



- Young children's naive, **intuitive beliefs** about the material world (e.g., "Air is nothing") are theory-like but often run counter to scientific understanding (e.g., "Air is matter")[1, 2]
- Between ages 6-12, in an episode of conceptual change, children start revising their "theory of matter"<sup>[1]</sup>
- Even before acquiring beliefs aligned with scientific understanding, learners may have knowledge that is inconsistent with naive beliefs but consistent with scientific understanding (e.g., "We need air to breathe")
- Belief inconsistency may lead to slower answers to "incongruent" questions (naive answer ≠ scientific answer; typically undergoing change) than "congruent" questions (naive answer = scientific answer)

## Do children at the brink of revising their naive beliefs about the material world show slower response times for "incongruent" questions than "congruent" questions?





- We selected a subset of 10 questions for analysis: Congruent questions (n = 5) were those most children answered correctly; incongruent questions (n = 5) were those fewest children answered correctly
- Based on video, we coded children's RTs (time between end of question and start of response)
- We then analyzed children's **RTs for incorrect responses to incongruent questions** and **correct responses** to *congruent* questions, also computing an individual "difference score" (M<sub>incongruent</sub> - M<sub>congruent</sub>)
- Children's executive functioning was captured via Backward Digit Span (working memory), verbal fluency (set shifting), Day-Night (inhibition); we also assessed cognitive reflection (CRT-D) and error monitoring

# Children's hesitancy as a marker of implicit skepticism of incorrect intuitive beliefs

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### BACKGROUND

### PROCEDURE

Children answered 36 forced-choice questions about entities and their physical properties



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RESULTS



Hesitancy correlated with EF and domain Children were **slower** answering **incongruent** questions; individual hesitancy varied markedly **knowledge** but not CRT-D or error monitoring

### **DISCUSSION & FUTURE DIRECTIONS**

### Our data suggests children's RTs reflect being at the cusp of overturning their naive beliefs about the material world.

- Even before acquiring a scientific understanding of matter and its properties, elementary schoolers show signs of hesitancy when producing responses invoking incorrect naive beliefs
- Learners vary in their degree of hesitancy; individual differences relate to levels of EF and overall domain knowledge
- We plan to replicate and extend this finding using a question set a) including items beyond the physical reasoning domain, and b), controlling for age of acquisition and processing-relevant variables (word frequency and length, no. of syllables)

REFERENCES







<sup>[1]</sup> Carey, S. (2009). The Origin of Concepts. Oxford University Press.

<sup>[2]</sup> Shtulman, A. (2017). Scienceblind: Why Our Intuitive Theories About the World Are So Often Wrong. Hachette UK.