Can processing demands explain toddlers' performance in false-belief tasks?

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Two-and-a-half-year-olds normally fail standard false-belief tasks. In the classic version, children have to say where a protagonist will look for an apple that, unbeknownst to her, was moved to a new location. Children under 4 generally predict that the protagonist will look for her apple in its current location, rather than where she left it. Setoh, Scott, and Baillargeon (1) argue that young children fail standard false-belief tasks because of their high processing demands, not because young children lack the necessary theory of mind.

This processing-demands account is challenged by "low-inhibition tasks," in which the apple is removed from the scene altogether (2): rather than succeeding, children under 4 perform at chance in these tasks. Setoh et al. argue that low-inhibition tasks still pose high processing demands for young children, because they must still inhibit a weaker prepotent response (corresponding with the unknown location of the marble) and also generate the correct response. In their study, Setoh et al. show that, indeed, when 2.5-y-olds receive a low-inhibition task with response-generation training (two practice trials with factual "where" questions), they perform significantly above chance.

However, Setoh et al.'s pattern of results is inconsistent with their account. If both inhibitory control and response generation are critical to passing a standard false-belief task, then reduced demands in either of these two processes (through the low-inhibition modification or the response-generation practice, respectively) should improve children's performance. However, this is not what Setoh et al. observed. Experiment 4 shows that, when 2.5-y-old children receive the same two practice trials in a standard, high-inhibition task, they perform significantly below chance—as they normally do without practice trials.

Setoh et al. claim that these results are "exactly those predicted by [their] account" because the inhibitory-control demands of standard tasks are still too high for young children, even with response-generation practice. However, if children in experiment 4 had performed at chance, or succeeded, their improved performance would have also been taken as evidence that response-generation practice is critical. Thus, not only is the prediction inconsistent with the account, but, on this logic, any possible pattern of results in experiment 4 would count as evidence for their account.

Setoh et al.'s account could explain the data if they assumed a linear process in which participants must first inhibit their true belief before they can generate the correct response. This mechanism, however, is inconsistent with looking data from infants, toddlers, and also adults suggesting that they do not first consider the true-belief response (3–5).

Finally, low-inhibition versions of the false-belief task are especially prone to solutions that do not require attributing a false belief. In Setoh et al.'s design, children's training on factual "where" questions might prompt them to point to the last location where the apple was. As such, the results of their study do not speak to the continuity argument, that is, the view that infants, toddlers, and older children all reveal the same understanding of belief in different types of false-belief tasks.

1 Setoh P, Scott RM, Baillargeon R (2016) Two-and-a-half-year-olds succeed at a traditional false-belief task with reduced processing demands. *Proc Natl Acad Sci USA* 113:13360–13365.
2 Devine RT, Hughes C (2014) Relations between false belief understanding and executive function in early childhood: A meta-analysis. *Child Dev* 85:1777–1794.
3 Clements WA, Perner J (1994) Implicit understanding of belief. *Cogn Dev* 9:377–395.
4 Southgate V, Senju A, Csibra G (2007) Action anticipation through attribution of false belief by 2-year-olds. *Psychol Sci* 18:587–592.
5 Rubio-Fernández P (2017) Can we forget what we know in a false-belief task? An investigation of the true-belief default. *Cogn Sci* 41:218–241.

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