

# Expecting the unexpected: Children’s over-exploration facilitates adaptation to a changing world

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- Children exhibit a tendency to persistently explore suboptimal options, rather than exploit optimal options.
- This ‘over-exploration’, although seemingly unnecessary, is systematic and non-random (e.g., Blanco & Sloutsky, 2019; Schulz, Wu, Ruggeri, & Meder, 2019).

So **why** do children over-explore?

1) When could it be adaptive? 2) What might it be driven by?

## Method

**Feedback**      **Condition**

### Experiment 1 & 2

139 adults and 74 children  
(6-12 years)

Partial

Static or  
dynamic

### Experiment 3

24 adults and 24 children  
(6–12 years)

Partial or full

Dynamic

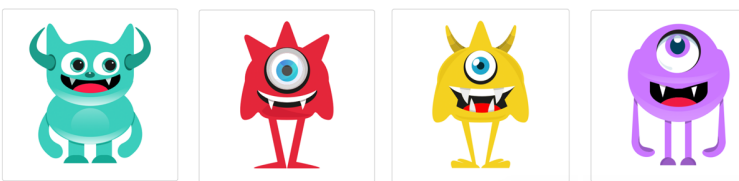
### Reward Structure Condition

trials

**static condition**

**dynamic condition**

1-40



6 2 3 1

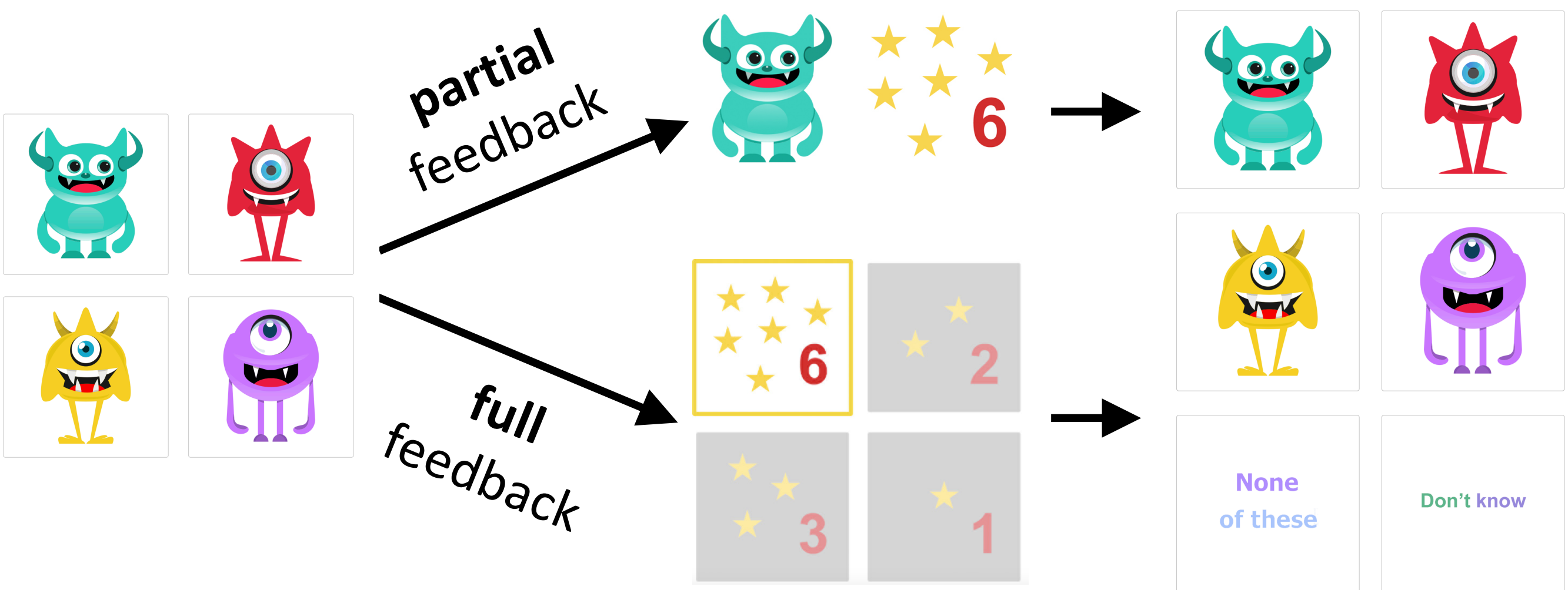
41-80



6 2 3 8

80 trials

Post-test Questions  
"Which monster gives \_ stars?"



## Acknowledgements

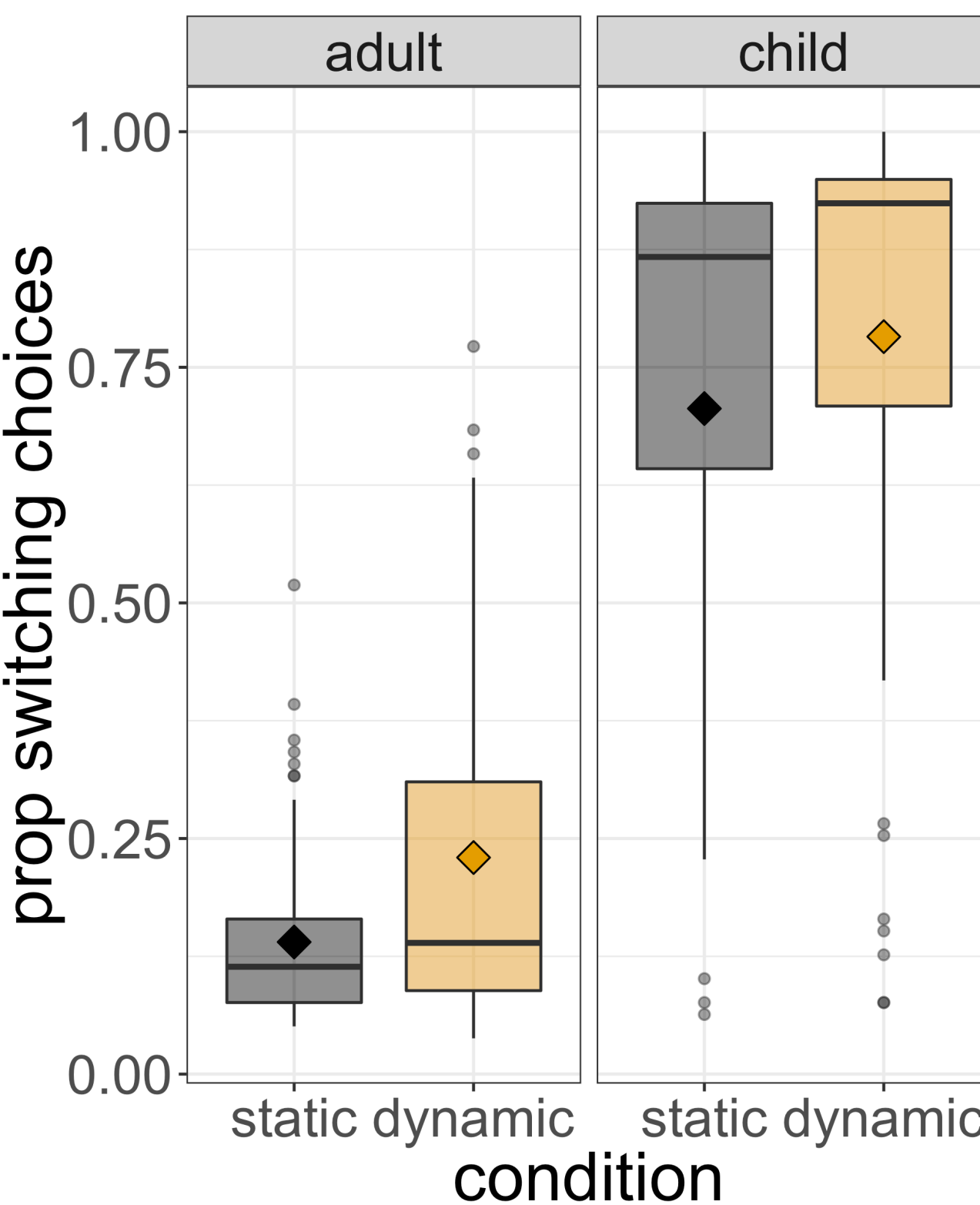
- We thank little scientists from Discovery Cube Orange County, and TASK Camdenville, Sydney, for making this work possible.
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Children’s over-exploration is advantageous in a changing environment, and persists even when there is no apparent need for information-seeking.

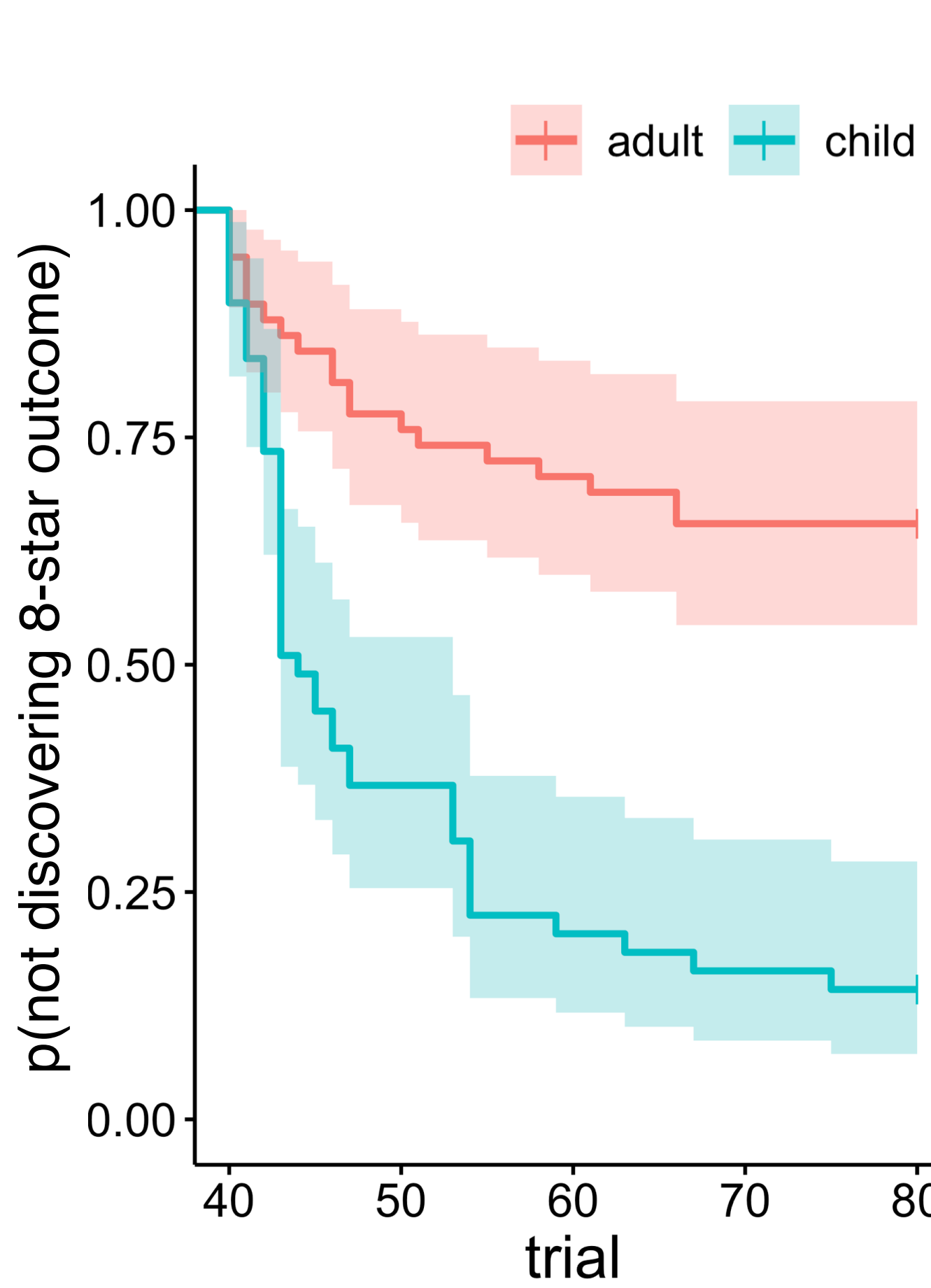
## Results: Exp. 1 & 2

Over-exploration helps children discover changes that adults miss when the environment is dynamic.

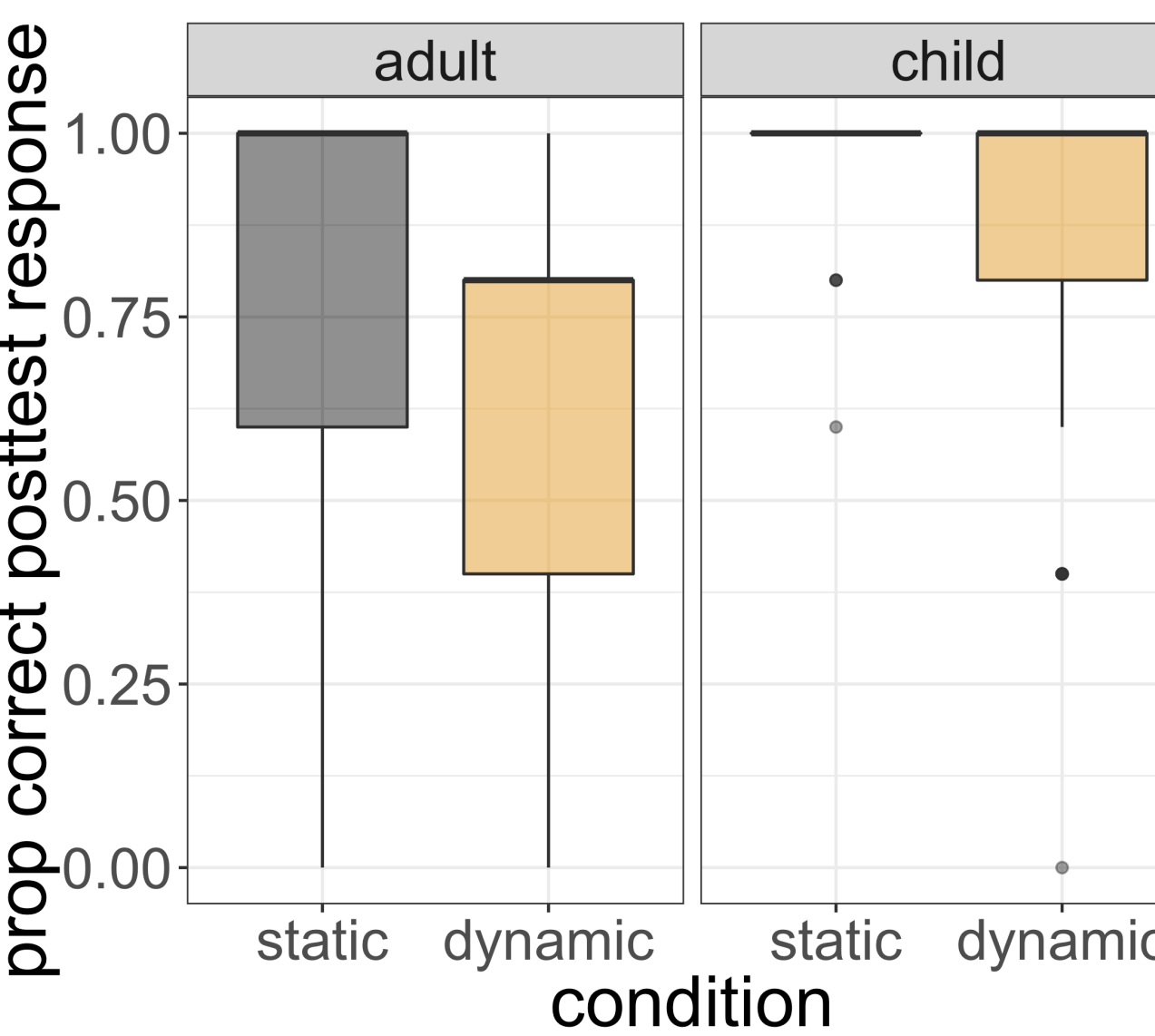
Children explore much more than adults.



Children are more likely than adults to discover change in-task.

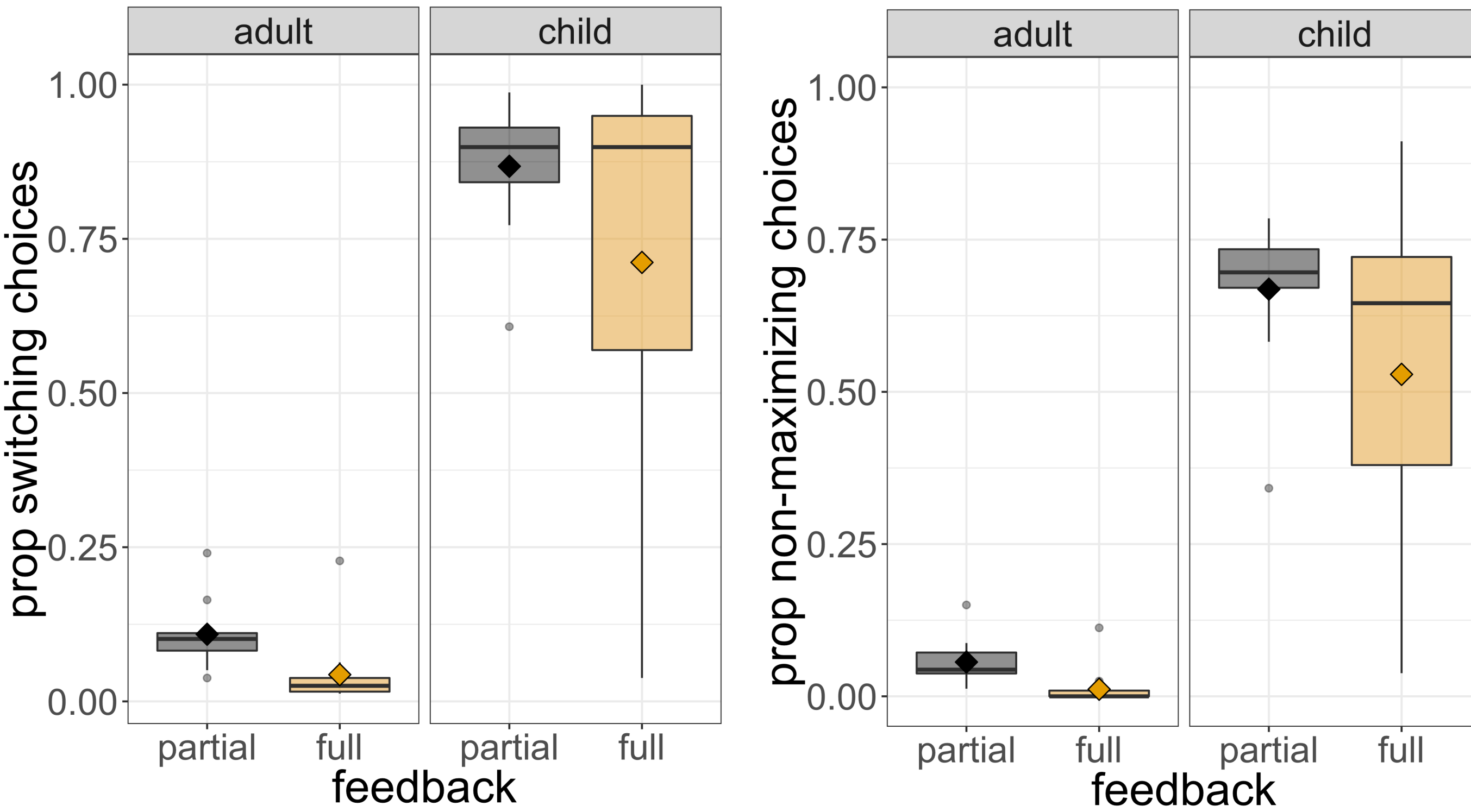


Children exhibit better memory of reward outcomes associated with choice options (monsters) than adults.

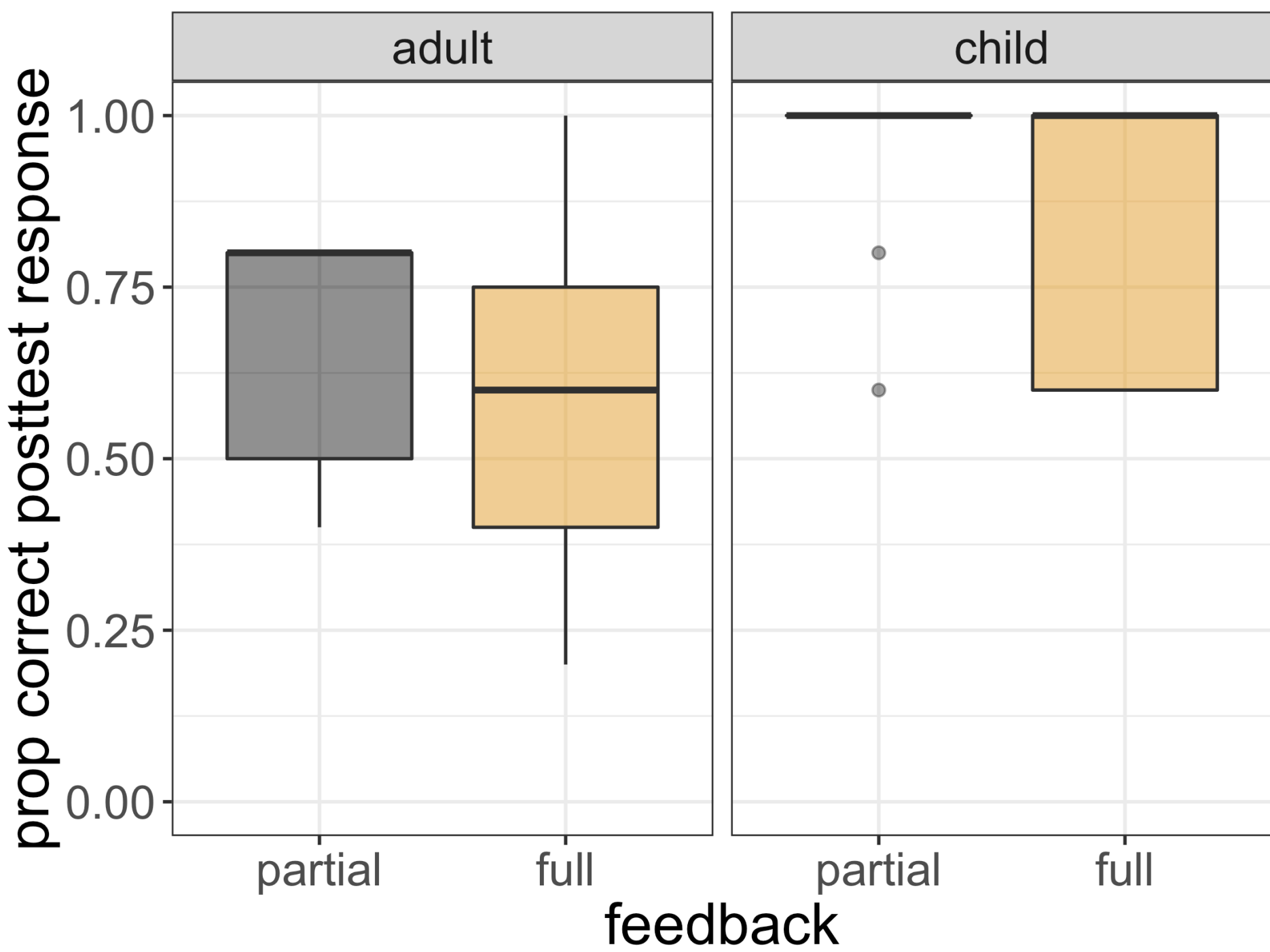


## Results: Exp. 3

Children’s exploration persists even when there is no clear need for information-seeking.



Children perform better overall on post-test recall task than adults, even when full feedback is given.



Receiving full feedback about rewards did not allow adults to improve recall for choice-reward associations.

## Summary

- Children’s over-exploration:
  - Enables them to better discover change in a dynamic environment than adults.
  - May not be solely driven by a need for information or memory limitations.
- Receiving full feedback did not allow adults to outperform children in memory of choice-reward associations, and overall resulted in a performance decrement for both adults and children.
  - Memory advantage for active learning vs. passive instruction?

## Materials

Associated analyses?  
Further visualizations?  
Suggestions, feedback, questions?



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