



Children More Robustly Fix Functions to Tools in the Context of Social Others - Even When Learning Via Screens

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Introduction

- Object functions are central to cumulative human culture, with societies passing tools from one generation to the next.
- By age 2, children and adults alike show a clear tendency to map particular tools to particular functions, using tools quite rigidly for (only) their specified functions. Although object features are naturally relevant, social cues appear to play a crucial role in these tool-function mappings.
- Thus tool learning may be especially sensitive to social context.**
- Here, we employed both eye tracking and behavioral paradigms to investigate whether children would make reliable tool-function mappings on the impersonal basis of video alone and, furthermore, whether the presence or absence of a person in the video might influence attention, tool learning, and subsequent actual use of tools in a behavioral test.

Hypotheses

- Children will rapidly fix functions to specific objects, despite alternative viable tool options, when a novel tool learning task is presented via video.
- Children will more robustly fix functions to tools in social (person-present) versus non-social (person-absent) videos.
- These outcomes will be evident in both attentional (eye tracking) and behavioral (tool using) tasks.

Methods

Participants

- 35 participants tested in-lab (*data collection ongoing*)
- 7-10 years old ($M=8.46$ years, $SD=1.48$ years, 19 females)

Procedure

- Randomly assigned to Social or Non-Social Condition.
- Watched demonstration video. Videos consisted of a series of still shots and voiceover.
- Completed **attentional** test trials on Tobii x3-120 eye tracker attached to a 25" LED monitor and then **behavioral** test trials with an experimenter.

Demonstration Videos

Social Demonstration



"This is called a Bli cte"... Let's see what she can do with the Bli cte... she can put it in the box and it makes a sound!"

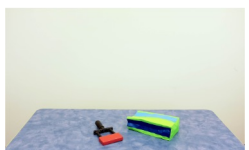
Non-Social Demonstration



"This is called a Bli cte"... Let's see what the Bli cte can do... it can go in the box and it makes a sound!"



"Oh look here's a present... hmm, what's in the bag? Oh, it's something else. Look at this thing, this is called a Modi!"

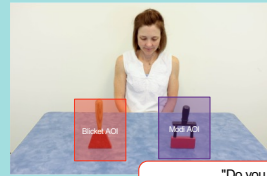


"Oh look here's a present... hmm, what's in the bag? Oh, it's something else. Look at this thing, this is called a Modi!"

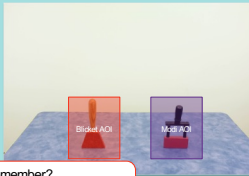
*Whether the brown-handled triangular tool or the black-handled rectangular tool was shown with a function (making the sound) or without a function (a gift in a colorful bag) was counterbalanced. Both tools were equally functionally capable of completing both of the behavioral test tasks (bell ringing, cracker crushing).

Attentional Tool Learning Test

Social Test Trial

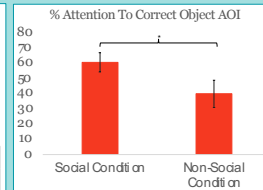
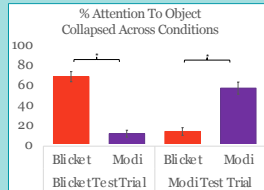


Non-Social Test Trial



"Do you remember? Which one is the Bli cte? Which one is the Modi?"

Preliminary Attention Results



Behavioral Tool Learning Test

Children completed four in-person sets of trials where they were asked to choose one of the two objects to ring the bell in the box or complete a completely new, unmodeled task of crunching crackers.

Example Test Trials

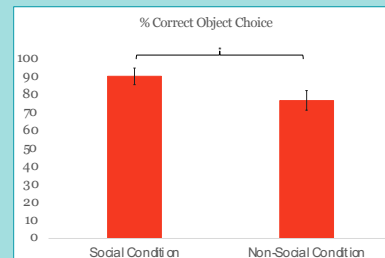


"If you want to ring the bell and make the sound, which one do you need?"

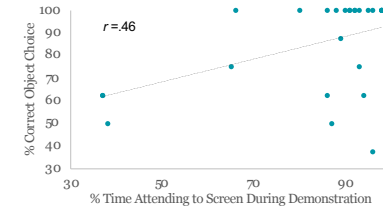


"If you want to crunch up the cracker and make crumbs, which one do you need?"

Preliminary Behavioral Results



Correlation Between Attention & Behavior



Conclusions

- Preliminary results support each of our three initial hypotheses.
- Collapsed across conditions, children demonstrated a rapid and recurrent desire to fix one function to one tool on the basis of minimal observation.
- Although both groups made these mappings, and although children showed no differences in overall attention to the videos across conditions, participants showed more robust tool-function mappings in the Social Condition compared to Non-Social. This was true for both visual attention (video test trials) and their actual object choices (behavioral test trials).
- Results add to a growing body of literature highlighting the importance of social influence on early tool use and object function learning.
- Results furthermore reveal that novel tool functions can be robustly fast-mapped with only a minimal, impersonal, screen-based demo.

Future Directions

- These data are part of a larger project focused on exploring the influence of social context on tool learning across typically-developing children (TD) and those with Autism Spectrum Disorder (ASD).
- Data collection for the TD sample will finish Summer 2022, and collection of the ASD sample will begin Fall 2022.
- We also are measuring the connection between autonomic nervous system arousal (as measured via pupil dilation) and learning across both condition (Social, Non-Social) and sample (TD, ASD).

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