

Two-year-olds demonstrate false-belief understanding

in a novel intent-based social-preference task

Amanda Rose Yuile, Renée Baillargeon, and Cynthia Fisher
University of Illinois at Urbana-Champaign

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.

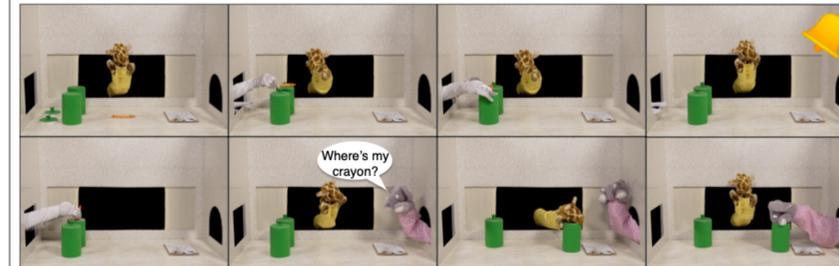
EXPERIMENTAL CONDITION

Procedure

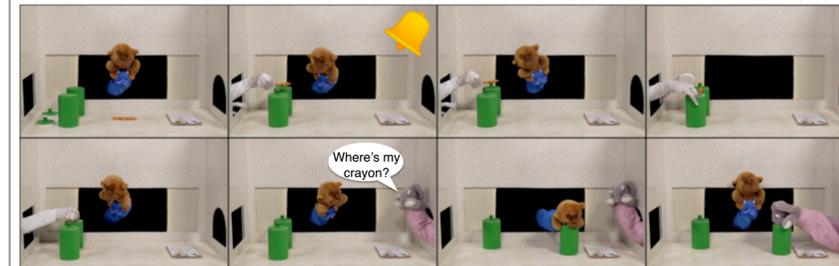
Familiarization Trials 1 & 2



Help Test



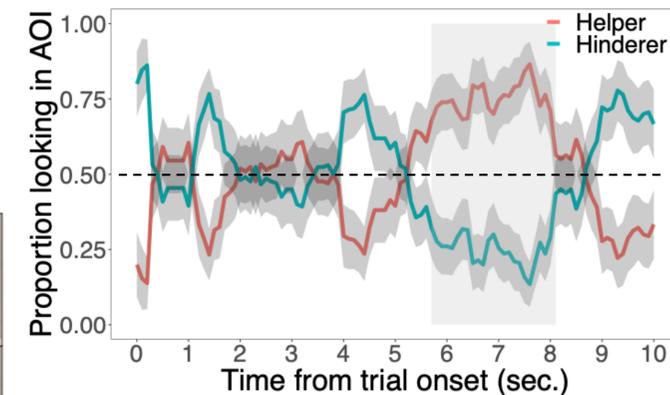
Hinder Test



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, $p < .001$.

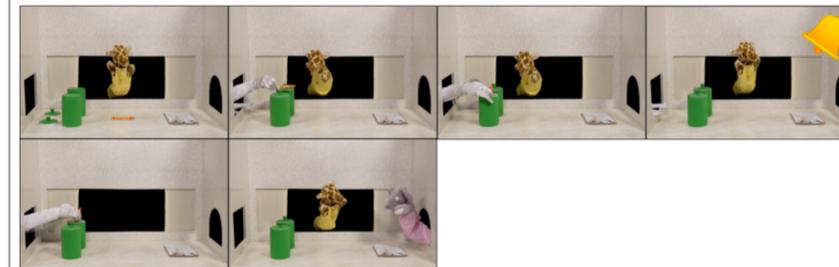
Window Analysis: Children looked at the helper significantly more than chance in Window 3 (seconds 6-9), $t(23) = 5.42$, $p < .001$.



20/24 children preferred the helper.

TRUNCATED CONDITION

Procedure

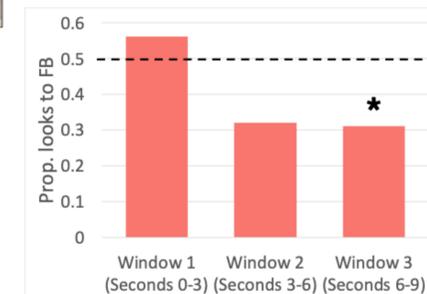


The Truncated Condition is identical to the experimental condition except that the test events ended just before the elephant asked for her crayon (shown above).

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

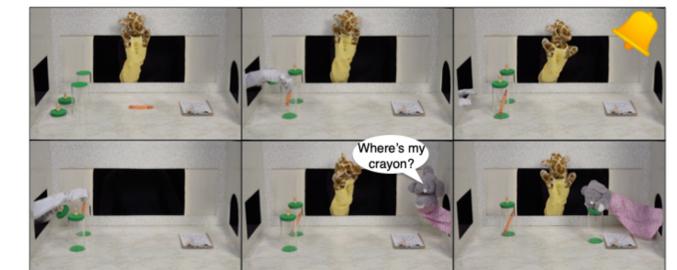
These results indicate that toddlers:

- (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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For further information contact:
A.R.Yuile at amandah3@illinois.edu