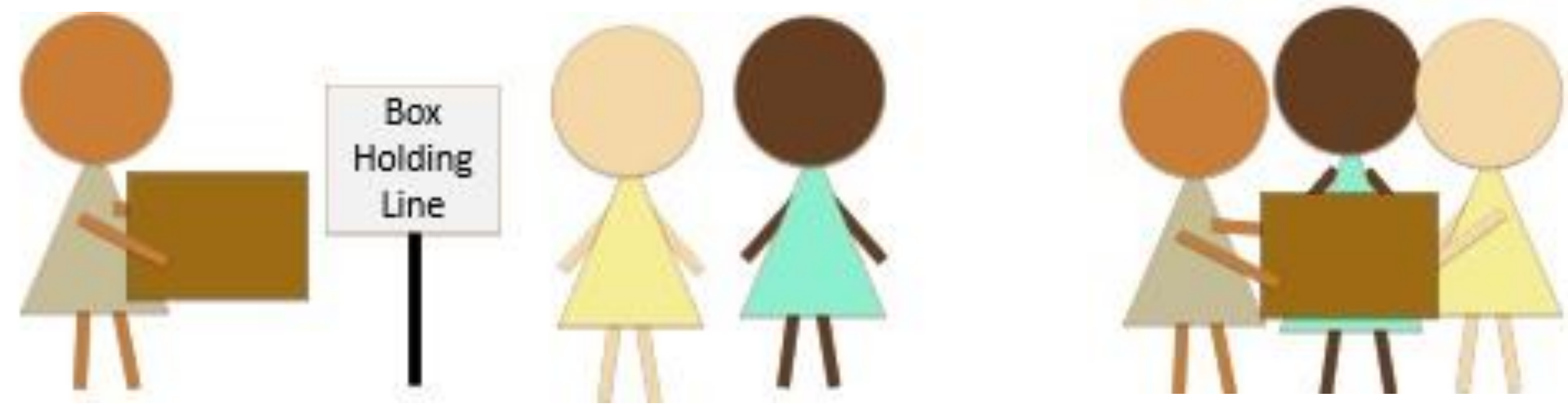


Introduction

- **Universal Quantifiers** (*each*, *all*, and *every*) can describe situations where all actors engage in an action
- But they differ in usage [1] [2]
 - '*Each*' can only be used to describe distributive actions
 - '*All*' can describe both distributive and collective actions

- (1) *Each* of the girls carried the box {*as a team/by themselves}
- (2) *All* of the girls carried the box {as a team/by themselves}



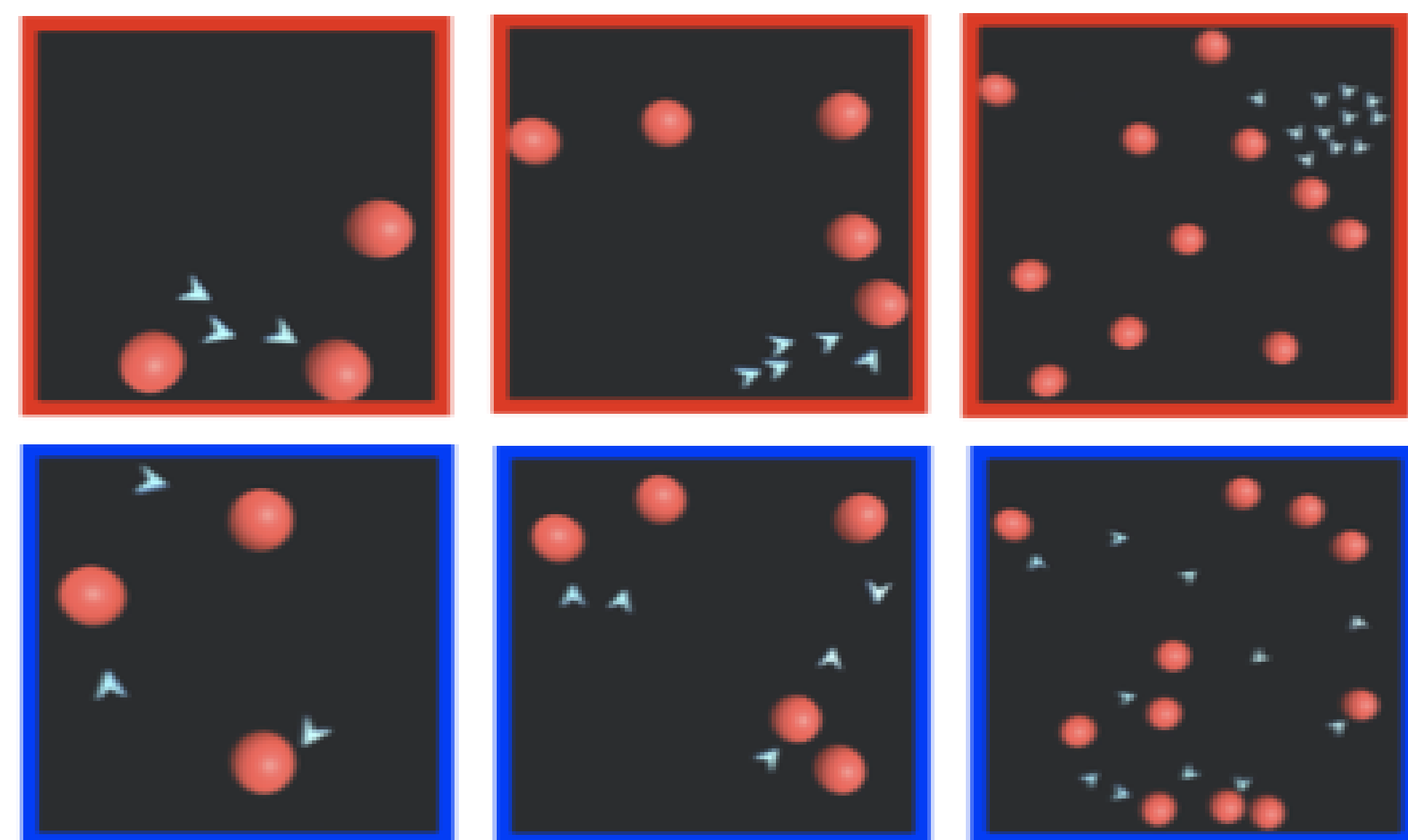
Q: Do infants make the distinction between *each* and *all* non-linguistically?

Norming the stimuli with adults

Method: Open Ended Description

- Wanted to determine how adults talk about quantifiers
- Asked 36 adults to describe different study videos using a sentence with the words 'balls' and 'chevrons' (Not told to use quantifiers)
- Events were presented with no linguistic descriptions
- Measured spontaneous production of '*all*' and '*each*'

- Silent '*all*' type videos (all chevrons chase one ball together)
- Silent '*each*' type videos (three chevrons each chase separate balls)
- Conducted with 3, 5, and 11 chasers (6 videos total)



Adults used:
 => '*all*' 25-40% of the time for '*all*' type videos (Figure stayed mostly consistent despite # of chasers)
 => '*each*' 40-80% of the time for '*each*' type videos (Figure decreased as # of chasers increased)

* Used '*each*' < 5% of the time for '*all*' type videos and vice versa
 * Used neither the remaining times

Results:

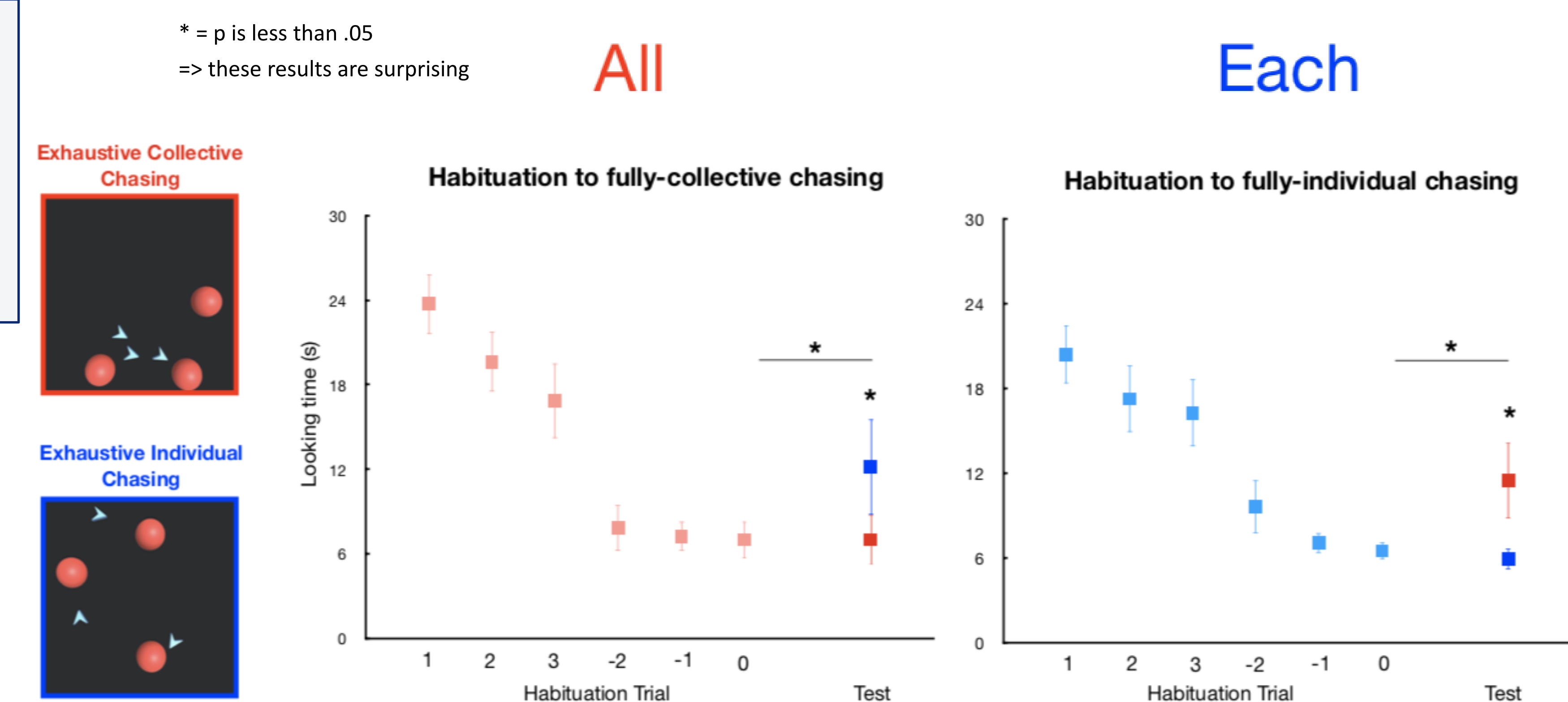
- Adults spontaneously use *all chevrons* for '*all*' type videos and *each chevron* for '*each*' type videos
- Suggests adults treat the '*all*' type videos as *collective* and '*each*' type videos as *distributive*, as was expected

Do infants notice the difference?

Method: Habituation Switch

- Measure how long infants watch a video
- Switch videos upon habituation (boredom)
- If infant
 - regains interest => infant noticed a difference
 - stays bored => infant treats videos the same [3]

- 36 infants: 9;15-10;15 month olds (mean age = 9;27)
- Habituated to either
 - '*all*' type videos
 - '*each*' type videos
- Events were presented with no linguistic descriptions
- At test, infants are shown the other scenario



Results:

- Habituated infants successfully dishabituated when the chevrons switched from collectively chasing to individually chasing the balls and vice versa.
- This suggests that prelinguistic infants distinguish between our '*all*' and '*each*' videos
- This might be because infants distinguish between collective and distributive events or because they rely on low-level perception

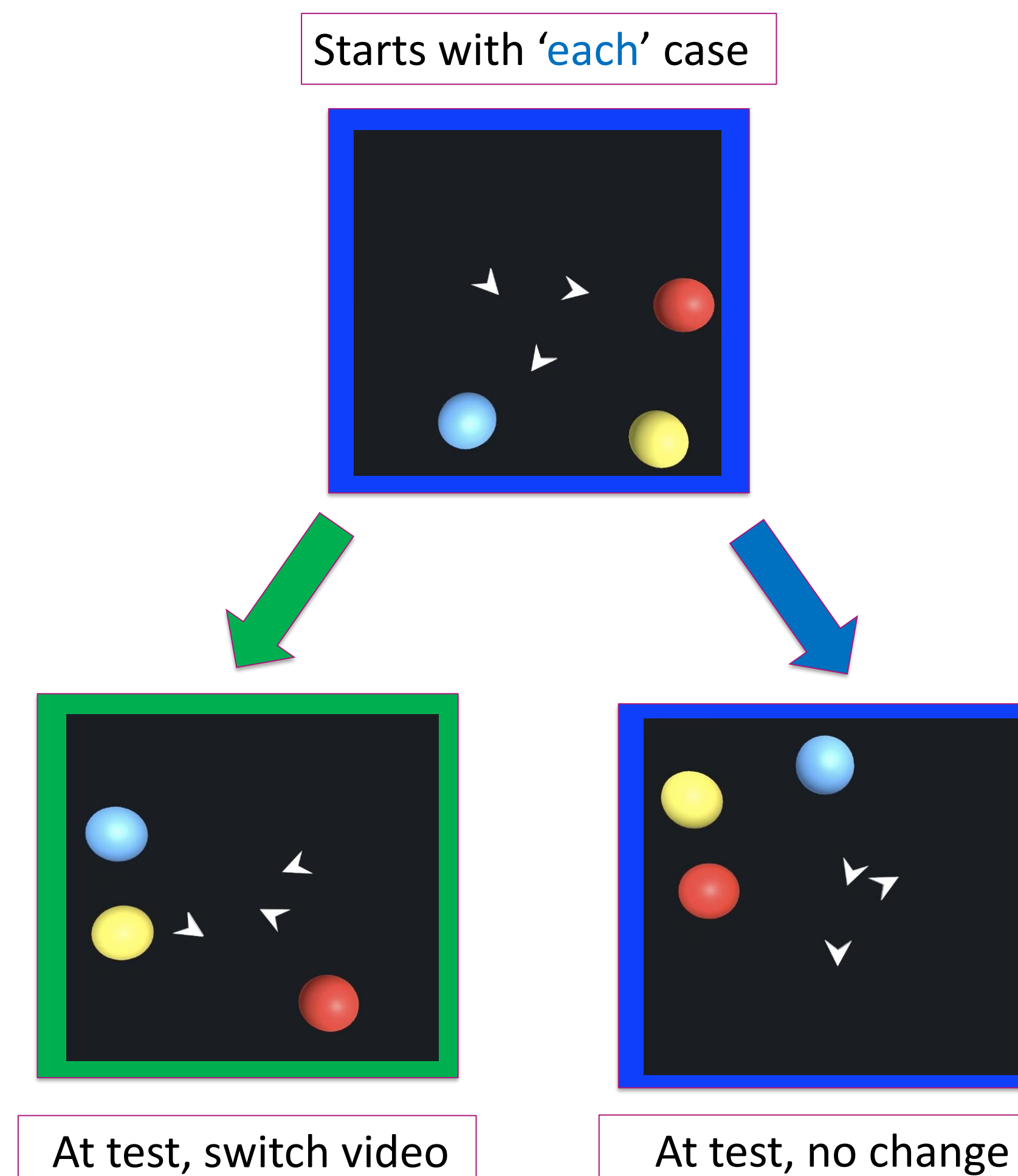
Current Work: What differences can infants determine?

Current Work:

Method: Habituation Switch

- Habituate infants to *individual* chasing events ('*each*' type) and test whether they notice the difference between *individual* and *random* chasing events

- Possibility that low-level differences (clumped vs spread) caused dishabituation in original experiment
- Tests whether infants can determine the difference between *individual* and *random* chasing
- For both events, chevrons are equally spaced out (stay in the center)
- 10 infants: 9;15-10;15 m/o
- Target of 36 infants



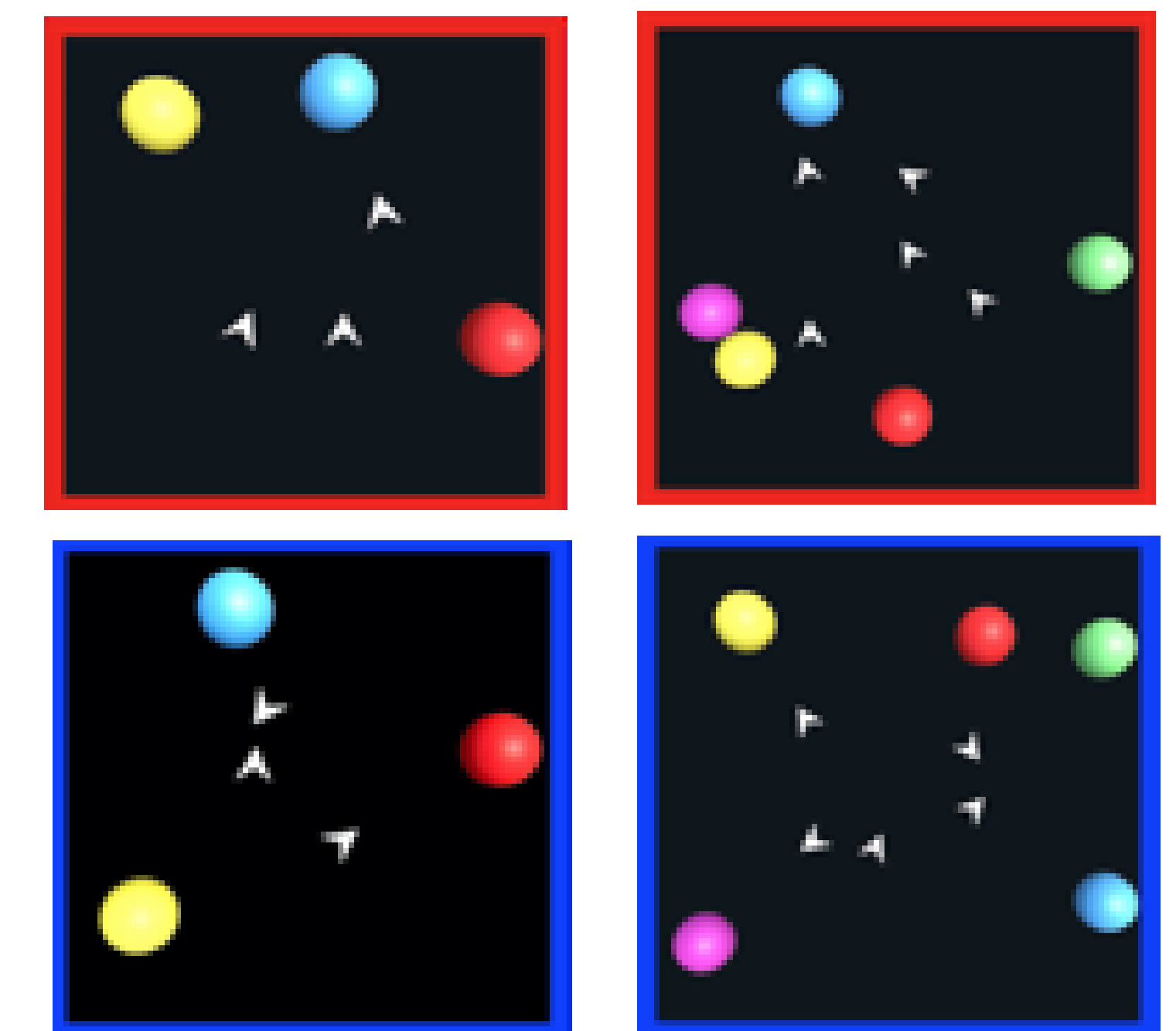
Predictions:

- If infants only represent clumped vs. spread => Predict infants to stay habituated
- If they represent individual vs random chasing => Predict infants to dishabituate
- Later scenario supports original study

Future Work:

ALL-Type

EACH-Type



- Infants can only store up to three separate objects in working memory [4]
- A collective group is represented as one object, regardless of actual number of members [5]
- Stronger support for earlier studies can be made by adding more chevrons

Our Predictions:

- Recreate current experiment with random case compared to:
- Five chevrons chasing balls individually => Predict infants to stay habituated (past three object limit)
 - Three chevrons chasing balls collectively => Predict infants to dishabituate (only three chevrons and only one set represented equals under three object limit)
 - Five chevrons chasing balls collectively => Predict infants to dishabituate (only one set represented equals under three object limit)

A: Our current results suggest yes... Further work needed