

How Is Children's Exploration Shaped by Alternative Actions?

Skyler Murphy, Stefan Nevajdic, Jaclyn Reynolds, Julia Rowe, Neha Sharma, & Emily Liquin
University of New Hampshire

What Drives Children's Exploration?

Exploration = seeking novel information to learn.

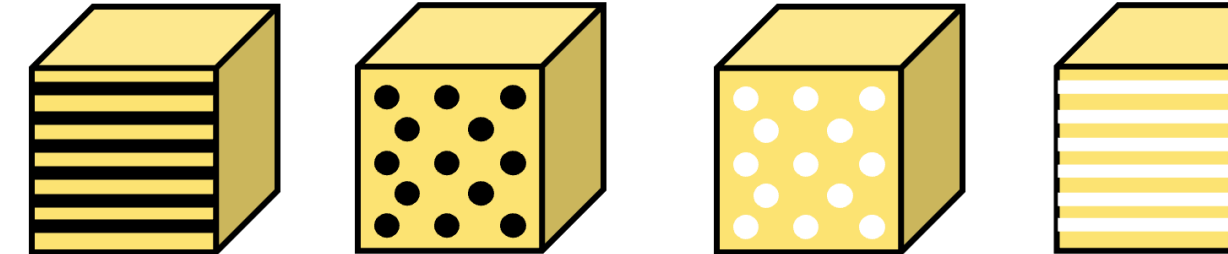
Exploitation = taking advantage of prior knowledge to maximize rewards.

- Prior work has shown that children explore more than adults in explore-exploit tradeoff situations. (Liquin & Gopnik, 2022; Kim & Carlson, 2024). However, past research has not shown *why* this is.



Do children explore more because they like to make things happen, or is it because they want to learn information?

Methods

- Participants: **75 English speaking four- to seven-year-olds**. Participants were collected at the Seacoast Science Center and Child Study and Development Center of UNH.
- Children were exposed to yellow blocks varying on two dimensions (pattern design and pattern color), producing four discrete block types. 
- Three block types were randomly assigned as "zaffs", one as "not zaffs".

One Machine Condition



Zaff machine lights up **green** for blocks that are zaffs, and **red** for blocks that are not zaffs.

Two Machine Condition




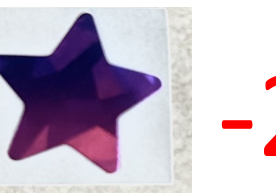
Zaff machine lights up **green** or **red** for blocks that are zaffs or not zaffs, the block machine lights up **yellow** for any block placed on it.

- In the one-machine condition, the alternative to exploring was simply putting the block away, resulting in no fun outcome.
- In the two-machine condition, the alternative to exploring was placing the block on the block machine. Although this did not lead to learning, it still produced an enjoyable effect.
- Children were given one block at a time and asked to choose which machine to place it on, or— in the one-machine condition—whether to put it away.
- After all sixteen blocks had been either placed on a machine or set aside, children entered the test phase. They were asked to judge each individual block type and indicate whether they thought it was a "zaff" or not.



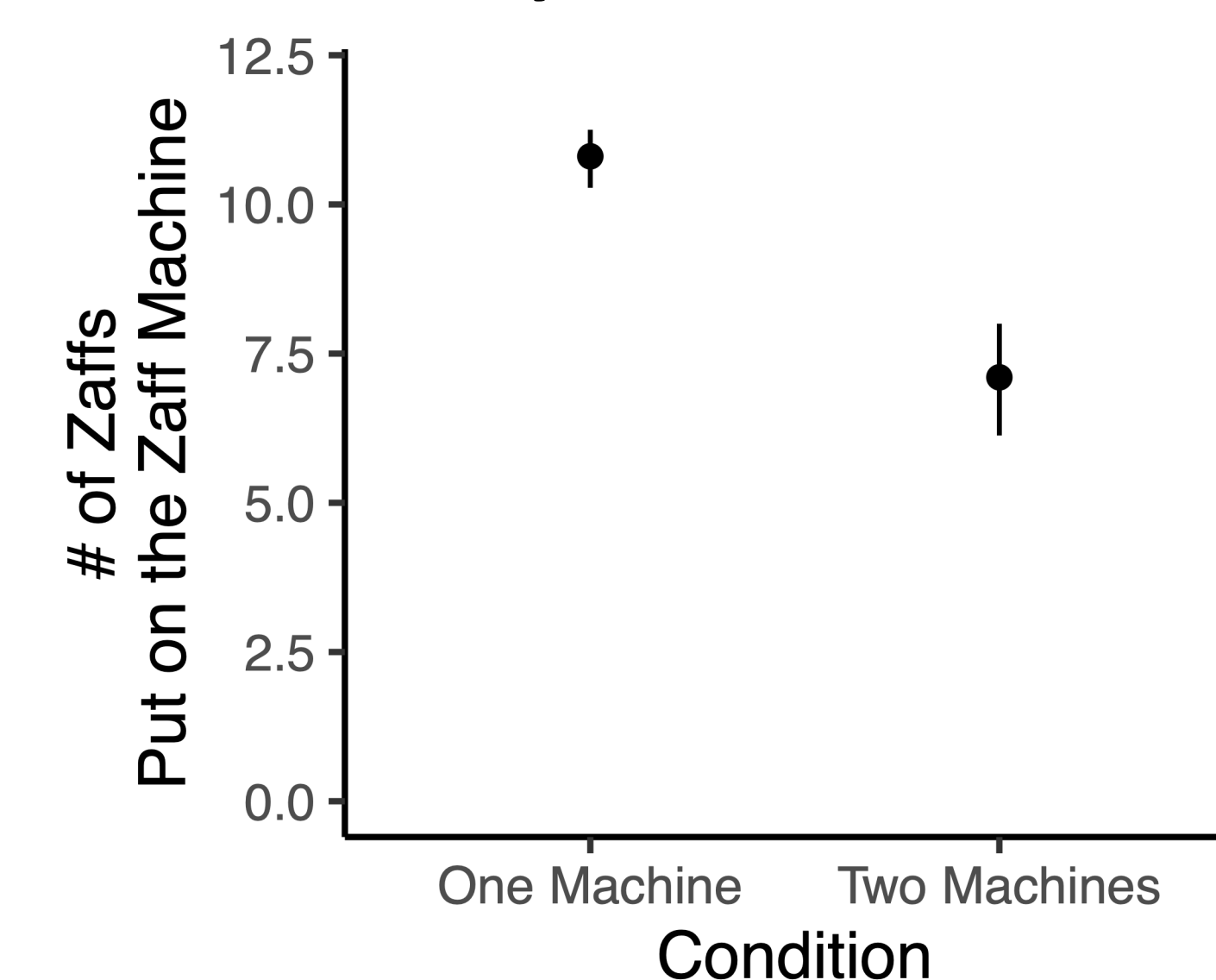
Consequences of Putting Block on Zaff Machine

If zaff =  +1

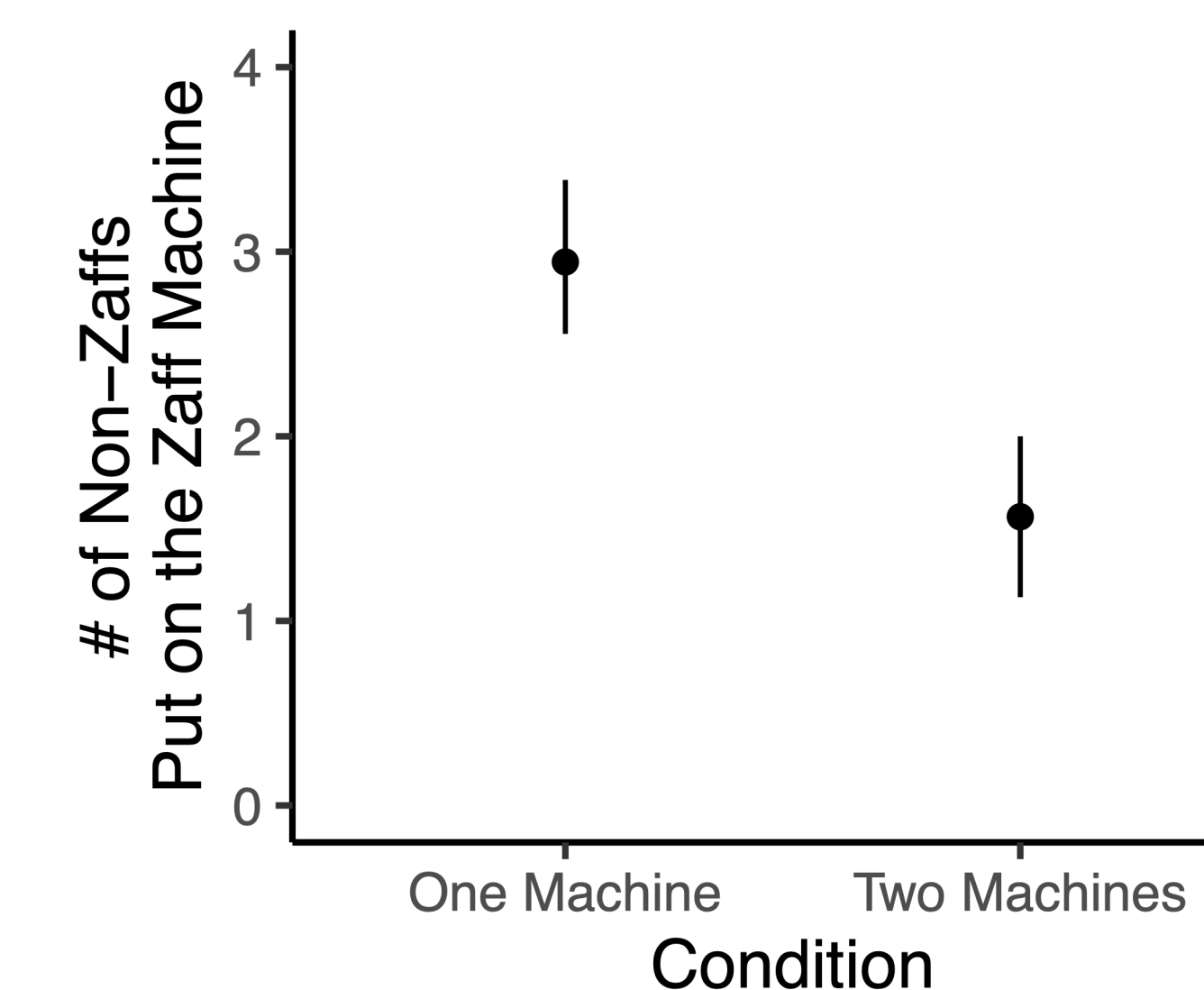
If non-zaff =   -2

Results: Exploration in Children

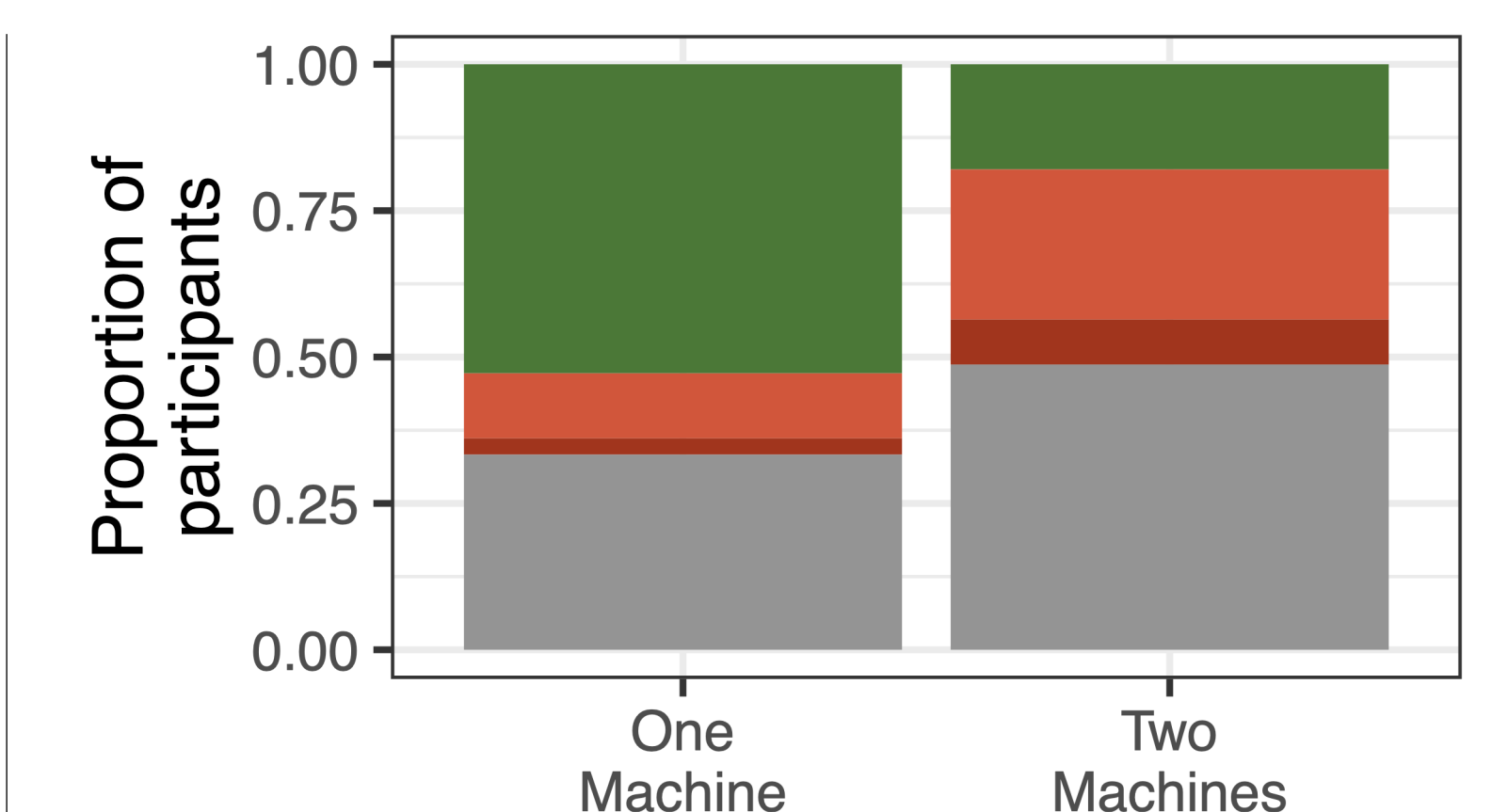
Analysis: t-tests and chi-square tests were used to evaluate condition differences



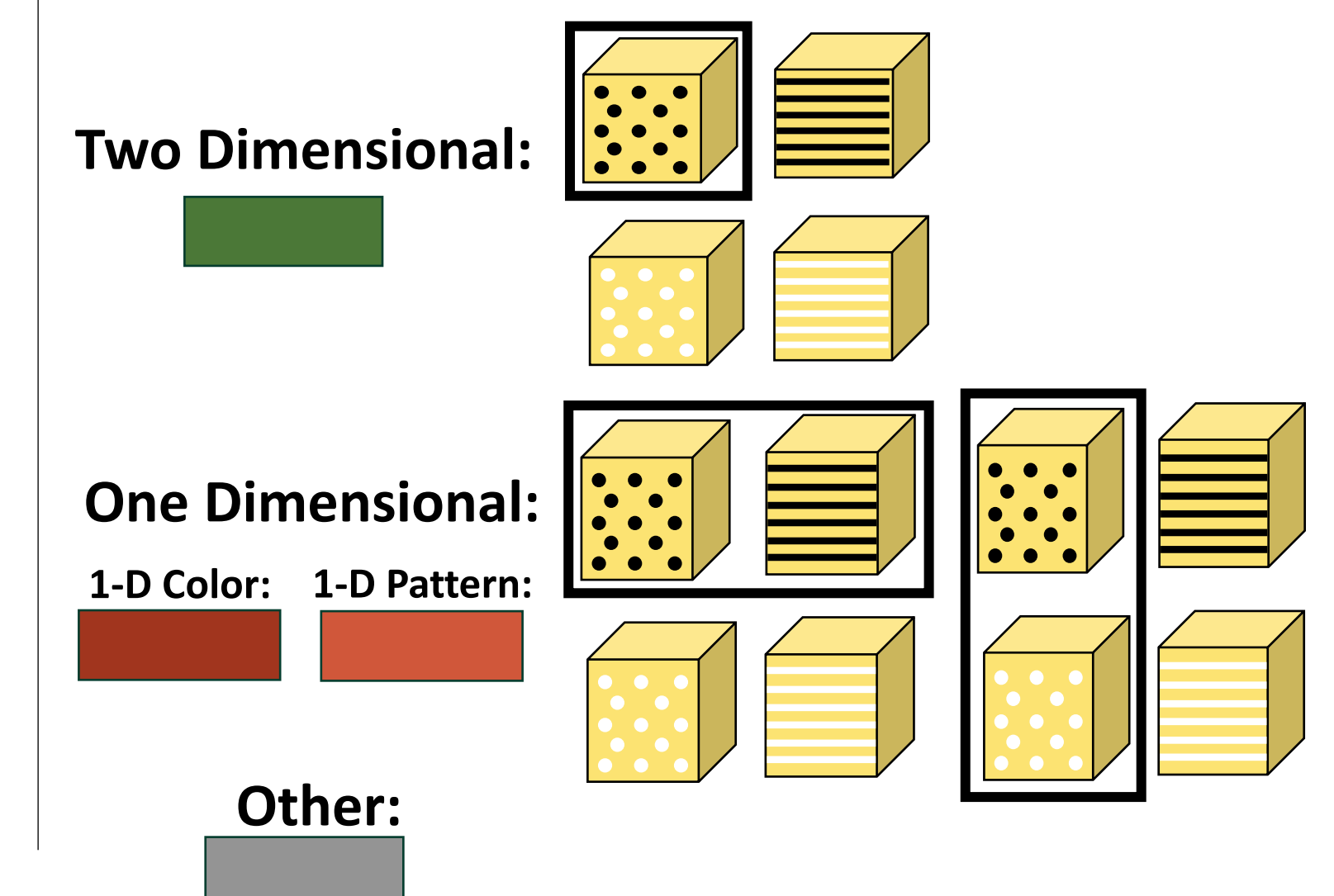
More zaffs placed on the zaff machine in **one-machine condition** ($p < .001$)



More non-zaffs placed on the zaff machine in **one-machine condition** ($p < .001$)



Higher rule identification accuracy in **one-machine condition** ($p = .003$)



Discussion

- Children showed greater exploration in the one-machine condition
- Increased exploration was associated with better rule learning
- Introducing a second risk-free option appeared to reduce exploration and lower learning accuracy
- Findings suggest children are motivated by desire to produce outcomes, not just information seeking
- Main takeaway:** children's exploration may be driven by making things happen, which typically supports learning
- Future directions:**
 - Examine age differences for each age group used in the study.
 - Explore whether children are using the block machine systematically to maximize stickers, or if they are choosing randomly between the two machines.

References

- Liquin, E. G., & Gopnik, A. (2022). Children are more exploratory and learn more than adults in an approach-avoid task. *Cognition*, 218, 104940. <https://doi.org/10.1016/j.cognition.2021.104940>
- Kim, S., & Carlson, S.M. (2024). Understanding explore-exploit dynamics in child development: current insights and future directions. *Frontiers in Developmental Psychology*, 2. <https://doi.org/10.3389/fdpys.2024.1467880>