

Supplementary Methods

False belief tasks

Story-based task. The story-based task consisted of 12 verbal stories. The stories first related a character's awareness of one reality (e.g. Zack puts the milk in fridge), then the character's unawareness of a change in reality (e.g. Zack leaves the room and Kim finishes the milk with her cereal and throws the milk carton in the bin). For each story, four questions were asked (each with a binary choice): (1) a false belief question (e.g. Where does Zack think the milk carton is?), (2) a counterfactual question that does not call upon false belief reasoning but makes formally similar reasoning demands (e.g. What if Kim had not had cereal, where would the milk carton be?), (3) a memory question (e.g. Where was the milk carton at the beginning?) and (4) a reality question (e.g. Where is the milk carton now?). Questions (3) and (4) controlled for the incidental processing demands of the false belief reasoning task (i.e. understanding, integrating and remembering the sequence of events).

Video-based task. The video-based, non-verbal false belief task was adapted from a previous study¹. The task consisted of 12 false belief, 12 memory and 12 inhibition control videos. The false belief videos showed a woman watching as a man placed a green object in one of two boxes. The participants could not see which box contained the green object. The woman then left the room and while she was away, the man swapped the two boxes. The woman then returned and pointed to one of the boxes. In order to locate the green object, the participants had to infer that the woman had a false belief and that the green object was therefore located in the box other than the one indicated. Importantly, the participants did not know the true location of the object until they made this belief inference. Thus, unlike most false belief tasks, participants' attribution of a false belief could not be disrupted by interference from their own knowledge of the correct answer.

The memory control videos were exactly the same, except that the sequence of two events had been reversed, i.e. the woman pointed to one of the boxes before leaving the room. The participants could then infer where the green object was without inferring that the woman had a false belief, but participants needed to update their memory of the object's location after the boxes had been swapped. The inhibition control video showed the same sequence of events as the false belief video but instead of swapping the boxes, the man performed a visible transfer of the green object from one box to the other. In order to locate the green object, participants did not need to infer that the woman had a false belief (they saw where the green object was transferred) but they needed to inhibit pointing to the (wrong) box indicated by the woman. Twenty-four filler-trials were added to minimise the possibility that participants solved the false belief trials by superficial means (e.g. always responding to the box opposite from where the woman pointed).

Executive function tasks

Working memory tasks. In the digit manipulation task, participants were presented with 12 sequences of either 3 or 4 orally presented digits (1-9). The length of the sequence was determined by the participant's basic digit span (if a participant had a digit span of 4 or less, the sequence was 3 digits long; if a participant had a digit span above 4, the sequence was 4 digits long). Participants were then asked to report the digits in ascending order. In the resistance to interference task, participants were presented with 12 similar sequences of digits and asked to recall the digits in the same order as they were presented. However, before recalling the sequence, they were presented with an interference task requiring them, on five consecutive occasions, to name the day that follows a particular day of the week (e.g. What comes after Wednesday?). In the updating task, participants were presented with 12 trials consisting of a sequence of digits of unpredictable length. They were asked to remember the

last digits of the sequence in the same order as they were presented (i.e. the 3 or 4 last digits depending on the span).

Inhibition tasks. In both tasks, a trial consisted of 10 items centrally presented on an A4 sheet (with 8 trials per condition). In the stimulus selection task, the items consisted of one or two hands raising either one or two fingers. Participants were asked to cross out the hands with two fingers raised irrespective of the number of hands presented. For all items in the compatible or baseline condition, the number of fingers raised was the same as the number of hands presented (i.e. two fingers or one finger). For all items in the incompatible or executive condition, the number of fingers raised was different to the number of hands presented (i.e. one finger or two fingers). In the mixed condition, both types of items were presented. This latter condition was not taken into account in the analyses but was aimed to discourage the participants from using strategies such as basing the response on the number of hands instead of the number of fingers. In the response selection task, the items consisted of a hand raising either one or two fingers. Participants were asked to say out loud “one” or “two” depending on the item presented. In the congruent or baseline condition, the participants had to say the number of fingers raised on each hand (if one finger say “one”, if two fingers say “two”). In the incongruent or executive condition, the participants had to say the opposite number of fingers (if one finger say “two”, if two fingers say “one”).

Shifting tasks. Both tasks consisted of three lists of 30 items presented in a central column on an A4 sheet. In the alternation of focus of attention task, each item consisted of a pair of one number (1-9) and one letter (A-Z). With the first list, participants were asked to cross out the numbers. With the second list, they were asked to cross out the letters. And with the third list, they were asked to cross out number and letter stimuli in an alternating way (e.g. first line, crossing out the number, next line, crossing out the letter, next line, crossing out the number etc.). In the alternation of arithmetical operation task, the items consisted of a

column of numbers (2-9). With the first list, participants were asked to add 1 to each number presented. With the second list, they were asked to take away 1 from each number presented. And with the third list, they were asked to add 1 and take away 1 in an alternating way.

Reference

1. Call, J. & Tomasello, M. *Child Dev.* 70, 381-395 (1999).