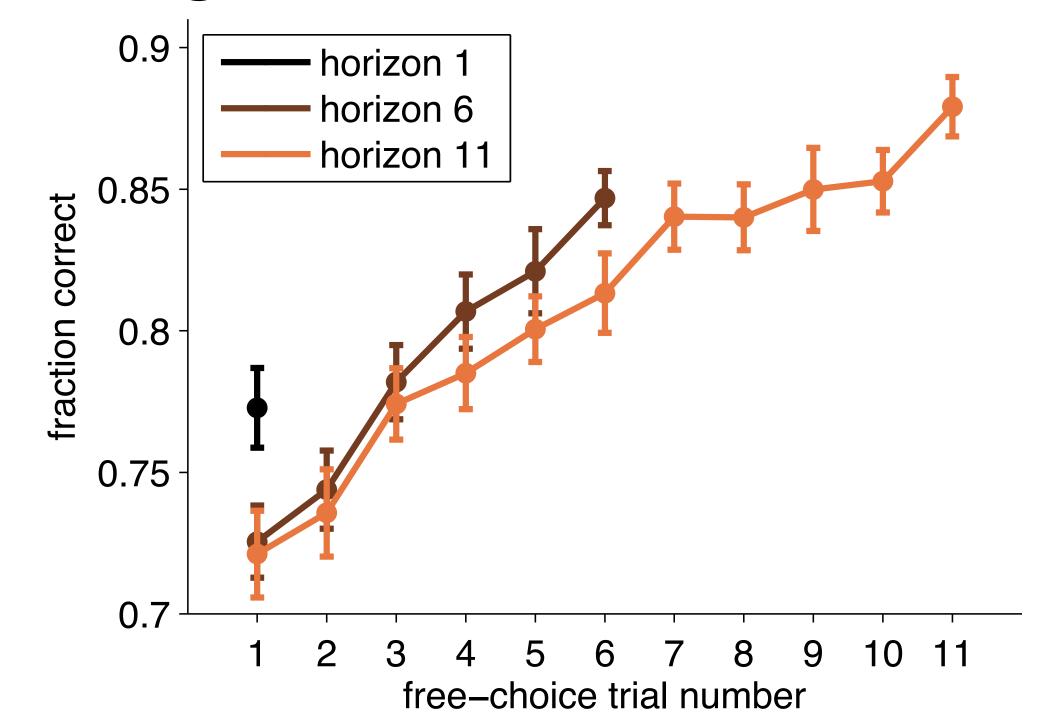
information bonus

side bias

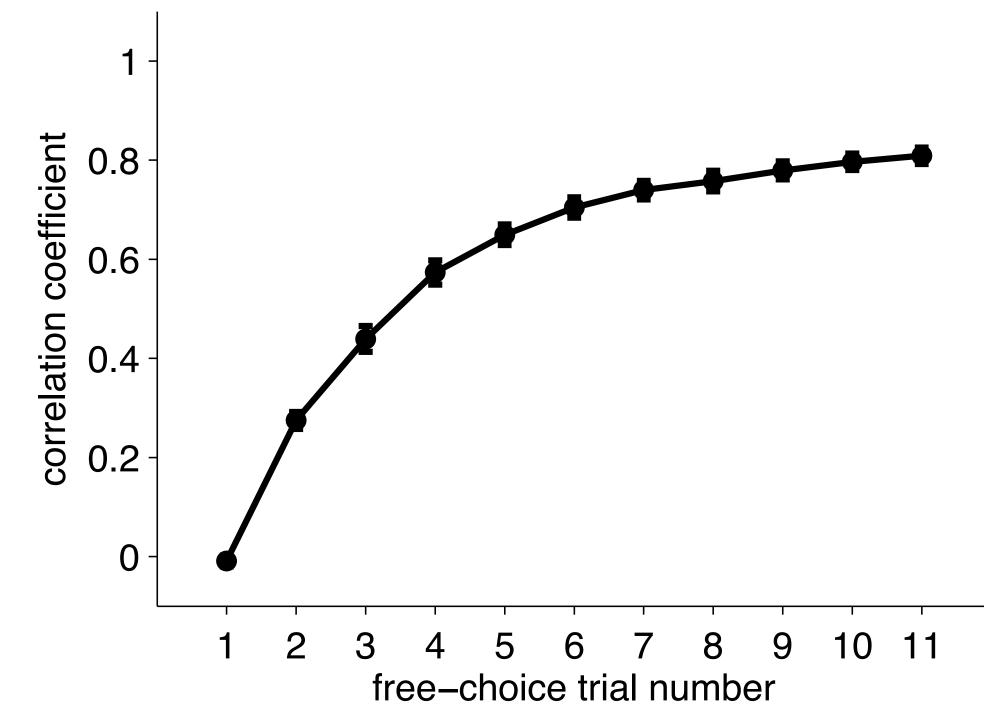
decision noise variance

# Side notes

## Learning curves



### Why only focus on first choice?



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