



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

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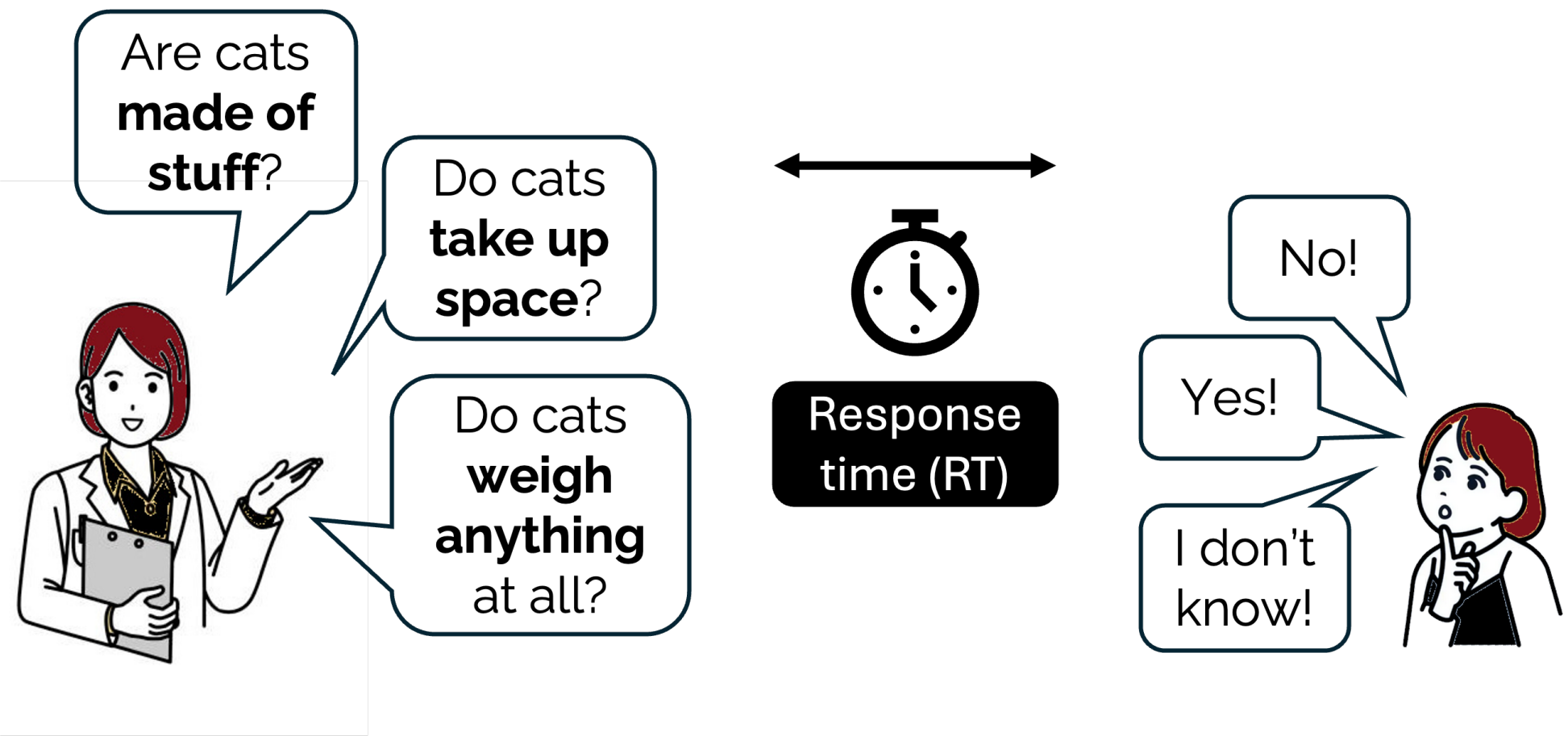
BACKGROUND

- Young **children's naive, intuitive beliefs** about the material world (e.g., “air is nothing,” “a grain of rice weighs nothing”) are theory-like but **run counter to scientific understanding** ^[1, 2]
- Previous work shows **aspects of naive beliefs are retained in adulthood** – expert adults' correct answers are slower for “incongruent” questions (where correct answers run counter to naive beliefs) than “congruent” questions (where correct answers align with naive beliefs) ^[3]
- Even before acquiring beliefs aligned with scientific understanding**, learners' **naive beliefs may conflict** with other parts of their knowledge (e.g., “air is nothing”; “we need air to breathe”)
- Elementary schoolers wrestling with such conflicting beliefs may respond more slowly to “incongruent” questions even *before* learning the scientifically correct response

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

PROCEDURE

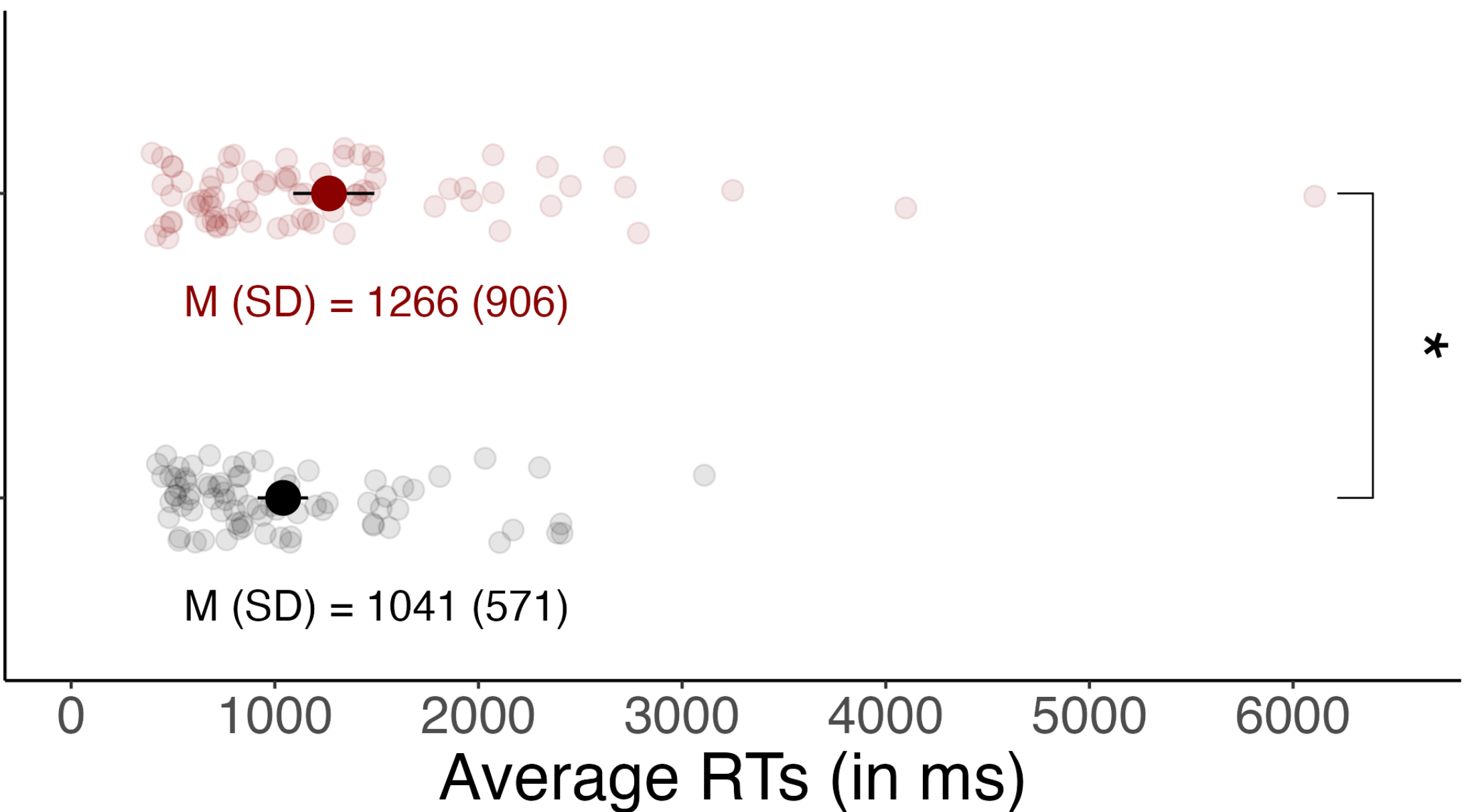
Children answered 30 forced-choice questions about 10 entities and their physical properties.



- Congruent questions** (n = 5) were those **most children** answered **correctly**; **incongruent questions** (n = 5) were those **fewest children** answered **correctly**
- We excluded children's RTs relating to inaccurate and accurate responses, respectively
- Based on video, we **coded children's RTs** (time between end of question and start of response)

RESULTS

Score ● Mean Congruent Items ● Mean Incongruent Items



OSF AS PREDICTED

N = 79 five- to nine-year-old children (M = X.XX)

Mean diff. = 225 ms, $d = 0.24$ [CIs -0.06, 0.54], $p = .041$; paired t-test (two-tailed)

- Second coder blind to hypotheses coded 100% of data; ICC = .84 (congruent); .95 (incongruent)
- Overall, children were **marginally slower to respond to incongruent questions** than congruent ones
- RTs correlated with EFs and domain knowledge** ($r = .28, p = .021$; $r = .31, p = .005$)
- Variance in RTs did *not* correlate with children's error monitoring or cognitive reflection abilities

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.
[3] Shtulman, A., & Valcarcel, J. (2012). Scientific knowledge suppresses but does not supplant earlier intuitions. Cognition, 124(2), 209–215. <https://doi.org/10.1016/j.cognition.2012.04.005>