

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

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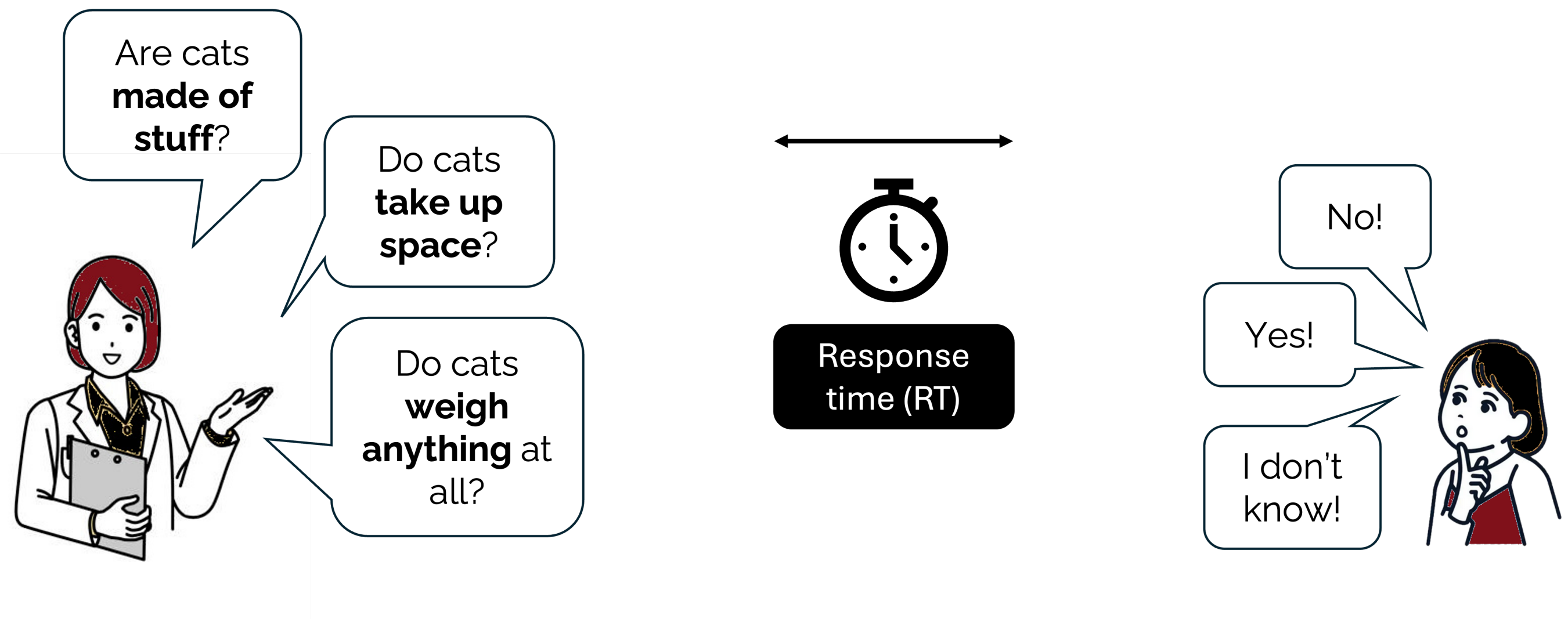
BACKGROUND

- "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]
- Between ages 6-12, in an episode of conceptual change, children start revising their "theory of matter"^[1]
- **Even before** acquiring beliefs aligned with **scientific understanding**, learners' **other knowledge can be inconsistent with naive beliefs** (e.g., "we need air to breathe")
- This belief inconsistency may lead to slower answers to "incongruent" questions (naive answer ≠ correct answer; typically undergoing change) than "congruent" questions (naive answer = correct answer)

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

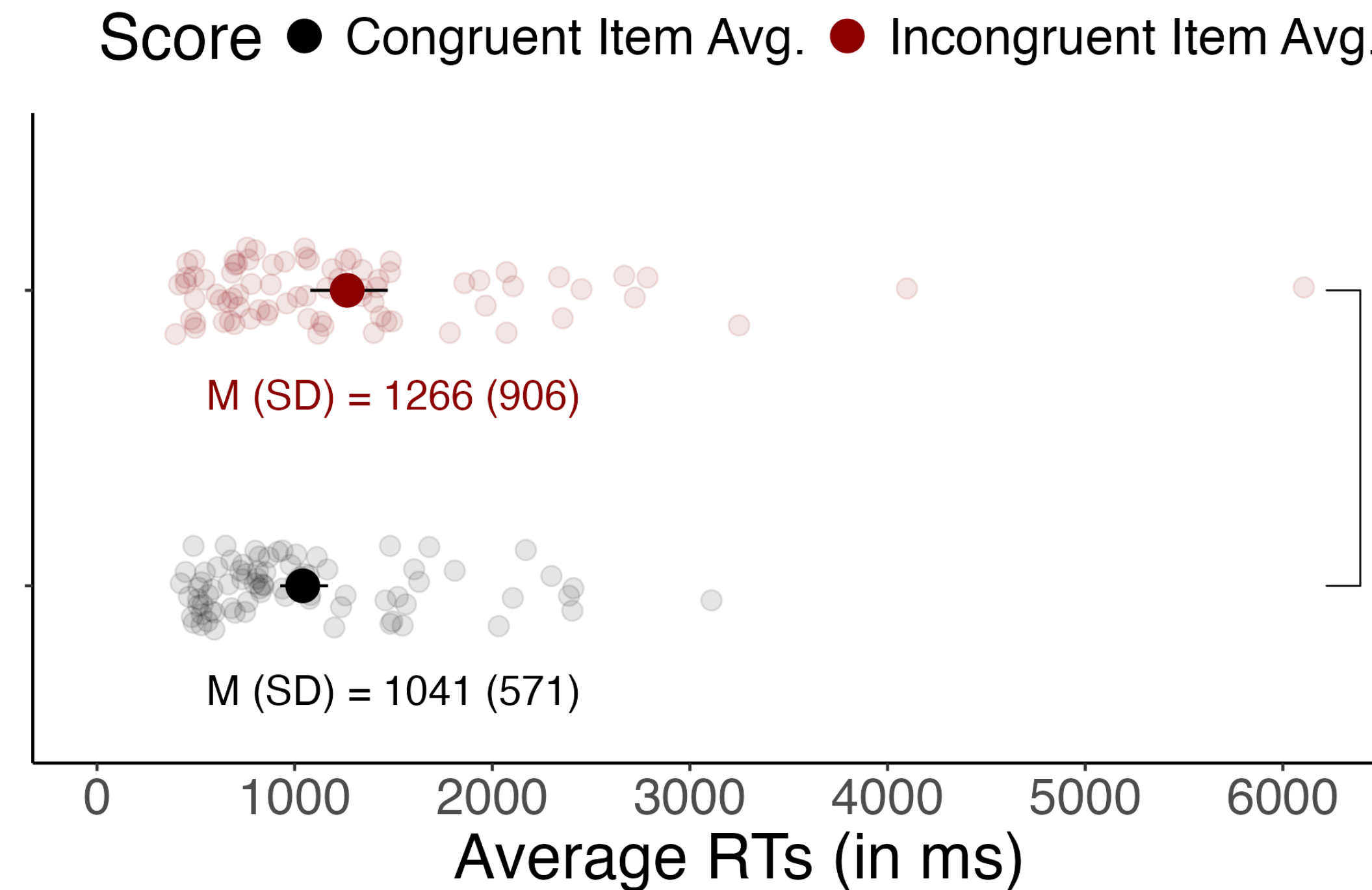
PROCEDURE

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

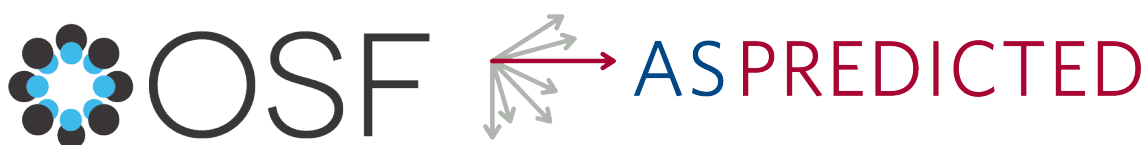


- Based on **video**, we **coded children's RTs** (time between end of question and start of response)
- Selected subset: **Congruent** questions ($k = 5$) were those **most children answered correctly**; **incongruent** questions ($k = 5$) were those **fewest children answered correctly**
- We excluded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

RESULTS



Error bars are bootstrapped 95% CIs. Second coder coded 100% of RT data; ICC = .84 (congruent); .95 (incongruent).



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

- Overall, children were **marginally slower answering incongruent questions** ($d = 0.24, p = .041$)
- Children **varied considerably** in their incongruent-congruent difference ("difference score")
- Difference score **correlated moderately with EFs and domain knowledge** ($r = .28, p = .021$; $r = .31, p = .005$)
- No correlation between difference score and children's error monitoring or cognitive reflection abilities

DISCUSSION & FUTURE DIRECTIONS

Children's RTs may be reflective 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 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), 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.