The Executive Brain Battery (EB)

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1. INTRODUCTION

Executive functions (from now on, EFs) refer to a set of cognitive processes that allow us to control our thoughts, emotions, and actions to adapt to the changing circumstances of the environment in which we find ourselves and to achieve our goals through deliberate reasoning, emotional regulation, and complex social functioning (Miyake et al., 2000; Zelazo, 2020).

Traditionally, the core cognitive components of EFs have been considered to include updating of working memory (WM), set-shifting (or cognitive flexibility), and inhibitory control (including inhibition of a prepotent response and suppression of interference from distractors) (Diamond, 2013; Miyake et al., 2000). However, in recent decades a more holistic model of EFs has grown in prominence, highlighting the importance of regulating emotions and the affective and motivational aspects. This broader conceptualization has important implications for developmental research. For example, it has been found that these other emotional components of EFs could also predict school readiness, academic performance, and social behavior (Poon, 2018). Thus, based on this integrative EF model, we can distinguish between cognitive EFs (*cool* EFs) and socio-emotional EFs (*hot* EFs) (Zelazo & Carlson, 2012; Zimmerman et al., 2016). According to this distinction, *cool* EFs are those cognitive processes previously mentioned by Diamond (2013) and Miyake et al. (2000) that are necessary to solve decontextualized problems and are usually activated without any affective, motivational, or social interaction component.

On the other hand, *hot* EFs involve cognitive processes that are activated in social and affective situations that generate emotion and motivation and the tension between immediate gratification and greater long-term reward (Tsermentseli & Poland, 2016). Although there is still no great consensus on the central components of *hot* EFs, most studies tend to evaluate decision-making in situations of uncertainty or performance on delayed gratification tasks (for example, Peterson & Welsh, 2014; Zelazo & Carlson, 2012; Zimmerman et al., 2016). In addition, Zelazo and Carlson (2012) identified the capacity for affective reversal learning as another *hot* EF. Affective reversal learning is defined as the basic ability of human beings to use their experience and adjust their behavior when there is a shift in the contingencies between stimuli (Boehme et al., 2016;

Contreras et al., 2008). When this occurs, a person may learn that a stimulus that previously predicted the onset of a reward now predicts the onset of punishment or vice versa. Thus, behavioral adjustment is based on balancing stability or exploitation and flexibility or exploration (Boehme et al., 2016). This type of learning is affective because the stimuli are associated with punishments and rewards. Another component that many other authors have included within the *hot* EFs category is the Theory of Mind (ToM) (McDonald, 2013; Tsermentseli & Poland, 2016; Zimmerman et al., 2016). ToM refers to the ability to make inferences about the mental states of others, that is, to put oneself in the place of another and theorize about what they may be thinking, believing, or feeling according to a certain context. This ability allows individuals to understand that the mental states of others affect their behaviors, thus facilitating the ability to respond appropriately and follow our goals (Rostan et al., 2014). Zimmerman et al. (2016) highlight that ToM — among other cognitive processes — allows the individual to engage in appropriate social interactions, share cognitive and affective experiences with other people, and predict the behavior of others to adapt and communicate more effectively and in accord with their objectives (McDonald, 2013; Zimmerman et al., 2016).

One of the problems we find when studying the development of EFs during middle childhood (the period between 6 and 12 years of age) is the wide variety of tasks proposed (for a recent systematic review, see Fernández García et al., 2021), as well as the "impurity" of most of the tasks used to evaluate any given component (Miyake et al., 2000). This problem of the impurity of the evaluation tasks is that most of these tend to simultaneously evaluate several different and partially overlapping cognitive and socio-affective processes (Pereira et al., 2018). Therefore, the results found regarding the development of EFs in middle childhood are somewhat heterogeneous and not very precise. In addition, the batteries proposed to date to assess EFs during this age period are limited by the fact that they only assess *cool* EFs (e.g., Neuropsychological Evaluation of Executive Functions in Children – ENFEN, Portellano, 2009; the Child Neuropsychological Battery – NEPSY-II, Korkman, Kirk, & Kempf, 1998; or the Child Neuropsychological Assessment battery – ENI, Matute, Rosselli, Ardila, & Ostrosky, 2007) or, do not include all the *cool* and *hot* components of the EFs (for example, only

decision-making in a risk situation is evaluated in the Cambridge Neuropsychological Test Automated Battery – CANTAB; Cambridge Cognition, 2006). However, some of these batteries, such as the CANTAB or NEPSY-II, also include tasks that evaluate some aspects of the Theory of Mind but do not highlight these as part of the socio-emotional aspects of the EFs.

Due to these limitations — and following a systematic review of the most widely used tasks to assess *cool* and *hot* EFs during middle childhood (see Fernández García et al., 2021) — a battery of performance tasks has been designed that allows us to evaluate all the executive components based on the theoretical model of EF previously proposed. In particular, importance is given to cognitive as well as social and affective aspects, which is one of the theoretical frameworks that has recently gathered great empirical support (Peterson & Welsh, 2014; Poon, 2018; Zelazo & Carlson, 2012). This battery, called the *Executive Brain* (EB) Battery, comprises 8 computerized tasks that allow us to evaluate both *cool* executive components (inhibition of a prepotent response, suppression of distractor interference, set-shifting and updating of working memory) and the *hot* executive components of delayed gratification, decision-making under uncertainty, affective reversal learning, and theory of mind (see **Table 1**).

Table 1. "Cool" and "hot" components of the EFs and the tasks comprising the EB Battery

Components of “cool” EFs	EB Battery Task
Inhibitory control (inhibition of prepotent or automated responses)	<i>The Zoo Game</i>
Inhibitory control (suppression of interference by distractors)	<i>Catch the frog</i>
Updating of working memory	<i>The colored owls</i>
Set-shifting	<i>Find the way</i>
Components of the “hot” EFs	EB Battery Task
Delay of gratification	<i>Planes and Rewards</i>
Decision making in a situation of uncertainty	<i>The Hungry Donkey</i>

Affective reversal learning	<i>The Mechanic's Game</i>
Theory of mind	<i>Playing with Jack</i>

The *EB Battery* has been designed to evaluate the components of the EFs with minimum verbal content, so that we can control variables such as difficulties in communication and the use of language, which could interfere with children's performance during tasks. Therefore, this battery has been developed for use in populations with hearing impairments or language disorders.

The tasks are presented as a series of games where children must help the main characters of each task to complete a mission. With this way of contextualizing the tasks, the aim is to maintain the motivation and collaboration of the participants throughout the entire evaluation. In addition, to achieve an evaluation context that generates emotion and motivation, a points system has been established in some of the tasks that measure the hot components. Specifically, during the tasks (5) "Planes and Rewards," (6) "The Hungry Donkey," and (7) "The Mechanic's Game," the children will gain a series of points after each trial. The total score obtained on each task is a guideline score but not a representative measure of children's performance. The purpose of these scores is only to encourage greater involvement by children in the tasks.

All the tasks included in the *EB Battery* were designed with the E-prime 3.0 software (Schneider, Eschman, & Zuccolorto, 2002). This software consists of programs that allow for designing computerized behavioral experiments, recording quantitative data with great precision of the execution, and exporting the data in computer packages for subsequent statistical analysis. Regarding the stimulus material used for the design of the tasks, while most of the pictures were extracted from free image databases, the visual stimuli used for the "Playing with Jack" task were developed especially for this battery.

A more detailed description of each of the eight tasks included in the *EB Battery* is provided below.

2. COOL EXECUTIVE FUNCTIONS

2.1. The Zoom Game. We designed an adapted version of the task “The Zoo Game” by Lamm et al. (2012, 2014) to evaluate the ability to inhibit prepotent or automatized responses based on the GO / No GO paradigm. The task was presented in the form of a game where the participants had the mission of helping the monkey “Miguelito” to catch the animals that had escaped from the zoo. To do this, every time an animal appeared in the center of the screen – “GO trials” - they had to press the space bar (as fast and precisely as possible), except when a monkey appeared – “No GO trials.” Animals were presented on the computer screen for 1500 ms (or until the participant responded), and then a blank screen was presented for a variable time interval (250, 500, 750, 1000, 1250, 1500, 1750, and 2000 ms; see **Figure 1**).

Figure 1. Example of a hypothetical sequence of “GO” and “No GO” trials of the “The Zoo Game” task.

This version of the task consists of a block of 12 practice trials and a block of 80 experimental trials in which 75% “GO” and 25% “No GO” trials are randomly presented. The measures that were obtained were: (1) percentage of correct answers or accuracy (ACC) on the “GO trials”; (2) percentage of commission errors or false alarms (FAs) on the “No GO trials,” and; (3) the median response time (RT) on the “GO trials” that is taken as a measure of impulsivity (Barkley, 1991). In addition, from the percentage of

ACC and FA, and applying the Signal Detection Theory (TDS) (Stanislaw & Todorov, 1999), the parameter B'' was also calculated. This parameter B'' informs us of the type of response criterion of the participant, so that if their response criterion is risky then they present a higher tendency to make a commission or false alarm errors on "No GO" trials. Or, on the contrary, a conservative response criterion is indicated by the tendency to make more omission errors on "GO" trials. The parameter B'' can range from -1 (riskier criterion) to +1 (more conservative criterion).

2.2. Catch the frog. The suppression of interference from distractors is evaluated using a modified version of the "The Flanker" task (Traverso et al., 2015, 2018), which is based on the flanking paradigm of Eriksen and Eriksen (1974). During this task, the participants were told that they had to catch the frog that appeared in the center of the screen by pressing the right button of the mouse when it was looking in the right direction or the left button if it was looking to the left (as quickly and accurately as possible). In addition, they had to ignore the other four frogs that appeared around the central frog (2 on each side). These frogs could look to the same side as the central frog – "Congruent trial" – or, towards the opposite direction – "Incongruent trial." On each trial, a fixation point was first presented in the center of the screen for 500 ms on a picture of a lake, followed by the five frogs presented horizontally in the center of the screen for 2000 ms (or until the participant responded). After the participant gave a response, feedback was shown for 500 ms where the frog in the center appeared to be jumping if the answer was correct (see **Figure 2**), whereas if the answer was incorrect, the same illustration as in the first picture of the trial was shown as feedback.

Figure 2. Example of congruent (1) and incongruent (2) trials of the “Catch the frog” task in which the participant gave the correct answer.

For this task, in the four practice trials, as in the 48 randomized experimental trials, 50% were congruent, and the other 50% were incongruent. In addition, the side towards which the central frog pointed was also counterbalanced, pointing to the left on half of the trials and to the right on the other half. The measures considered for this task were: (1) percentage of errors on both the congruent and incongruent trials, as well as (2) median response time on the congruent and incongruent trials.

2.3. The colored owls. This task is an adapted version of the task developed by Robinson and Fuller (2004), based on the n-back paradigm used to assess the ability to update working memory. Unlike the original version (Robinson & Fuller, 2004), the version used in this study only considers a single value of "n," which is equivalent to 2. On this task a sequence of owls of different colors appear in the center of the screen, and on each trial the child is asked to indicate whether the color of the owl matches the color of the owl that appeared two trials earlier. Thus, when the color of the owl on the screen coincided with the color of the owl presented two trials before - "Target trials" - (for example: **blue**, purple, **blue**), the participant had to respond as quickly and precisely as possible by pressing the “1” key. However, on trials where the color did not match -

“No-Target trials” – the participants were asked to press the “2” key (for example: blue, **purple**, blue, **orange**). Therefore, in this task, the participant must always respond, regardless of whether the owl's color is a match. For each trial, the owl picture was first presented in the center of the screen for 1000 ms (or until the participant responded), followed by a blank screen for 3000 ms. Thus, the children had 4000 ms to respond from the appearance of the stimulus on the screen to the beginning of the subsequent trial (see **Figure 3**).

Figure 3. An illustrative example of a Target and No-Target trial sequence and stimulus presentation times.

This version of the task consists of a block of 10 practice trials and two experimental blocks of 24 trials each, where 70% of the trials were "No-Target" and 30% were "Target" trials. The measures that were recorded were: (1) percentage of correct answers (yes response to a "Target" stimulus), as well as the percentage of false alarms (yes responses to a "No-Target" stimulus). And, from these data, we can calculate the value of the parameter A' of the SDT (Stanislaw & Todorov, 1999). This parameter informs us of the degree of detectability or sensitivity with which the participants can discriminate the "Target" trials where the correct answer was to press "yes," compared to the "No-Target" trials where the correct answer was to press "no." This index can range between 0 and 1. When the value of this parameter is above 0.5, we can consider that the subject can discriminate the "Target" from the "No-Target" trials.

2.4. Find the way. To evaluate set-shifting ability, we designed a version of the “Dimensional Change Card Sort” task (Zelazo, 2006). Before starting the task, the participant is told to help the rabbit (or his boat) to find the right path. To do this, when one of the characters appears at the fork of a path (“Target stimulus”), the participant has to click with the mouse on one of the drawings that appear at the end of each path (“Reference stimuli”). The “Target stimulus” can be a rabbit or a boat in blue or red colors. The “Reference stimuli” can coincide with the color or the shape of the “Target stimulus,” but the same “Reference stimulus” cannot coincide in both dimensions at the same time. To choose the correct path on each trial, a “clue” appears in the center of the screen (the word “SHAPE” or “COLOR”) that indicates the dimension according to which the stimulus should be classified. Thus, the participant is presented with the following sequence of events on each trial. First, an 800 ms image of a landscape with two paths where at the end of each path, one of the “Reference stimuli” appears (for example, a blue boat and a red rabbit). Then, a fixation point appears in the center of the screen for 1250 ms, replaced by a box with the words “COLOR” or “SHAPE” for 1000 ms. And finally, the “Target stimulus” appears in its place for 10.000 ms (or until the participant responds; see **Figure 4**).

Figure 4. The trial sequence in which the participant has to classify the stimulus according to the color dimension.

This task consists of two practice blocks of 4 trials each (one for each criterion), two simple experimental blocks of 5 trials each (one for color and one for shape), and a mixed block of 30 trials on which 80 % of the trials the participants must classify the "Target stimulus" according to one dimension and on the other 20% they have to classify it according to the other dimension. Therefore, within this mixed block, 23 trials are presented pseudo-randomly where there is no change in the relevant dimension ("Switching trials"), and on six trials the participants must switch from one dimension to the other ("No-Switching trials"). In the two practice blocks and the two simple experimental blocks, if the child fails to reach a correct response criterion (3/4 for the practice blocks and 4/5 for the simple blocks), such a block is repeated three times. If the established criteria are not reached, the task is finished. In addition, the transition between the practice blocks and the two simple blocks is explicitly indicated by a broken screen where the classification criteria to be followed by the child for each trial block are specified. In addition, to avoid a possible effect of the order of presenting the classification dimensions, two versions of this same task were created where the order in which the dimensions appeared was counterbalanced. The measures that were recorded on this task were: (1) the percentage of errors and (2) the median response time in the two experimental simple blocks and the mixed block for "Switching trials."

3. HOT EXECUTIVE FUNCTIONS

3.1. The Hungry Donkey. Decision-making in uncertain situations was evaluated through a version of the "The Hungry Donkey" task developed by Crone et al. (2005). This task consists of an adapted version of the "Iowa Gambling Task" – IGT – (Bechara et al., 1994). In this task, the child is told to help the hungry donkey get as many apples (or points) as possible. To do this, on each trial, they must open one of the identical doors shown on the screen (A, B, C, D) by pressing the C, V, B, and N keys, respectively. Therefore, on each trial, the sequence of events shown is the following: first, the four identical doors (A, B, C, D) appear horizontally in the upper half of the screen until the participant presses any of the response keys. After responding, the number of apples won and lost, and the total number of accumulated apples are displayed. In addition, a horizontal

green and red bar are displayed at the bottom of the screen to indicate the average number of apples that had been won (green color) and the amount lost (red color) as the game progressed. This last screen was shown until the participant pressed the space bar on the keyboard, starting the next trial (see **Figure 5**).

Figure 5. Example of a trial on which the participant chose door A, thus receiving a reward of 4 apples, but a loss of 8 apples.

Unlike the original version designed by Crone et al. (2005), in this task, the total number of trials was reduced to 100, as in the original task by Bechara et al. (1994). And participants started with 0 points instead of \$ 2,000, as in Bechara et al. (1994).

Otherwise, this task uses the same principle as the IGT regarding rewards and punishments. The selection of door A or B results in a gain of 4 blocks after each choice, while door C or D results in a gain of 2 blocks for each trial. However, choosing doors A and B during the task implies a negative total net score at the end of the task; these doors are considered *disadvantageous*. The main difference between them was that for door A the losses are more frequent, but of a lower magnitude (8, 10, 10, 10, or 12 losses every ten trials); while for door B, the loss is less frequent but higher (a single loss of 50 apples every ten trials). In contrast, the choice of doors C or D is associated with a positive total net score at the end of the task. These doors are thus considered *advantageous*. Both doors are equivalent in terms of overall net loss. However, door C is associated with more frequent but smaller losses (1, 2, 2, 2, or 3 losses every ten trials)

than door D, which is followed by less frequent losses of a higher magnitude (loss of 10 apples on a single trial every ten trials). Therefore, in this task, both the final net gain or loss in the task are manipulated if doors A and B (losses) or doors C and D (gains) are chosen, while the frequency of losses increase for doors A and C, and decline for doors B and D. As is conventional in analyses of IGT performance (Bechara, Tranel, & Damasio, 2000), the measure recorded for this task is the difference between the number of advantageous choices and the number of disadvantageous choices (Net Score), in the five blocks of 20 trials into which the task was divided. This allows us to observe whether the participants' decision-making evolves throughout the task.

3.2. Planes and Rewards. This is an adaptation of the task developed by Scheres et al. (2006, 2014), based on the delay discounting paradigm designed to assess the ability to delay gratification. In this task, the participant is instructed to get as many points as possible throughout the game. At the beginning of the task, the participant starts with 0 coins (or points), and they have a total of 20 trials to earn as many points as possible. To do this, on each trial the participant must choose between an airplane that represents a small and variable reward (2, 4, 6, or 8 coins) that is delivered immediately; and another plane that represents a fixed higher reward (10 coins) but delivered after a variable waiting time (5000, 10,000, 20,000, 30,000 or 60,000 ms). The airplane's height implicitly indicates the waiting time required for each delayed reward. Therefore, on each trial the participant must choose between a small but immediate reward in by pressing the "I" button or a larger, delayed reward by pressing the "D" button.

The sequence of events shown to the participant on each trial is as follows: first, the two planes (immediate and delayed) are shown on the computer screen until the participant presses one of the response keys. Then, depending on the response, if the participant chooses the delayed plane, a blank screen is displayed during the waiting time corresponding to that trial. If the participant chooses the immediate plane (or after the delay time associated with the delayed plane), a screen is displayed with the number of coins won on that trial, the total coins accumulated, and the number of trials the participant has remaining (see **Figure 6**).

Figure 6. Example of a time delay discount trial. On this trial participants have to choose between 6 euros immediately or 10 euros after a delay of 60000 milliseconds.

In the original task by Scheres et al. (2006), each delay level (5,000, 10,000, 20,000, 30,000, or 60,000 ms) was paired twice with the different reward amounts (2, 4, 6, or 8 coins). However, in this version of the task, we only matched them once, resulting in a total of 20 experimental trials that were administered to all participants in the same pseudo-random order. Moreover, the left or right positions in which the immediate and delayed rewards appeared on the computer screen were counterbalanced. As a first step, the measure recorded for this task was the subjective value of the delayed reward as a function of waiting time. The subjective value of the delayed reward was defined as the magnitude of the small immediate reward for which the participant showed indifference in a choice against the large, delayed reward. Thus, subjective values were calculated for the delayed reward (10 coins) for each delay (5,000, 10,000, 20,000, 30,000, or 60,000 ms). For example, with an immediate reward of 8 coins and a delayed reward of 10 coins that has the longest waiting time (60,000 ms), if the participant prefers the immediate reward, it means that the ten coins have lost their value, and for this participant the subjective value of the reward is eight coins.

3.3. The Mechanic's Game. To evaluate affective reversal learning, we designed an adapted version of the "Probabilistic Reversal Learning Task" (D'Cruz et al., 2013), based on the probabilistic reversal learning paradigm (PRL). The task is presented within

a context where the participant is shown two identical pictures on a computer screen. Before starting the task, the participant is informed that they will start the game with zero coins and that the aim is to help the mechanic gain as many coins as he can, avoiding choosing the picture that makes him lose coins. To do this, the participant will have to "click" with the mouse on the "correct" picture — the one that provides the most coins. Thus, on each trial, the following sequence of events is displayed on the computer screen. First, two identical stimuli appear in the upper left corner of the screen and the other in the lower center for 4000 ms or until the participant responds by clicking with the computer mouse on any of them. Feedback is provided immediately after for 900 ms. If the participant selects the stimulus considered "correct," the screen shows a coin and the message "+10", along with an arrow indicating that it would be inserted into a money bag located in the lower right corner of the screen to reflect the number of points accumulated. On the other hand, if the selected stimulus is "incorrect," the message "-10" appears in the center of the screen and is subtracted from the amount shown on the bag. If the participant does not respond after 4000 ms, the word "CHOOSE" is presented in the center of the screen, and the participant loses 10 points as this would be considered an incorrect answer (see **Figure 7**).

Figure 7. Acquisition and reversal phases of the affective reversal learning task.

The task consists of a practice block and an experimental block. Within each block, there are two phases: (1) in the *discrimination phase*, the participants have to learn which of the two pictures is followed by a reward, that is, the one considered as the "correct" picture. When the participants achieve a certain number of correct responses (which varies according to the block) out of every ten consecutive trials, the (2) *reversal phase* takes place in which the stimulus considered as "correct" is now the picture situated in the other location. The number of correct responses that the participants are required to give in each block varies. Thus, nine correct responses are needed within ten consecutive trials in the practice block while eight correct responses are needed in the experimental block. Another main difference between the practice block and the experimental block is the proportion of rewards and punishments. In the practice block, choosing the "correct" picture is followed by positive feedback on 100% of the trials and choosing the "wrong" picture is followed by negative feedback on 100% of the trials. However, in the experimental block, only 80% of the correct answers are followed by a reward. Thus, even if the participant responds correctly on the remaining 20% of trials, they are shown negative feedback. Therefore, in this task, the proportion of correct trials followed by rewards and punishments (100: 0, 0: 100, 80:20, or 20:80) varies, along with the location of the correct image on the computer screen.

For this task, three types of measures (or errors) that occur in the *reversal phase of the experimental block* were recorded: (1) Perseverance errors that occur when, although the reversal of contingencies occurs and the "correct" response becomes the other picture, the participant continues to choose the answer that was "correct" before. (2) Regression errors that occur when, after having chosen the new "correct" picture, the participants once again choose the picture that is now "incorrect." and (3) Switching errors, which occur when negative feedback is provided despite having selected the "correct" picture, and on the next trial, they choose the other "wrong" picture.

3.4. Playing with Jack. To assess the theory of mind, we adapted the "Jack and Jill Task" by Dennis et al. (2012). This task allows us to specifically evaluate the ability to understand false beliefs of the first order, following the "change of location" paradigm (see Fernández García et al., 2021). In this task, Jack and María appear to play with a blue and a red glass. On each trial, Jack will hide a ball in one of the two glasses,

sometimes in front of Maria and sometimes without her. Thus, there are four types of trials depending on whether Jack changes the ball from the glass ("Change or Non-change trials") and if Maria is present when he changes the ball ("Witness or Non-witness trials"). Only the "Change without witness" trials are regarded as a good measure of understanding false beliefs (called "ToM trials"), since these require the participant to understand the belief that Maria holds, that is, the location of the ball will be erroneous because she has not seen how the ball was moved.

Therefore, for each trial, a sequence of 3 images is shown on the computer screen: (A) Jack is shown hiding a ball in a blue or red glass for 2000 ms, an event witnessed by Maria; (B) For 2000 ms, Jack is seen dropping the ball, either into the same glass in Image A or into the other glass. This scene may or may not have been witnessed by Maria; and (C) An image is shown for 3000 ms (or until the participant responds) in which Maria is "thinking" about one of the two glasses. In this sequence, the children must put themselves in Maria's place and decide whether they think she believes that the ball is in the glass shown on the screen (by pressing button 1), or if they do not agree (by pressing button 2). Responses that occur before 100 ms are considered "out of time" responses and were excluded from further analysis (see **Figure 8**).

1. TRIAL OF CHANGE WITHOUT WITNESS (FALSE BELIEF TRIAL)

2. TRIAL OF CHANGE WITH WITNESS (TRUE BELIEF TRIAL)

3. TRIAL WITHOUT CHANGE AND WITNESS (TRUE BELIEF TRIAL)

4. TRIAL WITHOUT CHANGE, BUT WITH WITNESS (TRUE BELIEF TRIAL)

Figure 8. An example of the images of Jack and Maria for the four types of trials. In all these examples, the correct answer was "yes."

This task consists of a practice block of 4 trials of each type and an experimental block of 16 randomized trials (4 of each type); instead of 32 trials as in the original version developed by Dennis et al. (2012). And the specific measure that was considered in this task was the percentage of hits on the “Change without witness” (ToM) trials.

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