

# Two-year-olds demonstrate false-belief understanding

## in a novel intent-based social-preference task

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### INTRODUCTION

According to prior social-preference findings, infants and toddlers:

- (a) distinguish between positive and negative actions,
- (b) prefer agents who act positively over agents who act negatively,
- (c) and show this social preference even when agents' positive actions fail to achieve their intended outcomes.

**We built on these findings to create a novel measure of early false-belief understanding.**

- Toddlers in the **Experimental Condition** saw events involving a protagonist, a helper, and a hinderer. The *helper* had a false-belief and inadvertently gave the protagonist an empty container; the *hinderer* knowingly gave the protagonist an empty container. Based on prior social-preference findings, **we predicted that toddlers would prefer the helper (who attempted to help) over the hinderer, thus providing new evidence for false-belief understanding in toddlers.**
- Toddlers in the **Truncated Condition** saw truncated events that ended before the protagonist was given the empty container. Based on prior findings that children typically prefer informed over uninformed individuals, **we predicted that toddlers would prefer the TB agent over the FB agent (the reverse pattern from the experimental condition).**

### METHODS

#### Participants

- Experimental: 24, *M* age = 21.9 months
- Truncated : 7, *M* age = 21.25 months

#### Eye-gaze Recording

- EyeLink 1000 eye-tracker in a remote arm configuration
- 5-point calibration and validation

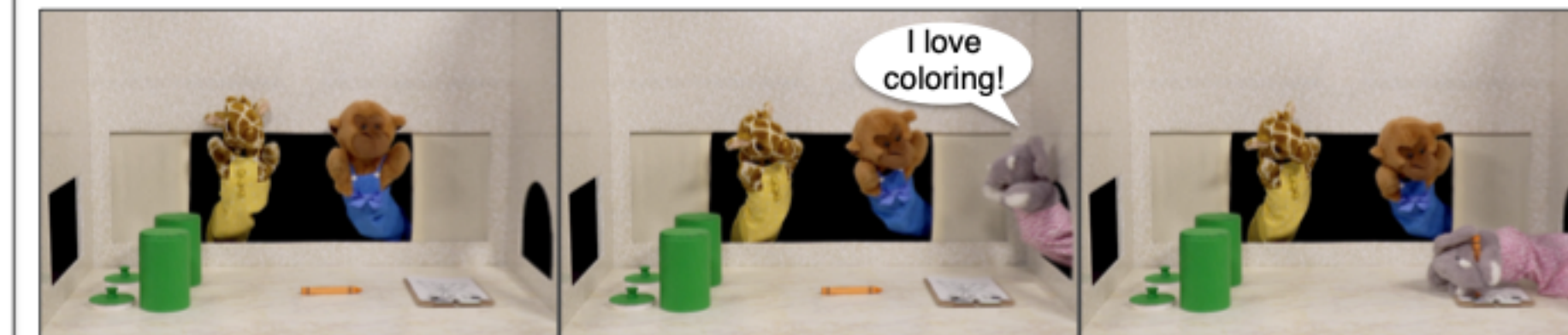
#### Counterbalancing

- We counterbalanced the left/right positions of the helper and hinderer in the familiarization trials, the order of the help and hinder test trials, the identity of the helper and hinderer, and the left/right positions of the two agents in the choice trial.

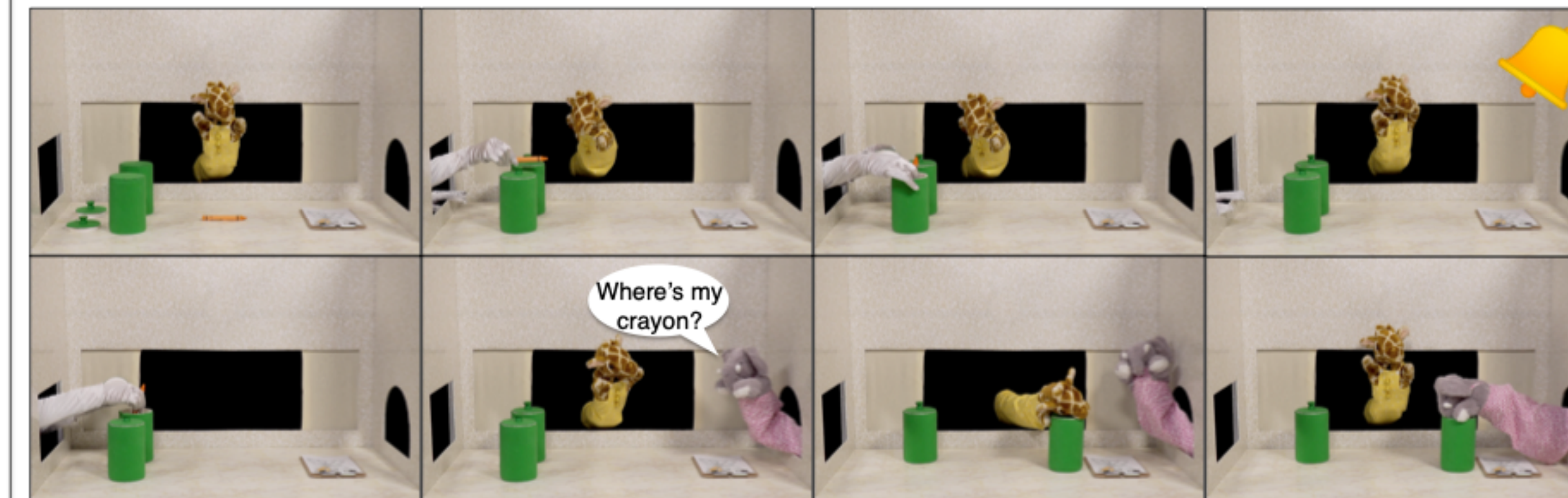
### EXPERIMENTAL CONDITION

#### Procedure

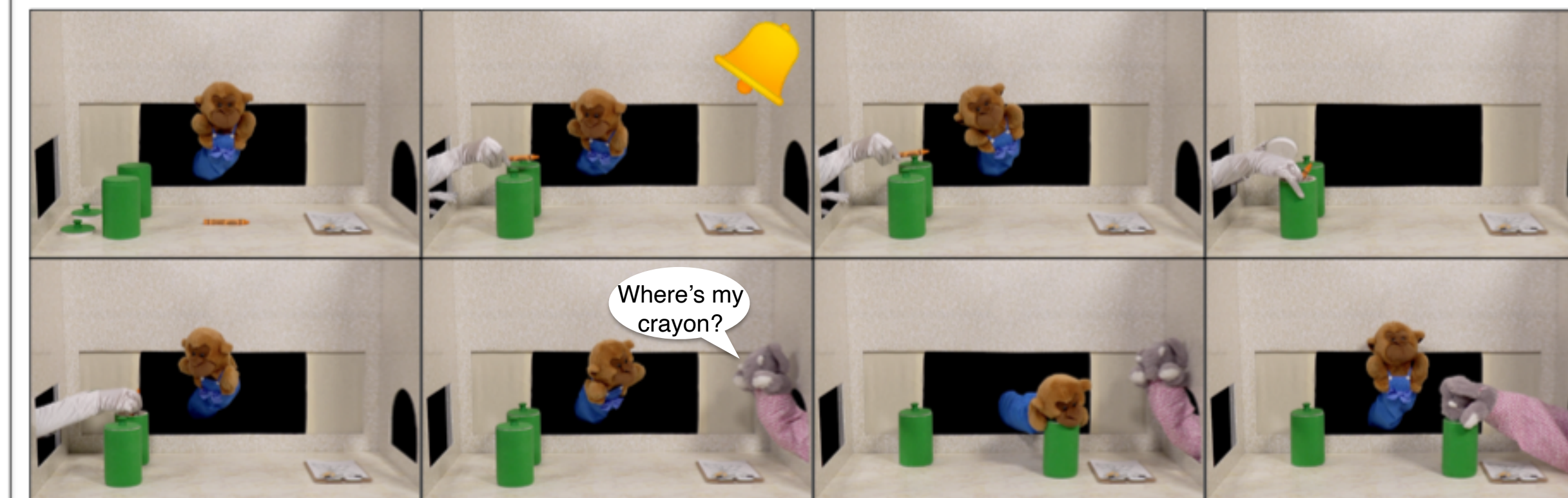
##### Familiarization Trials 1 & 2



##### Help Test



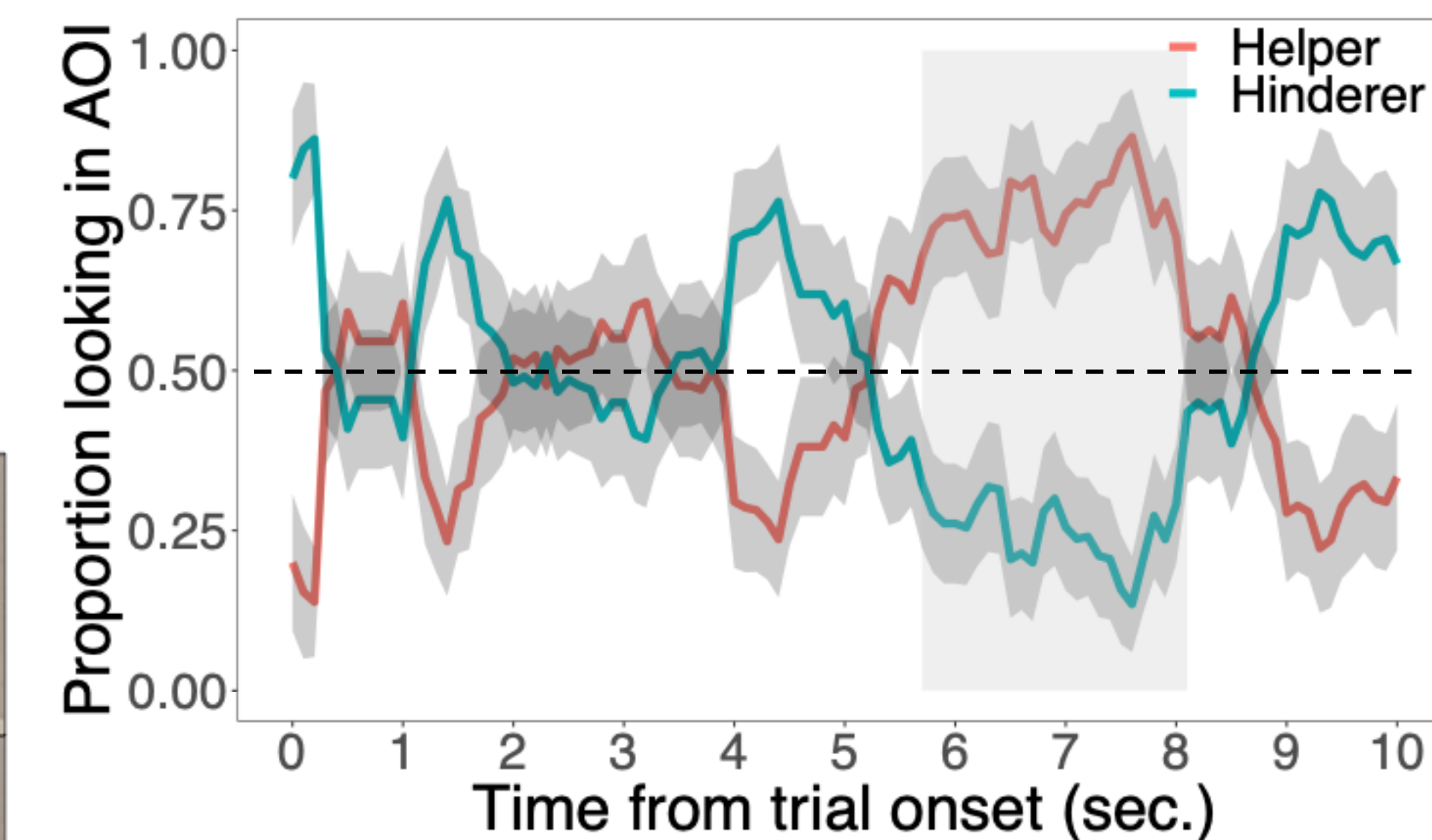
##### Hinder Test



##### Choice Trial

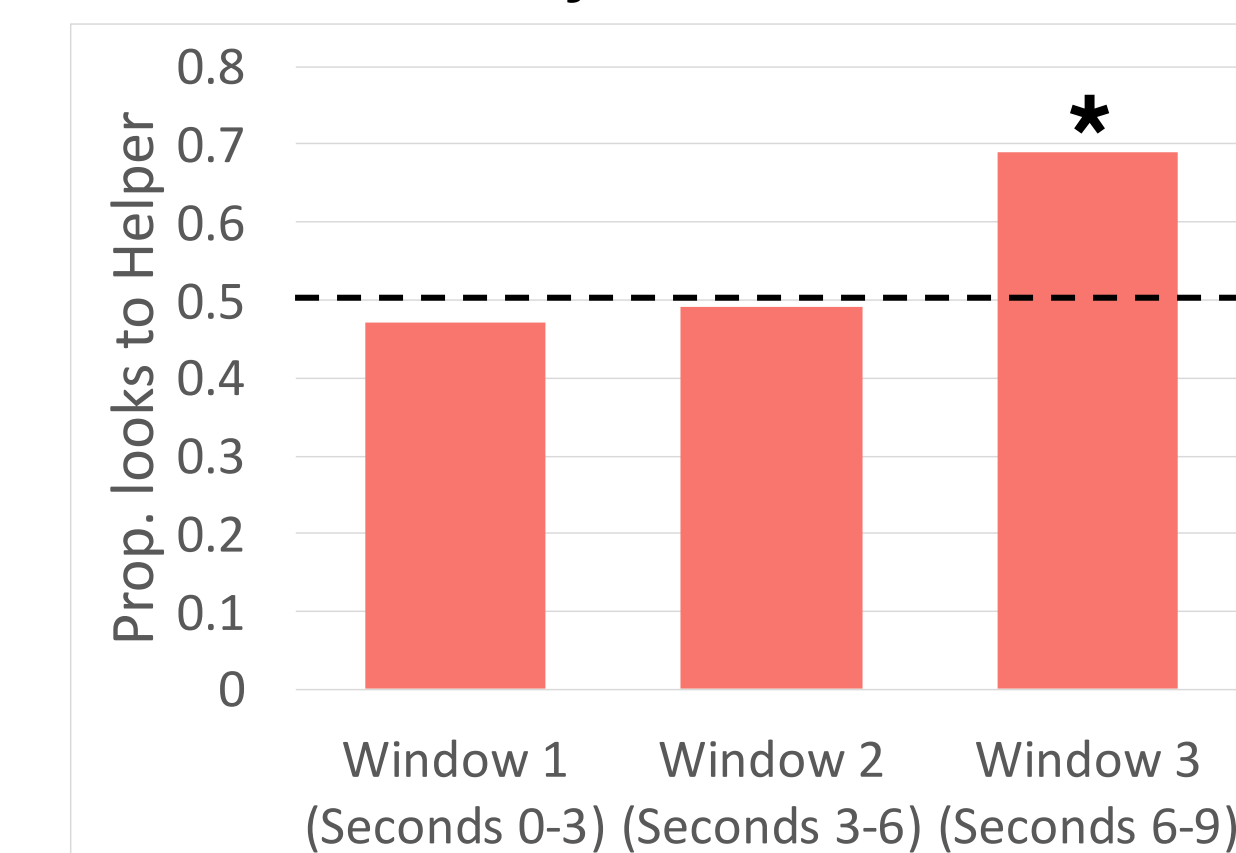
1. Children view a black screen and hear: "Now look! Who do you like?" (6 sec.)
2. Children view giraffe and monkey images (10 sec.)

#### Results



**Cluster-based Permutation Analysis:** Children look at the helper significantly more than chance level from 5.7s to 8.1s,  $p < .001$ .

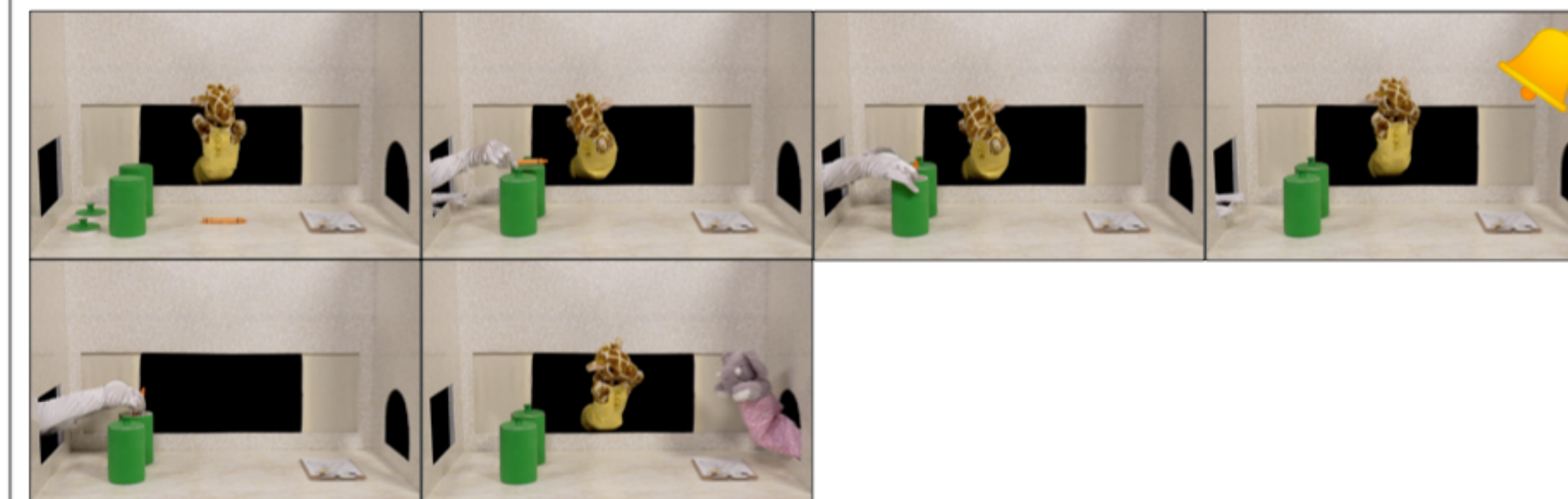
**Window Analysis:** Children looked at the helper significantly more than chance in Window 3 (seconds 6-9),  $t(23) = 5.42$ ,  $p < .001$ .



**20/24 children preferred the helper.**

### TRUNCATED CONDITION

#### Procedure

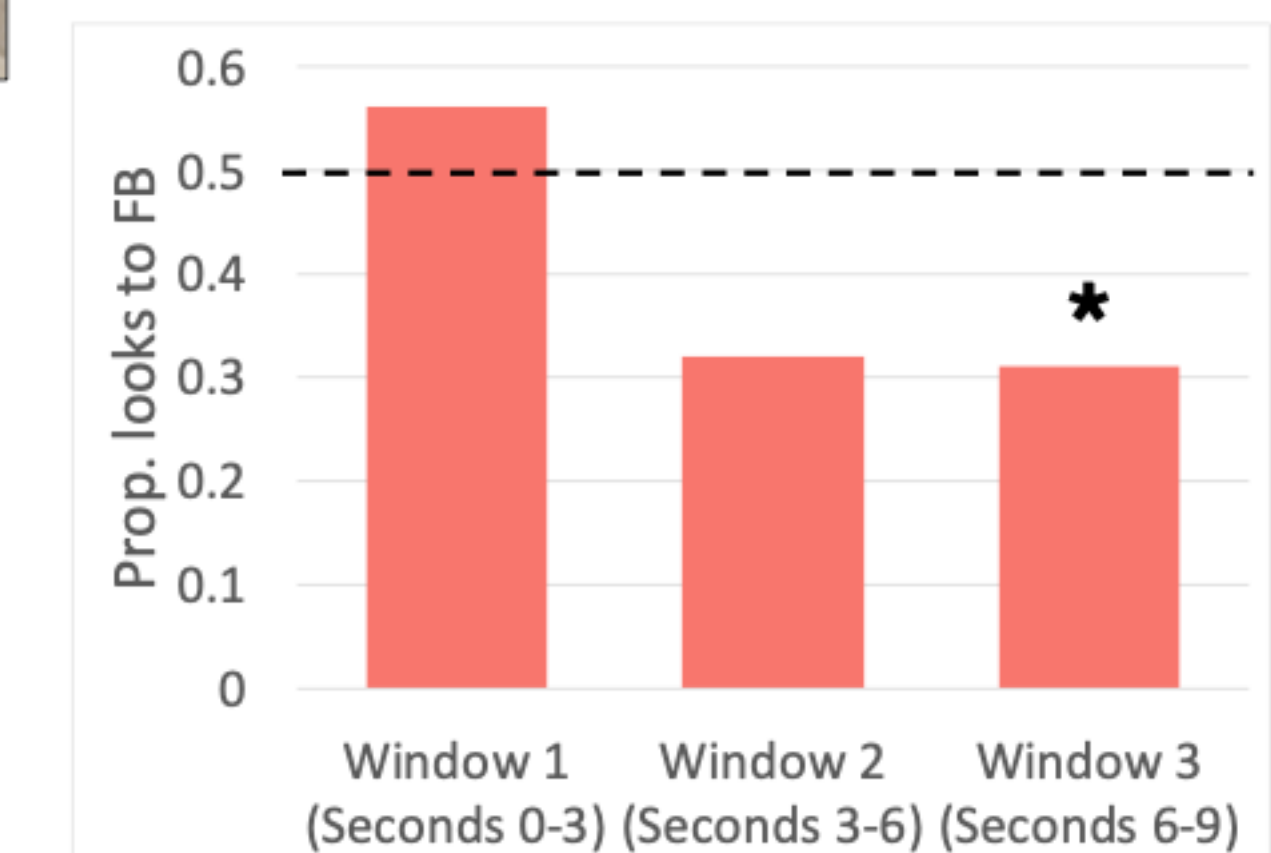


The Truncated Condition is identical to the experimental condition except that the test events ended just before the elephant asked for her crayon (shown above).

*Thus, the two agents hold the same beliefs as in the experimental condition, but neither gave an empty container.*

#### Results

**Cluster-based Permutation Analysis:** Children look at the **agent with a true-belief (TB)** more than chance level from 6.9s to 7.5s,  $p = .029$ .



**Window Analysis:** Children looked at the TB agent significantly more than chance in and Window 3,  $t(6) = 4.26$ ,  $p = .005$ .

**6/7 children preferred the TB agent.**

### DISCUSSION

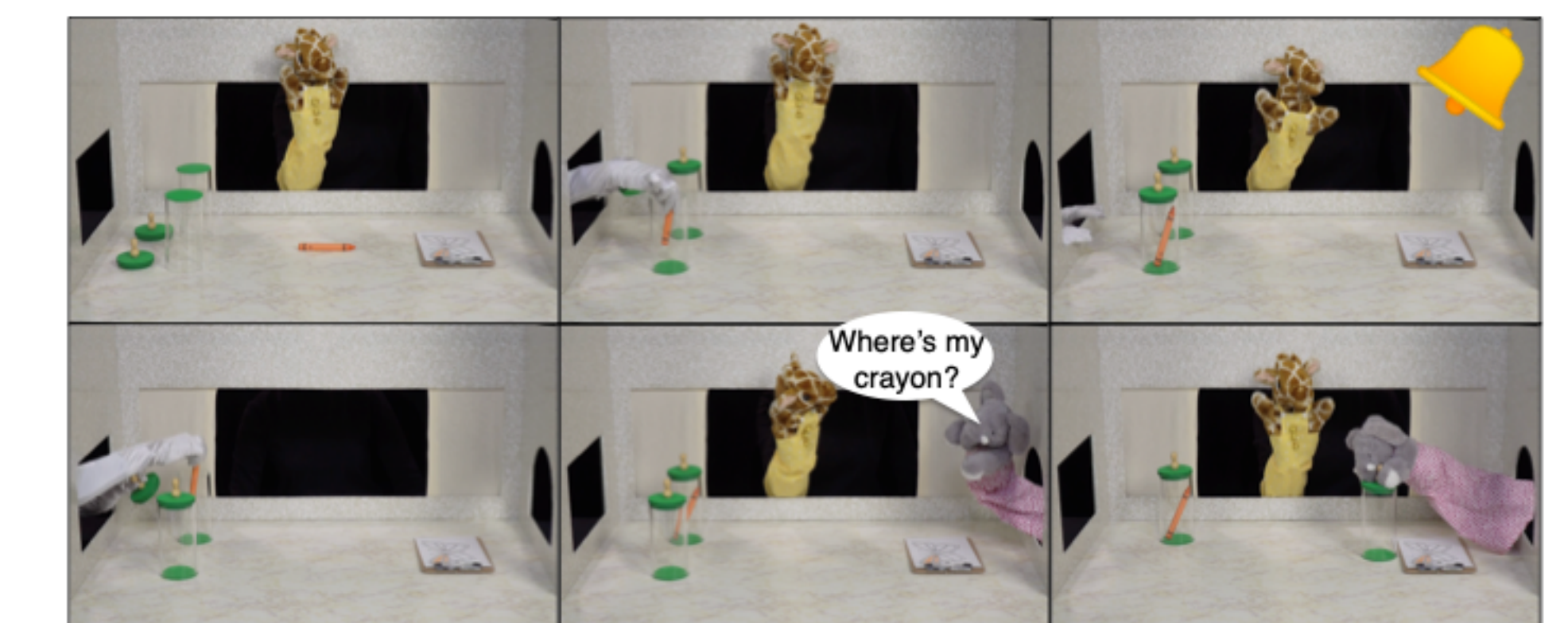
These results indicate that toddlers:

- (a) represented the helper's false belief and the hinderer's true belief about the crayon's location,
- (b) used these beliefs to ascertain each character's goal, and
- (c) evaluated the helper more favorably, based on its intent to help the protagonist.

*Our results thus provide evidence of early false-belief understanding using a novel social-preference task.*

### FUTURE DIRECTIONS

1. Complete in-lab data collection.
2. Conduct an online version with 18- to 30-month-olds to assess whether our task can be adapted for an online environment.
3. Run a **Transparent-Containers Condition**
  - This condition will be identical to the experimental condition except that the containers are transparent.
  - Half of the children will see the agents give the container with the crayon (shown below), and half will see them give the empty container.
  - *Thus, the two agents are both knowledgeable about the crayon's location and both perform the same action (both help or both hinder).*
  - **We predict that children will look equally at both agents, because their beliefs and actions are matched.**



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