# Reward Magnitude Effects on Sequential Risky Choices in Rats

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# Probabilistic choice

- Choice between an outcome that is uncertain and one that is certain

P(reward) = **1.00**
**2** pellets of food

P(reward) = **.33**
**6** pellets of food

# Probabilistic choice

- Choice between an outcome that is uncertain and one that is certain

P(reward) = **1.00**
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P(reward) = **.90**
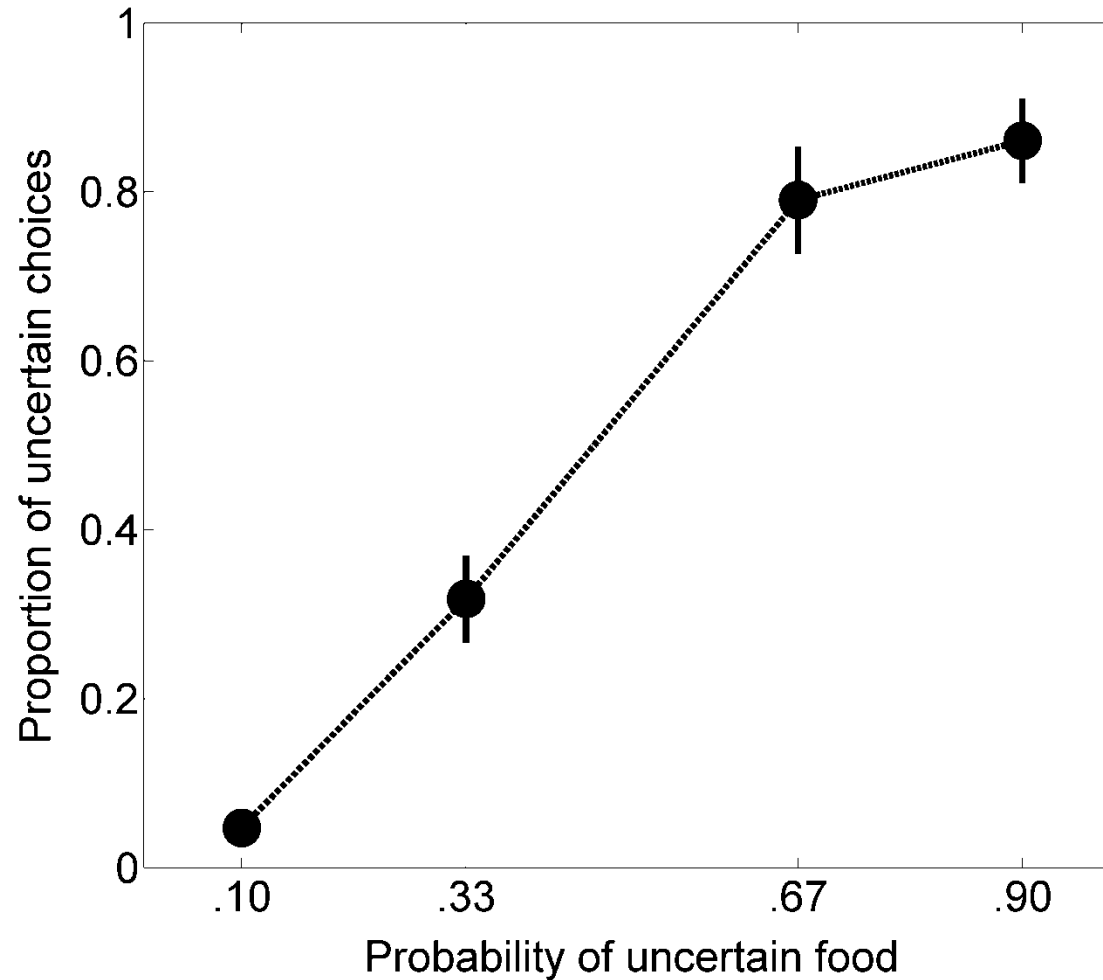**6** pellets of food

# Probabilistic choice

- Choice between an outcome that is uncertain and one that is certain

P(reward) = **1.00**
**2** pellets of food

P(reward) = **.10**
**6** pellets of food

# Probabilistic choice

# Sequential probabilistic choice

- Risky choices do not always occur in isolation
- Differences in choice behavior depending on if choices are one-shot or sequential
  - Keren and Wagenaar (1987)
- The previous outcome of a choice has been shown to affect subsequent choice
  - Greggers and Menzel (1993), Hayden and Platt (2007), Marsh and Kacelnik (2002), McCoy and Platt (2005), Stopper and Floresco (2010), Thaler and Johnson (1990)

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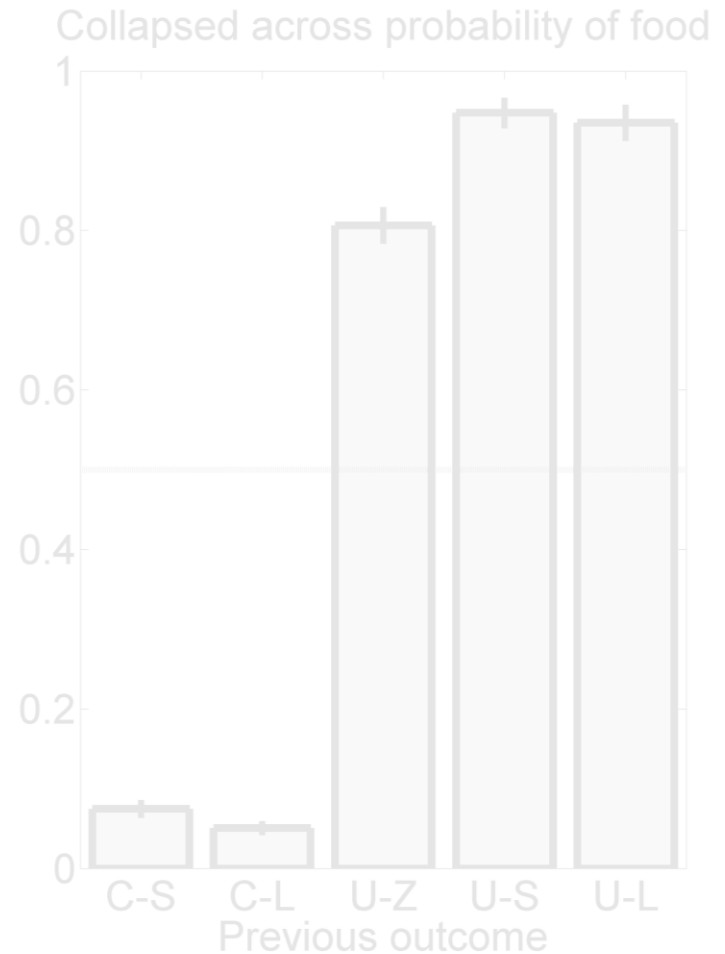
# Sequential probabilistic choice

- Previous research (Marshall & Kirkpatrick, accepted)
  - Certain outcome: **1** or **3** pellets
  - Uncertain outcome: **0**, **3**, or **9** pellets
- How did choice behavior differ depending on most recent outcome?
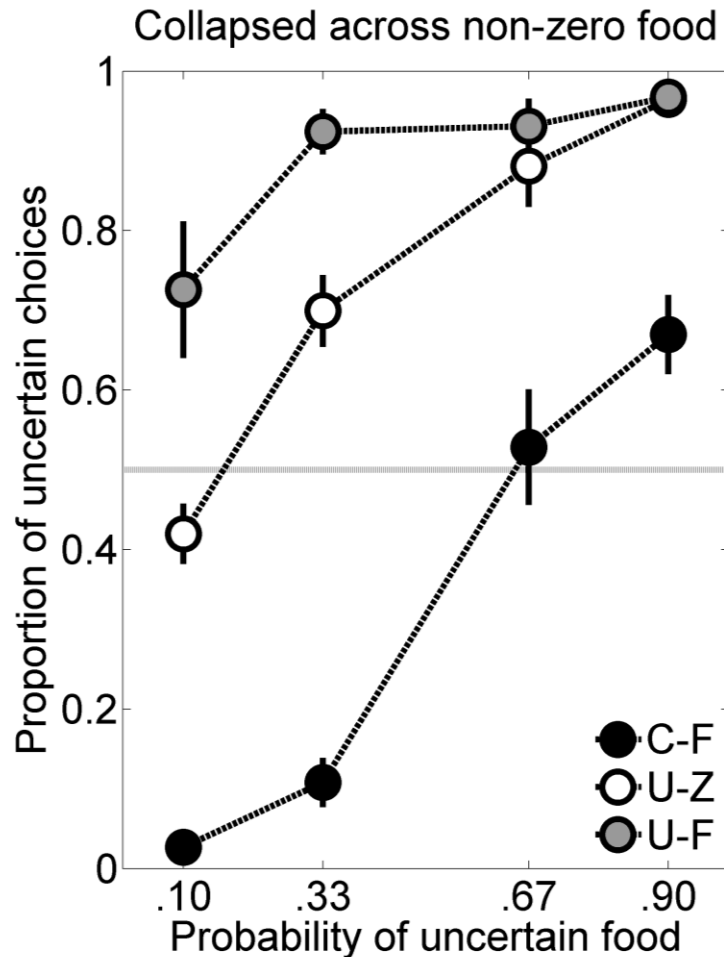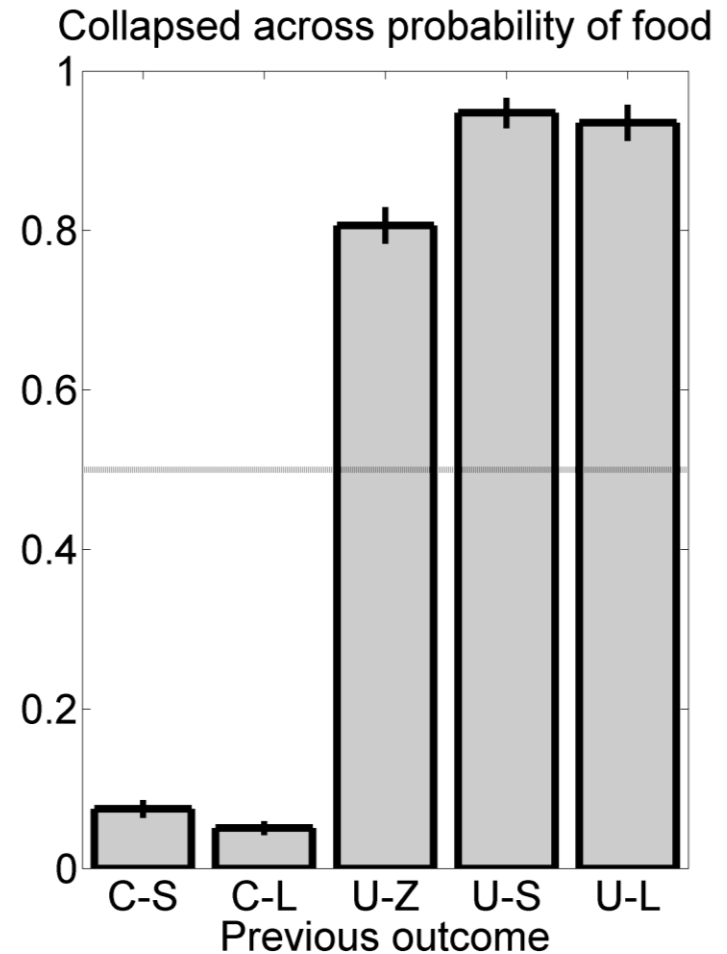
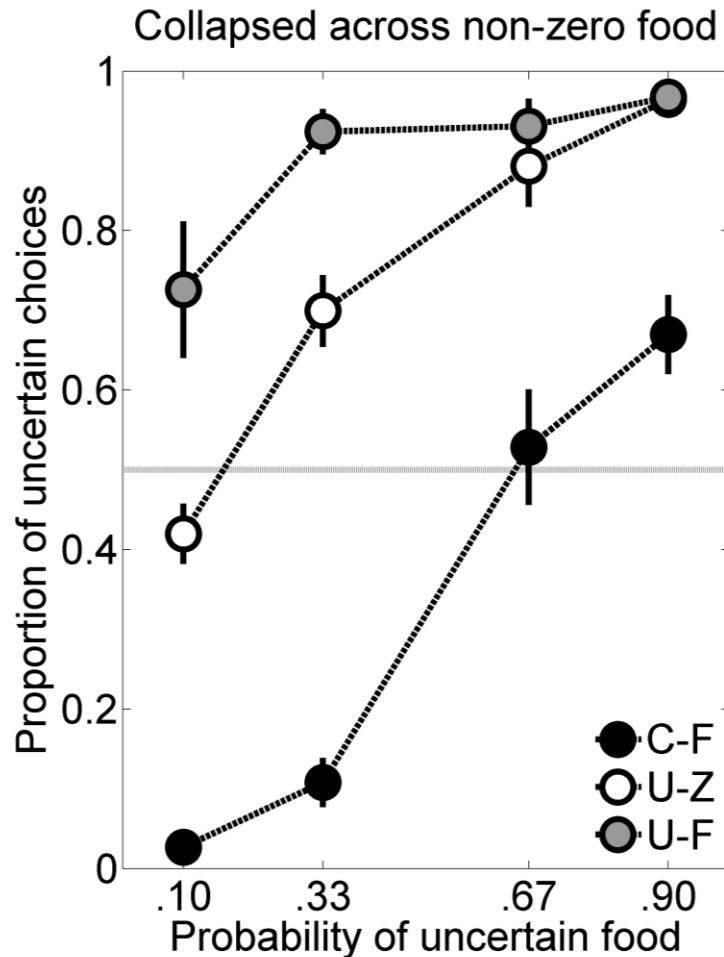# Sequential probabilistic choice

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Collapsed across non-zero food

Collapsed across probability of food

# Sequential probabilistic choice

- P(uncertain food) = .90
  - E(certain) = 2.0 pellets
  - E(uncertain) = 5.4 pellets
- Win-stay / lose-shift behavior
  - Expected:
    - U-S 3-pellet outcome → shift to the certain side
  - Observed:
    - U-S 3-pellet outcome → stay on the uncertain side

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- U-S 3-pellet outcome was greater than E(certain)
  - ▫ Was the "win" relative to the certain side?
- If you win a "gamble" but the win is less than what you could have received for a more certain outcome, how likely are you to continue "gambling"?

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# Methods

- 24 rats
- Choice:
  - Certain outcome: **2** or **4** pellets
  - Uncertain outcome:
    - Group 1-11: **1** or **11** pellets
    - Group 2-11: **2** or **11** pellets
    - Group 4-11: **4** or **11** pellets
  - 20-s FI between choice and food availability time
  - P(uncertain): **.1**, **.25**, **.33**, **.50**, **.67**, **.75**, and **.9**

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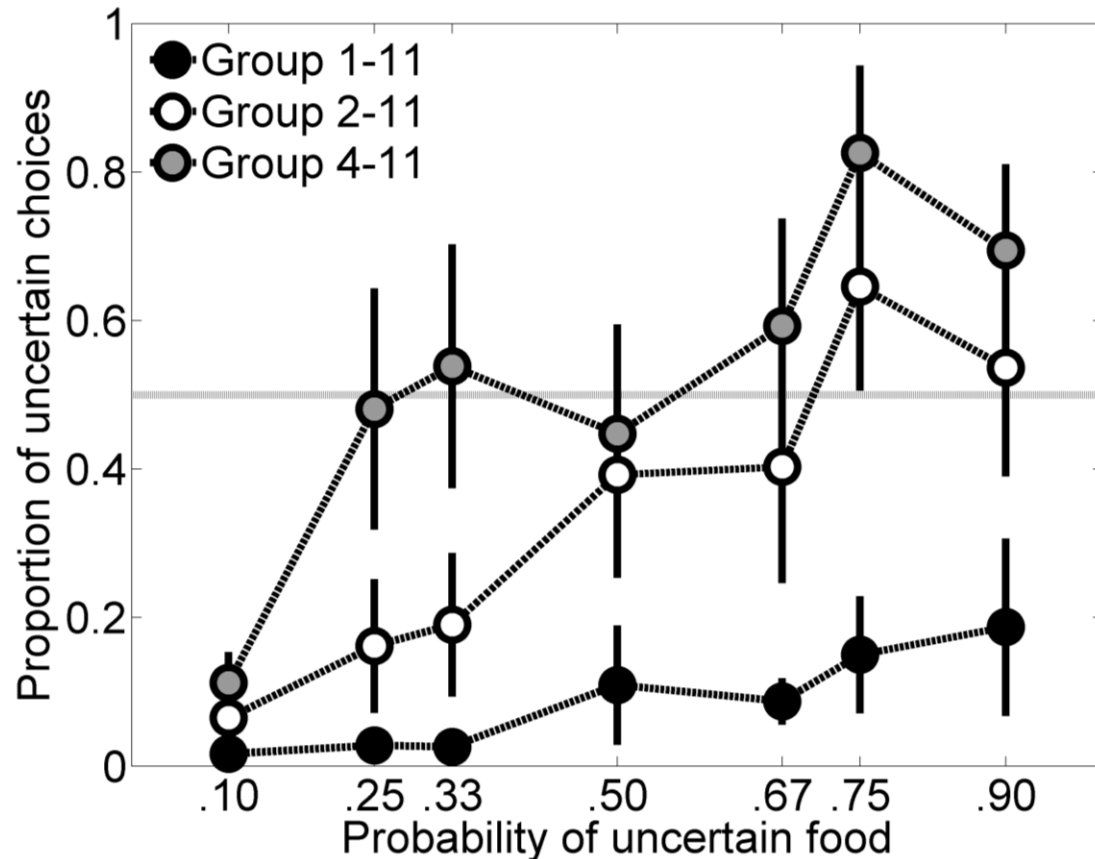
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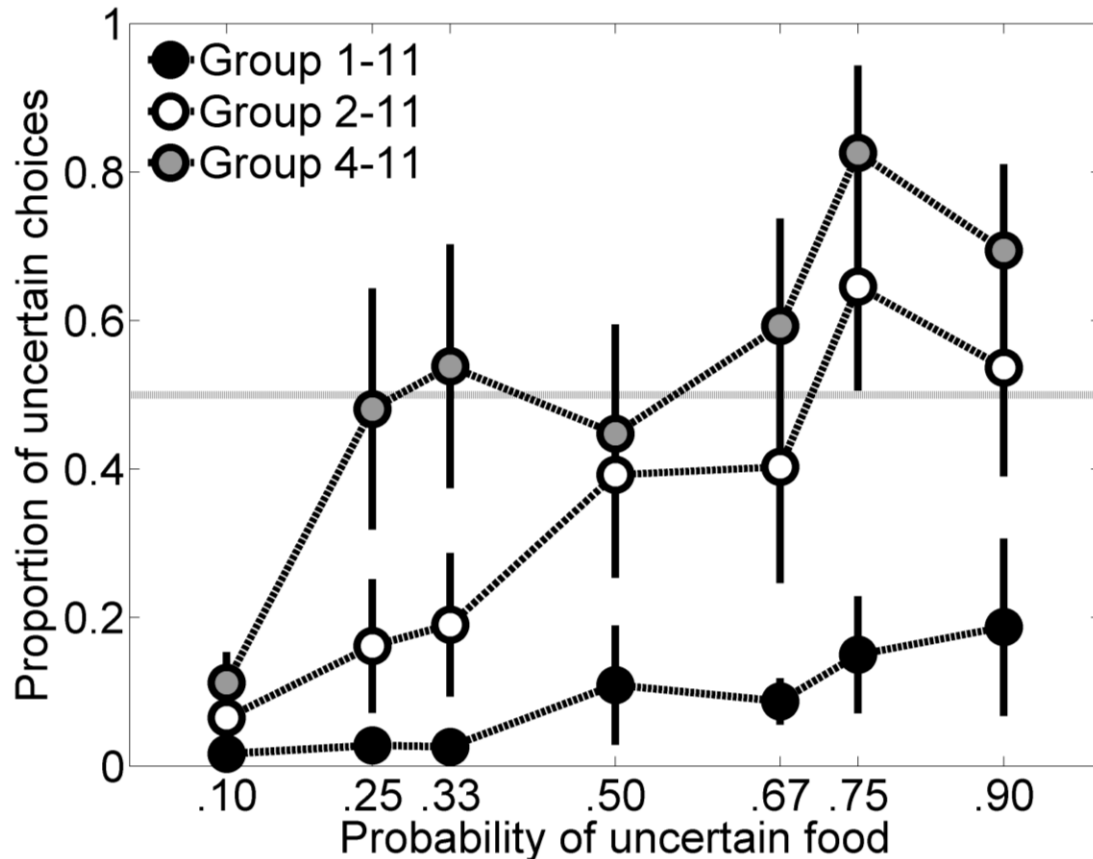# Results: Global choice behavior

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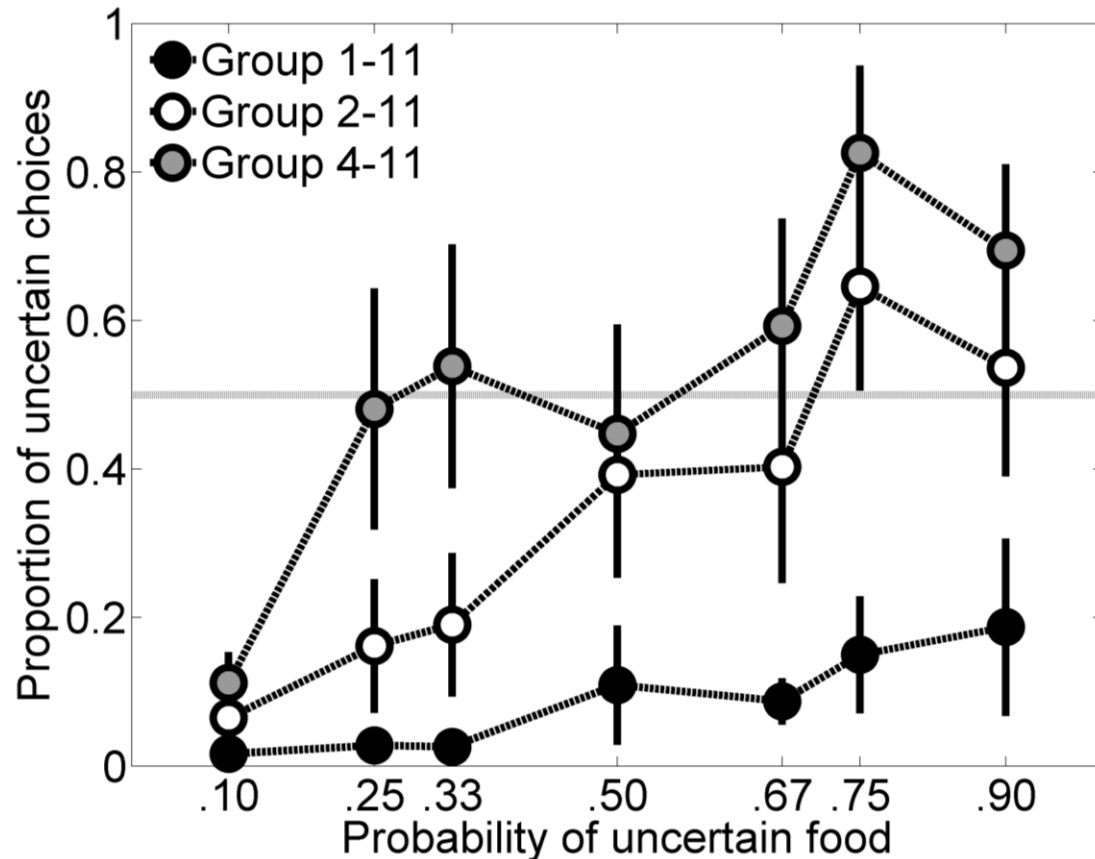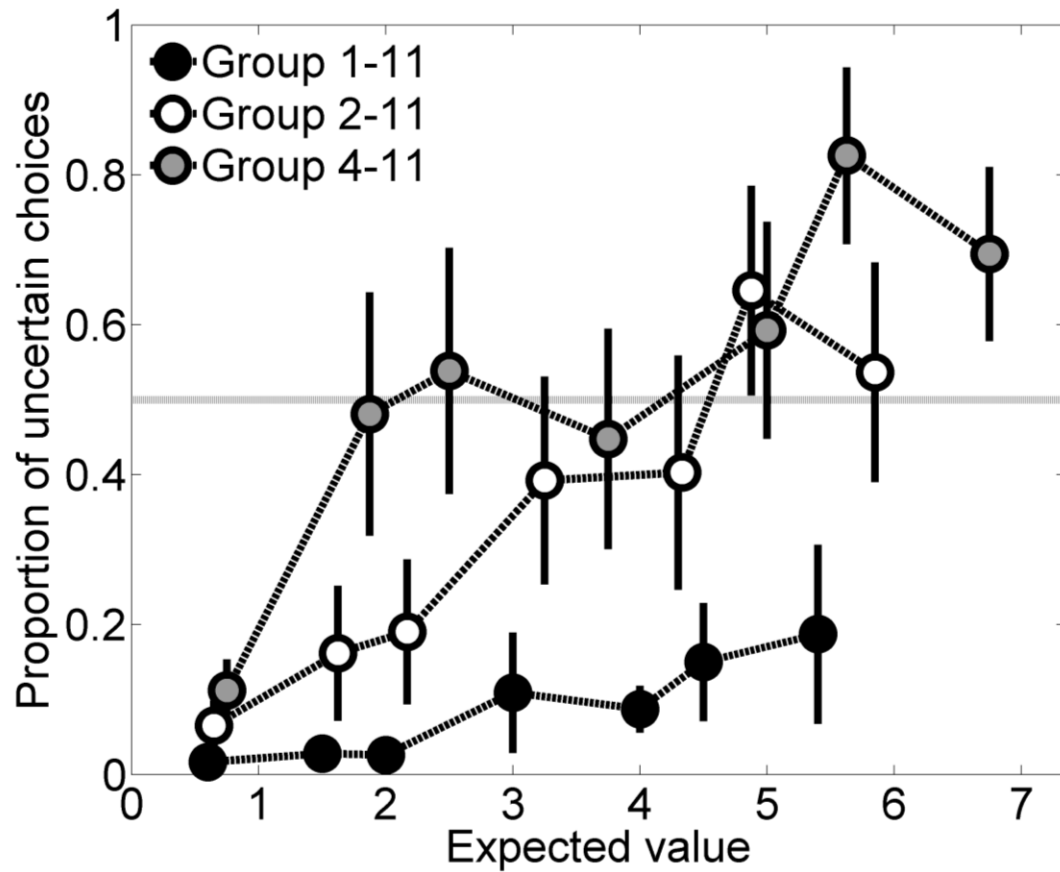# Results: Global choice behavior

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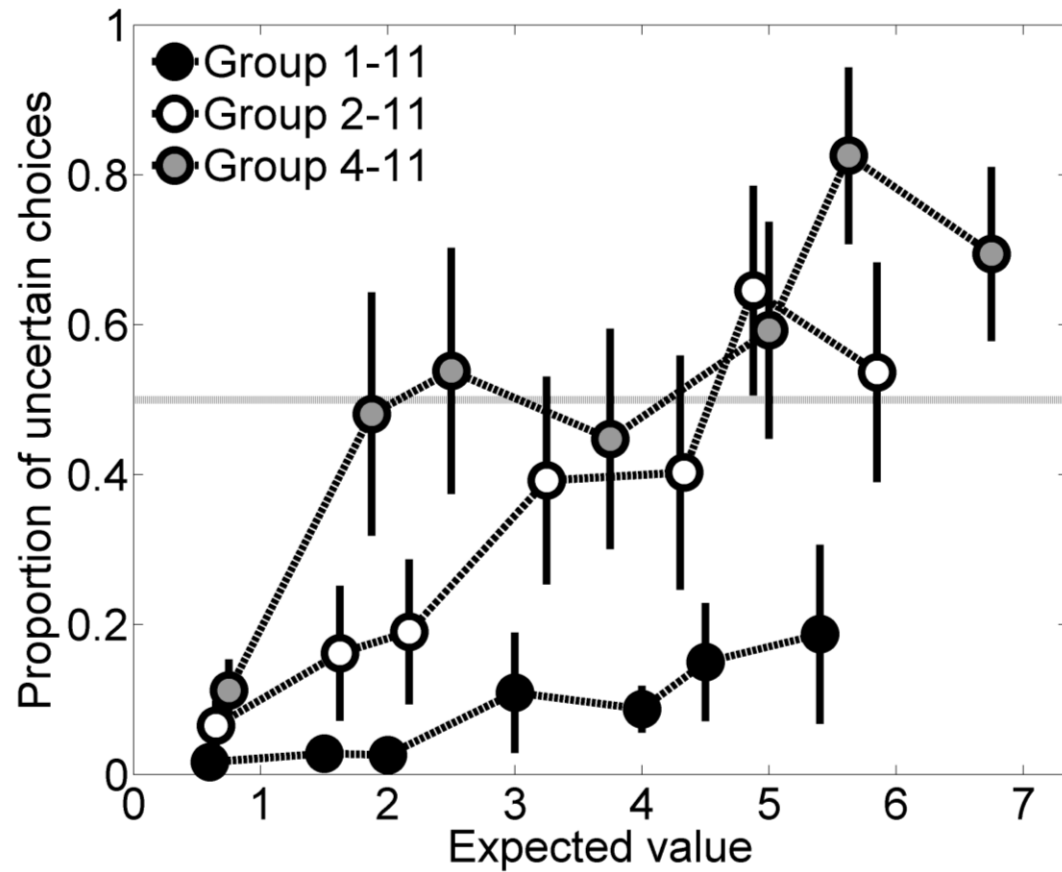# Results: Global choice behavior

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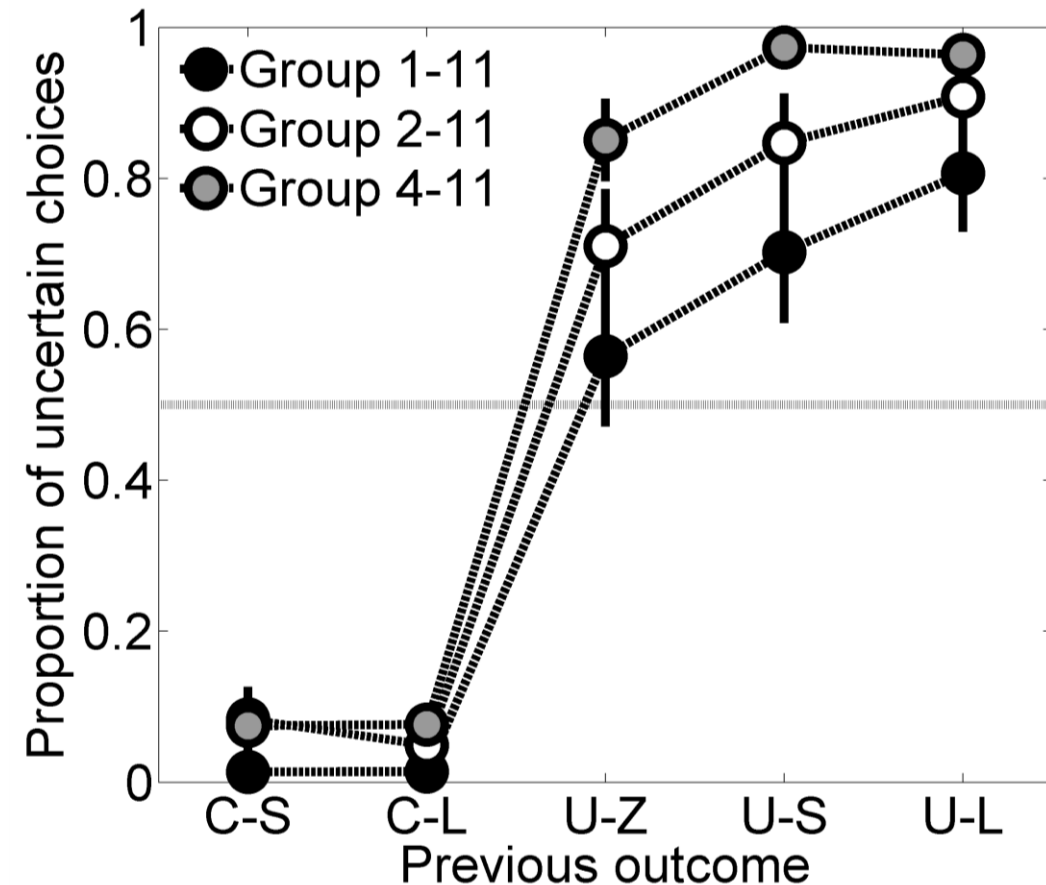- Effect of absolute magnitude of reward

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# Results: Local choice behavior

- Effect of group
- Effect of previous outcome
  - Group 1-11 chose the uncertain outcome less than Group 4-11

# Discussion

- ## What affected probabilistic choice behavior?
  - Probability of uncertain food
    - Increase in uncertain choices with p(uncertain food)
  - Magnitude of the uncertain-small outcome
    - Group 1-11 < Group 2-11 < Group 4-11
  - Previous outcome
    - Most like to gamble after winning a gamble

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- Implications
  - Pyrrhic victories
    - Can the desire to gamble be attenuated by providing several wins that are less than a more certain outcome?
    - Is such a loss more salient than an unrewarded gamble?
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# Thank you!

- Acknowledgements
  - Drs. Kim Kirkpatrick and Tiffany Galtress
  - Jeffrey Hyder
  - My rats
- Questions?