From Possible to Pause-able: Children's hesitancy may mark implicit skepticism of incorrect intuitive beliefs

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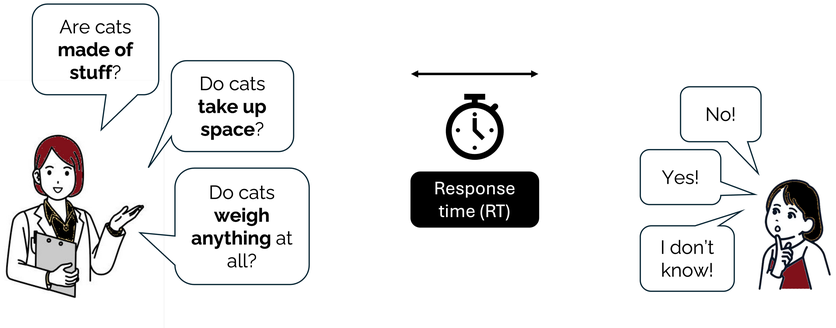
BACKGROUND

- *"Air is nothing:"* Young children's naive, **intuitive beliefs about the material world** are theory-like but **often run counter to scientific understanding**[1, 2]
- *"We need air to breathe:"* **Even *before*** acquiring beliefs aligned with **scientific understanding**, learners' **other knowledge may be inconsistent with naive beliefs**
- Belief inconsistency may lead to slower answers to "incongruent" questions (correct answer ≠ naive belief) than "congruent" questions (correct answer = naive belief)

Among children with *naive* beliefs about the material world, are response times (RTs) slower for incongruent questions than for congruent questions?

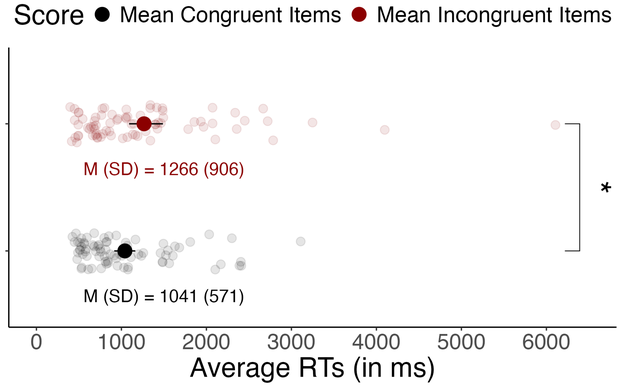
PROCEDURE

Children answered 36 forced-choice questions about 10 entities and their physical properties (e.g., cats, rocks, shadows; air, steam, electricity)



- Based on **video**, we **coded children's RTs** (time between end of question and start of response)
- Selected subset: **Congruent questions (k = 5)** were those **most children** answered **correctly**; **incongruent questions (k = 5)** were those **fewest children** answered **correctly**
- We excluded children's RTs for inaccurate (congruent) and accurate (incongruent) responses

RESULTS



Error bars represent 95% CIs.

OSF AsPredicted

***N* = 79 five- to nine-year-old children** (*M* = 7.4 yrs)

- Children were **marginally slower to respond to incongruent questions** ($d = 0.24$, $p = .041$, two-tailed)
- RTs **correlated moderately with EFs** and **domain knowledge** ($r = .28$, $p = .021$; $r = .31$, $p = .005$)
- No correlation between variance in RTs and children's error monitoring or cognitive reflection abilities
- Second coder coded 100% of data; ICC = .84 (congruent); .95 (incongruent).

DISCUSSION & FUTURE DIRECTIONS

Children's RTs may be informative of their 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 aligned with 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), explicitly controlling for age of acquisition and processing-relevant variables (word frequency and length, no. of syllables)

REFERENCES

[1] Carey, S. (2009). The Origin of Concepts. Oxford University Press.
[2] Shtulman, A. (2017). Scienceblind: Why Our Intuitive Theories About the World Are So Often Wrong. Hachette UK.

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