

Why the grass is greener on the other side

Behavioral evidence for an ambiguity bonus in human exploratory decision-making

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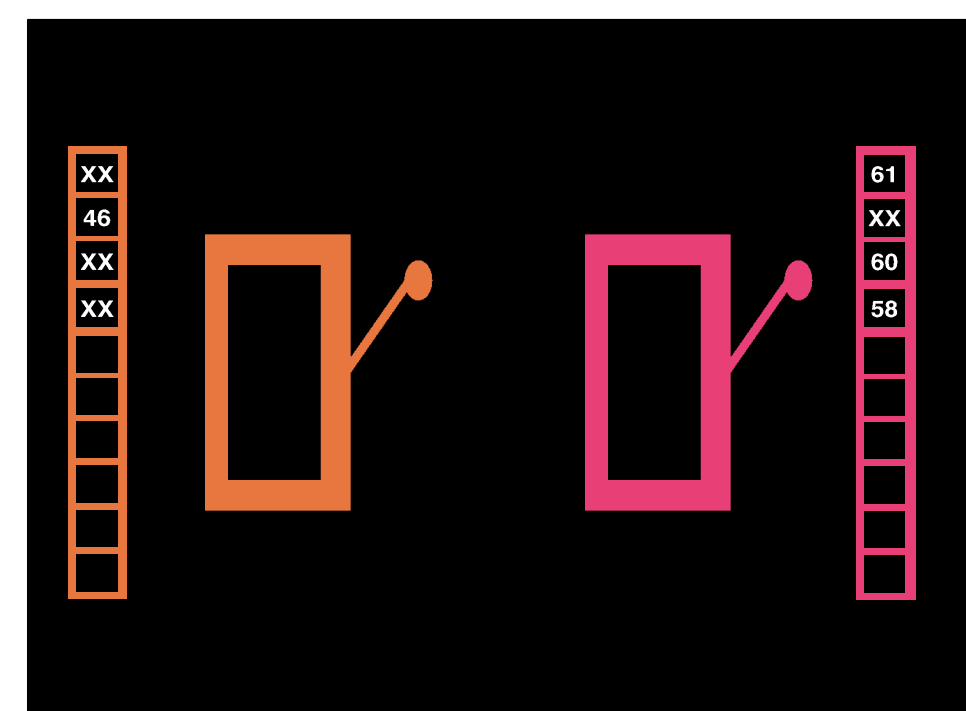
Introduction



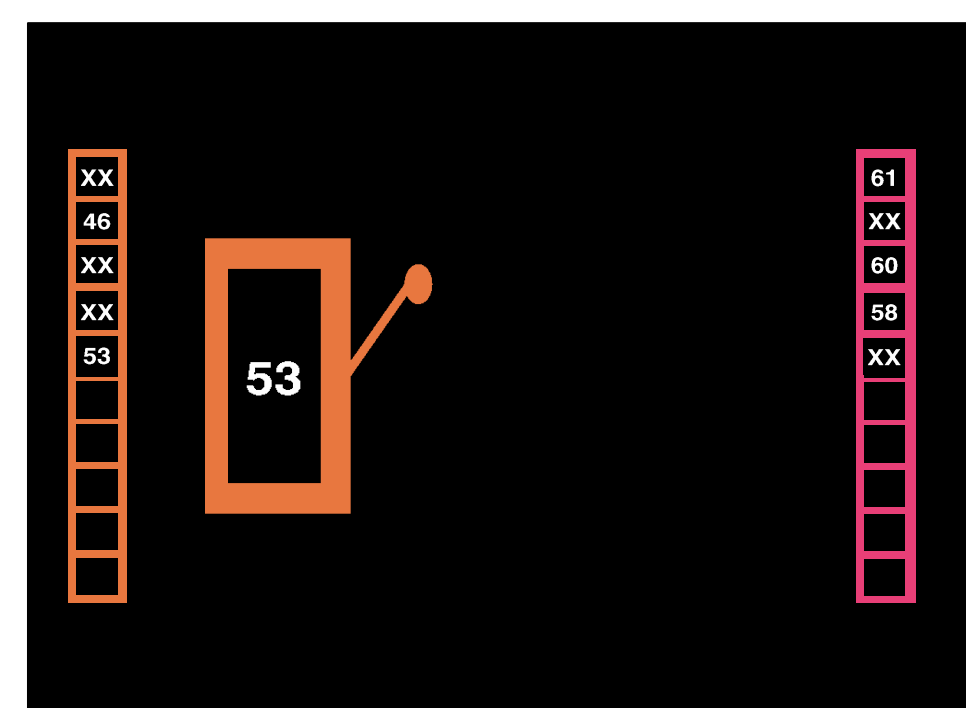
How does ambiguity affect exploratory decision making?
The grass is greener, but the unknown is scary

Task

- Subjects choose between two one armed bandits
- At start of game four "example" rewards are shown



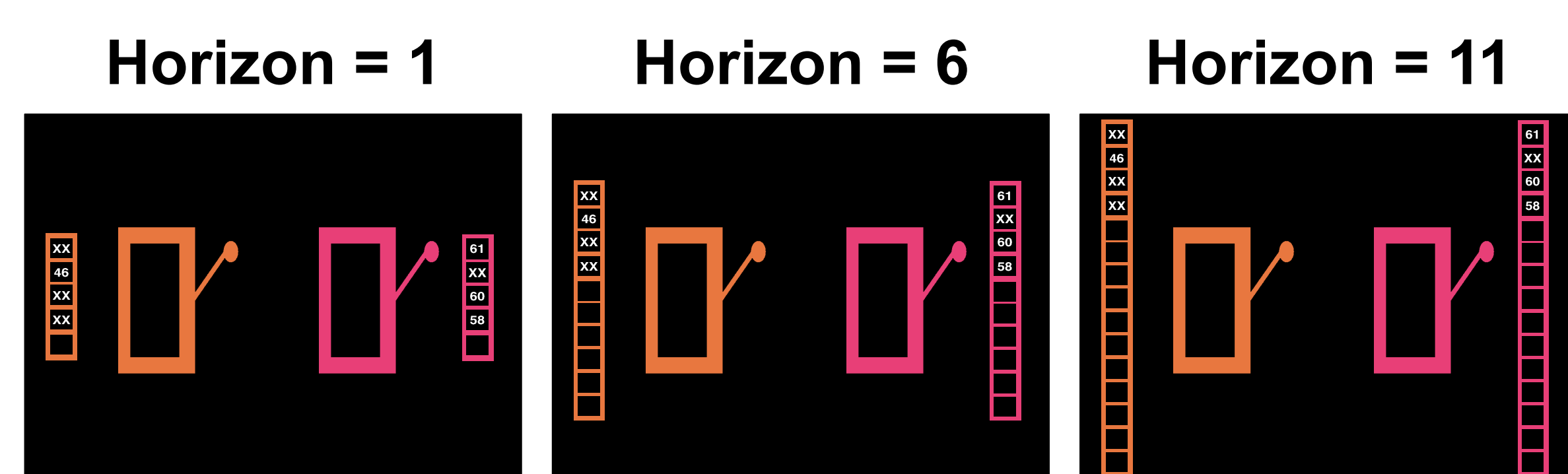
- Subject makes choice and gets immediate reward feedback



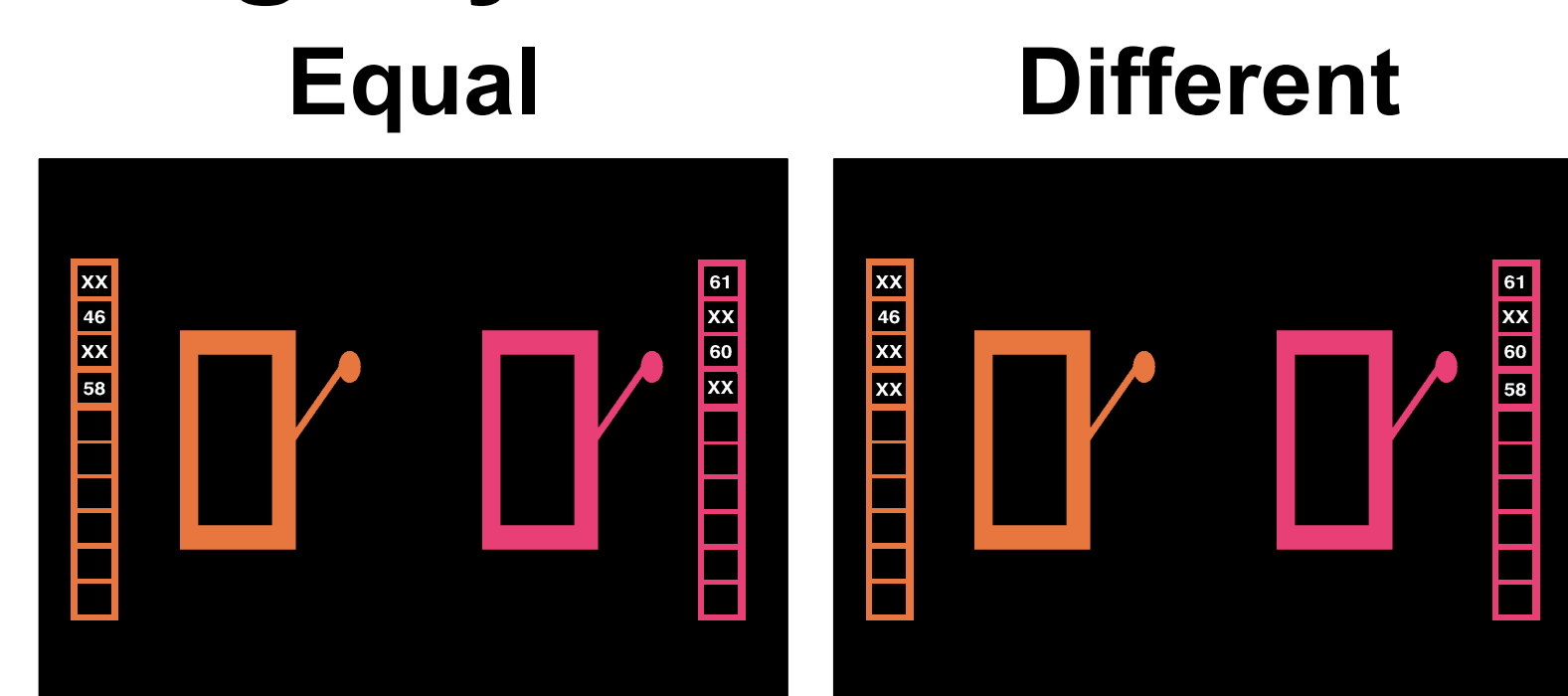
- Next trial begins



Three horizon conditions

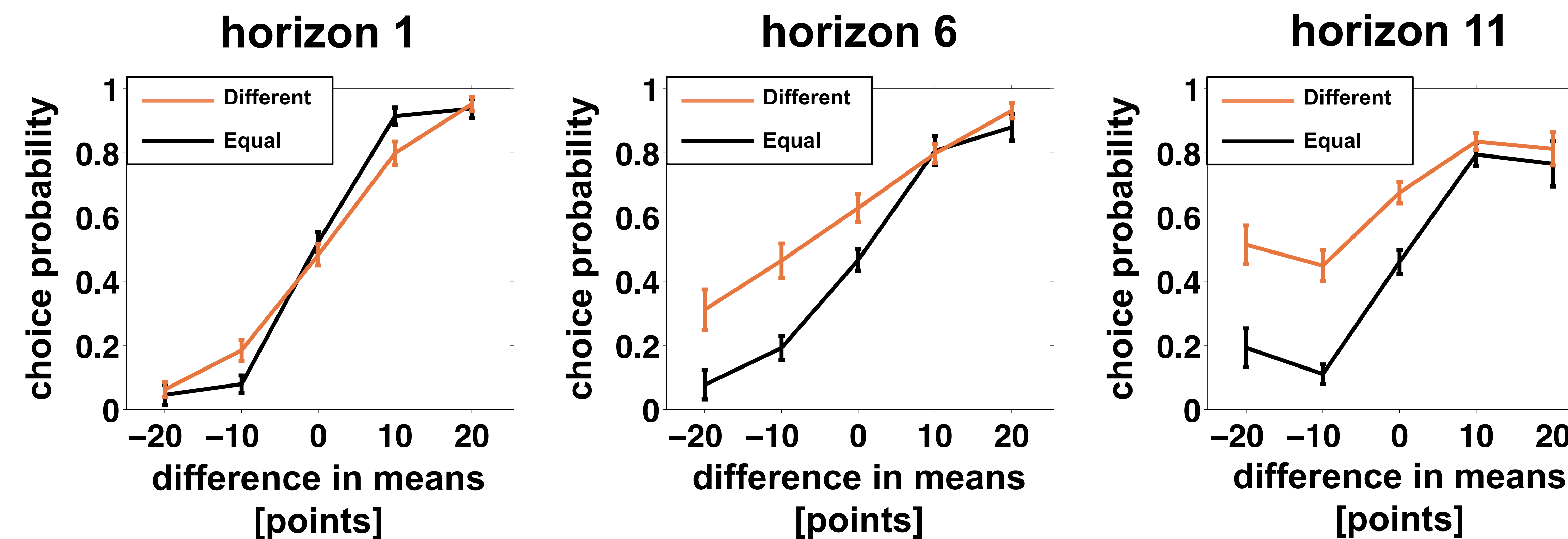


Two ambiguity conditions

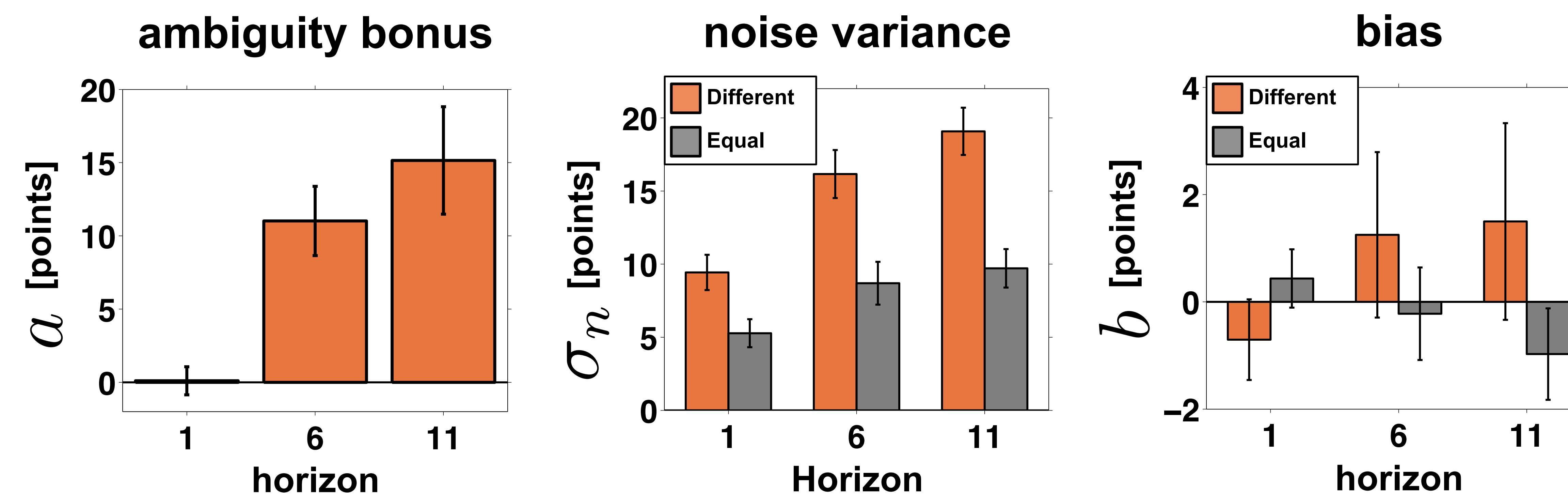


Results

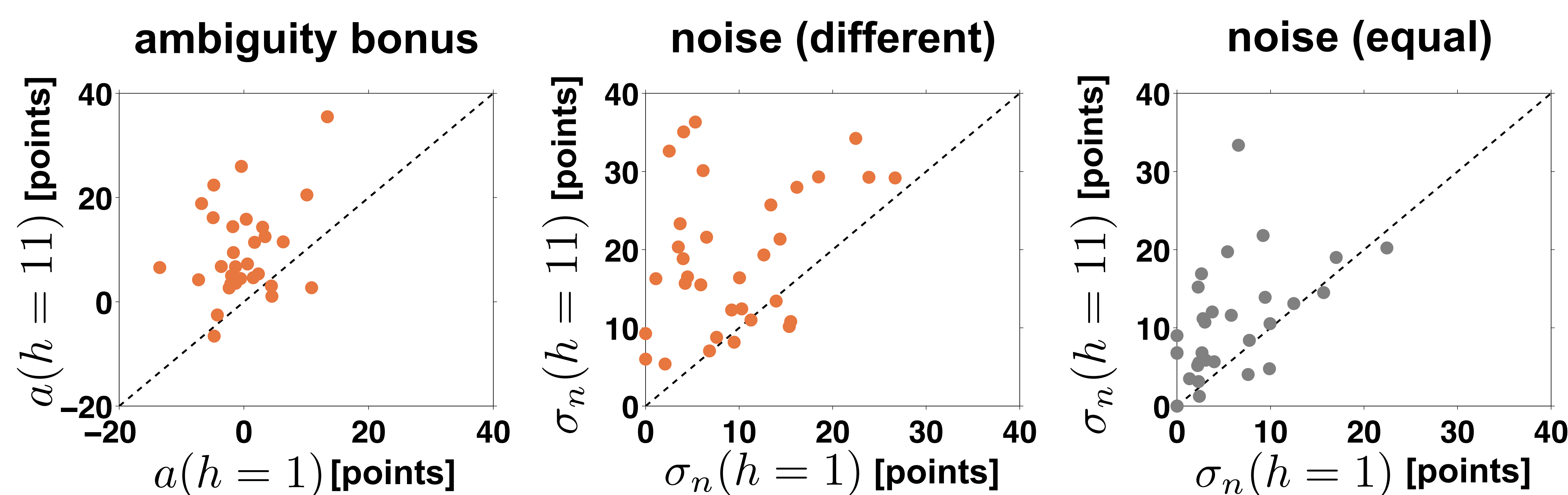
Choice curves (n = 33)



Model fits



Scatter plots



Conclusions and future work

- Exploration in humans is driven by
 - an ambiguity bonus that is consistent with directed exploration of optimal models
 - adaptive noise consistent with undirected exploration of practical models
- In the brain we expect to see
 - Ambiguity bonus in value system (VS, OFC, etc...)
 - Adaptive noise in LC

Model

Values

$$\Delta V = \Delta\mu + a\Delta k + b + n$$

$\Delta\mu$ difference in means

Δk difference in information (-1, 0 or 1)

a ambiguity bonus

b bias

n random noise, variance σ_n

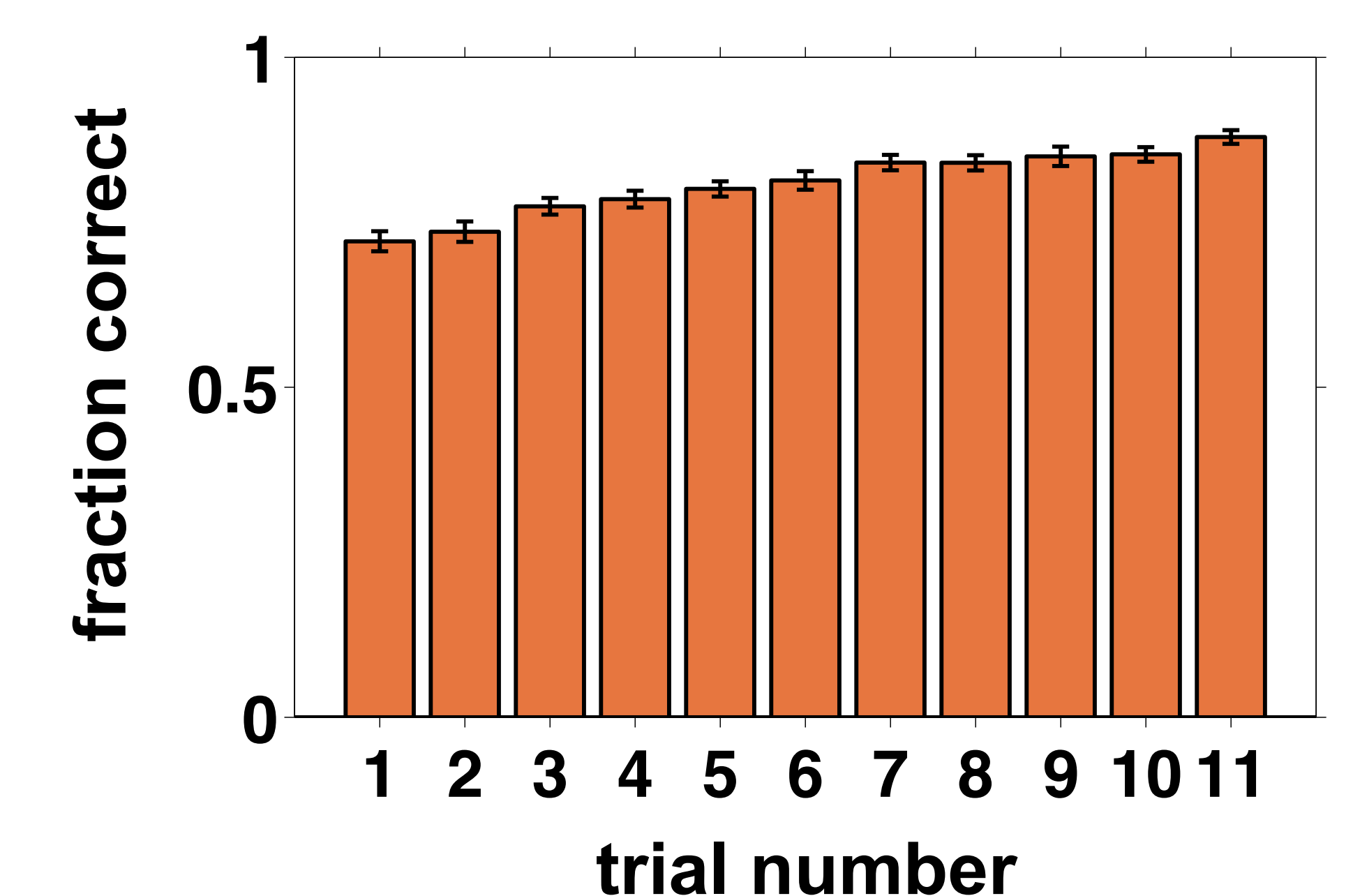
Choice probabilities

$$p = \frac{1}{1 + \exp(\beta(\Delta\mu + a\Delta k + b))}$$

$$\beta \propto \frac{1}{\sigma_n}$$

Side notes

Learning curves



Why only focus on first choice?

