Children use disagreement to infer what happened

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Introduction

- A challenge when learning from others about past events is that people can disagree in their interpretations of what happened.
- Disagreement is sometimes caused by an *ambiguous event* that generates multiple reasonable interpretations.[1]

Research Questions:

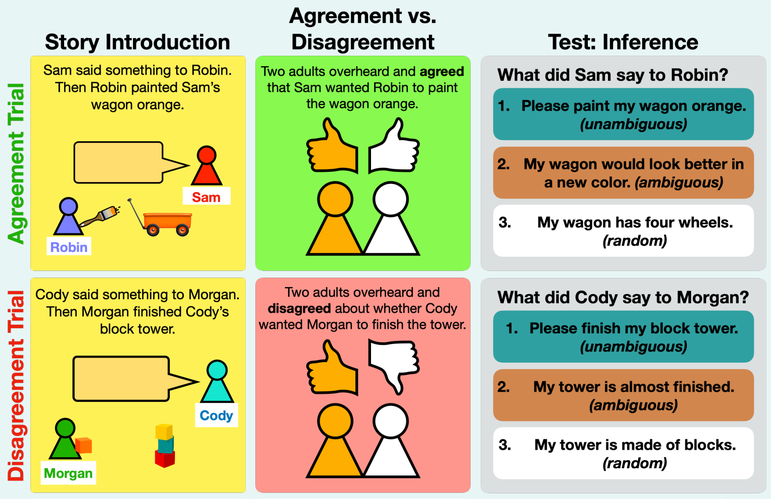
(1) Can children use disagreement to <u>infer</u> that an ambiguous event (here, an ambiguous *utterance*) occurred?

(2) Do children's <u>predictions</u> that ambiguous events cause disagreement explain their inferences in line with Bayesian inferential reasoning?[2]

Experiment 1: Inference (*N* = **52** 7-11 year olds)

Children completed 4 trials: 2 Agreement trials, 2 Disagreement trials.

Examples of an Agreement and a Disagreement trial are below:



We predicted children would infer ambiguous utterances *more* in disagreement than agreement trials.

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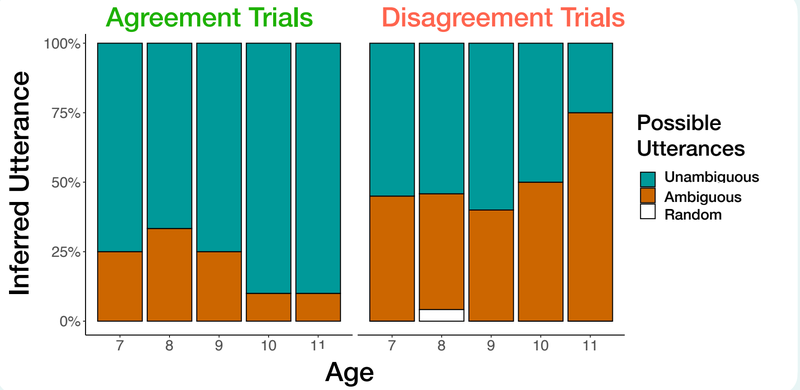
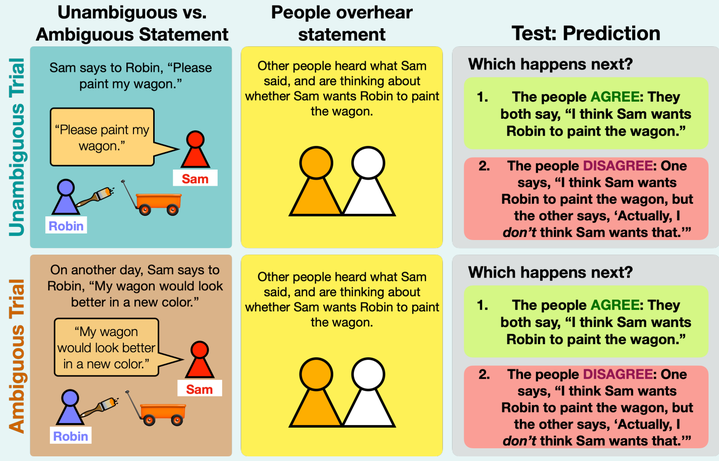
Experiment 1 Results (Inference Only)

Children inferred the ambiguous utterance more after hearing disagreement than agreement, $\beta_{disagree}$ = 1.83, 95% CI [1.03, 2.63]. The effect strengthened with age, $\beta_{disagreeXage}$ = 0.82, 95% CI [0.26, 1.38].



Experiment 2 (Prediction + Inference) *N* = **110** 7-11 year olds

Children *either* completed the Inference task (similar to Experiment 1, now with ***only*** the unambiguous and ambiguous options) ***OR*** the Prediction task:



We hypothesized children would predict disagreement *more* after hearing ambiguous than unambiguous statements, and that these predictions may explain children's inferences in line with Bayesian inference (see computational model in the Inference Task results).

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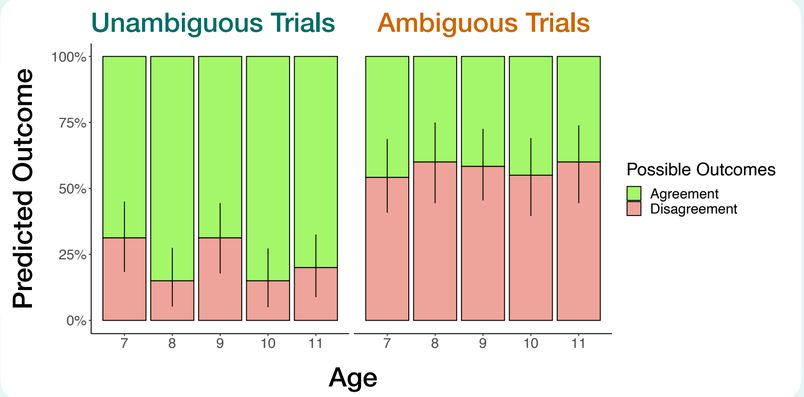
Experiment 2 Results (Prediction + Inference)

Prediction Task: Across ages, children predicted that disagreement would occur more after an ambiguous than unambiguous statement, $\beta_{ambiguous}$ = 1.58, 95% CI [1.14, 2.02].



Inference Task: Experiment 2 replicated the inference results from Experiment 1. We then linked children's predictions to inferences using Bayes' theorem: $p(utterance|agree) \propto p(agree|utterance)p(utterance)$ We assumed prior $p(utterance)$ was uniform. The model captures the main trends that children are more likely to infer ambiguous utterances after disagreement than agreement, r = 0.96, RMSE = 0.21.

Discussion

Children use disagreement to infer ambiguous events, and this inference is explained in part by their predictions (in line with Bayesian inference). Future work will apply computational models that explain *age-related change* in inferences.

References & Funding

1. Amemiya, Walker, & Heyman (2021). Children's developing ability to resolve disagreement by integrating perspectives. *Child Development*, *92*, e1228-e1241. doi:10.1111/cdev.13603
2. Gerstenberg, Siegel, & Tenenbaum (2021). What happened? Reconstructing the past from vision and sound. *PsyArXiv*.

JA was supported by a grant from NICHD F32 HD098777 and NSF #2203810. TG was supported by a grant from the Stanford Institute for Human-Centered Artificial Intelligence (HAI).