# THE EFFECT OF GROUP MEMBERSHIP ON SOCIAL BEHAVIOR IN YOUNG CHILDREN

by

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## LIST OF ABBREVIATIONS

| Abbreviation | Description |
|---|---|
| ToM | Theory of Mind |
| EF | Executive Function |
| IQ | Intelligence Quotient |
| VIQ | Verbal Intelligence |
| NVIQ | Non-Verbal Intelligence |

## ABSTRACT

The ability to deceive others is an early-emerging and socially-complex skill which has been consistently linked to other social outcomes, including theory of mind (i.e., understanding thoughts and emotions of others). This study used a minimal group paradigm to examine children's willingness to deceive in-group versus out-group members across varied contexts (e.g., lying for personal gain; lying to spite). Forty-one children (24 males) aged 4-7 (*M*=6.1y, *SD*=1.2y) played a puppet in three versions of a sticker-hiding game: Self-Benefit condition (child could lie for personal gain), Other-Benefit condition (child could lie to give another puppet a sticker), and No-Benefit condition (child could lie to spite in-group or out-group members). Children additionally completed a battery of theory of mind tasks and a measure of verbal and non-verbal IQ. Our results indicated that children lied the most in the Self-Benefit condition and lied equally to in-group and out-group members in this condition. However, when the potential for self-gain disappeared, in-group bias emerged. In the Other-Benefit condition and in the No-Benefit condition, children engaged in more lie-telling to out-group members. Results suggest that lying behavior is sensitive to group membership only in certain social situations. Specifically, young children are able to flexibly apply a complex social skill (i.e., deception) based on group membership and task demands. Further, children's desire to benefit themselves appears to trump in-group bias. Future research should examine alternate situations, such as lying to avoid punishment, to determine whether the context of the lie has a stronger effect on children, or if group membership

overrides the desire to benefit oneself. Children's understanding of lying and group membership has implications for education and intergroup relations throughout development.

# I. INTRODUCTION

Humans are social creatures and are motivated to engage in social interactions. Thinking about others—or social cognition—underpins our social behavior, and understanding the development of social cognition has important implications for pediatrics and education. Although social cognition and social behavior are multifaceted, one particularly important manifestation of children's developing social skills is the ability to deceive. Lying entails awareness of a social partner's mental state and consideration of one's own social goals. Because of this, understanding the skills that cause lying to develop is important. Recent research has indicated that different types of lying may show different developmental trajectories; however, we do not know how these types of lies are affected by social context and other social-cognitive abilities. Thus, broadly, the goal of the current project was to better understand how differences in children's deceptive skill relate to other social abilities.

## Deception

Developmental psychologists have extensively studied lie-telling behavior, finding that this behavior emerges very early in development. In an established paradigm, researchers asked children to resist the temptation to peek at something they were told not to look at. Results indicated that over half of these children peeked at the item when the experimenter was out of the room and then proceeded to lie about whether they transgressed or not (Evans & Lee, 2013; Talwar et al., 2007). These results are also consistent with additional studies, using the same methodology, suggesting that the majority of children between the ages of 3 and 5 years old peeked in these types of paradigms and denied having done so (Polak & Harris, 1999). As children get older, the

complexity of lies in order to conceal disobedience increases (Talwar, Gordon, & Lee, 2007; Evans, Xu, & Lee, 2011). Evans, Xu, and Lee (2011) found that children are not only capable of telling lies around 4- to 5- years of age, but also that they can ensure that these lies are consistent with available physical evidence (Evans et al., 2011). For example, a child may steal desserts from the kitchen and leave the cookie box open. When they are asked if they did this, they may deny having stolen the cookies and blame it on their other sibling. The child knows that it is important to create a plausible explanation for the physical evidence that the cookies had been eaten.

The general ability to deceive, even outside of contexts in which children conceal disobedience, becomes more complex as children develop (Chandler, Fritz, & Hala, 1989; for review see Lee, 2013). During middle childhood, children develop a better understanding of the different types of lying and begin to care more about whether the lie is for someone else's benefit, or for their own benefit (Cheung, Siu, & Chen, 2015). These milestones involved in children's deception can be marked by the development of the child's ability to understand others' mental states (known as *theory of mind*), discussed in the following section.

## Role of Theory of Mind in Deception

Although many social components play into a child's ability to lie, extensive research has shown that a child's theory of mind (ToM) ability can predict a child's ability to deceive (Chandler, Fritz, & Hala, 1989; Talwar & Lee, 2008). ToM involves understanding or inferring the thoughts and mental states of someone other than yourself (Premack & Woodruff, 1978). A canonical task used to assess ToM understanding in children is the false belief task. These tasks ordinarily ask children to predict the thoughts

of others, who are not aware of critical events or pieces of information (Peterson, Wellman, & Liu, 2005; Wellman, Cross, & Watson, 2001; Wellman & Liu, 2004). For example, a researcher might show a child a crayon box and ask the child what they think is in the box. The researcher would then reveal that the box had unexpected contents, such as crackers. Then the researcher would introduce a doll that did not watch the emptying of the box and ask the child what this doll would think is in the box. If the children have a developed ToM and are able to understand the doll's thoughts, they should report that since she was not here to see what was really inside the box, she should think that crayons are inside of it, not crackers. If, on the other hand, children are projecting their own thoughts onto the doll, they would answer that the doll would know the box has crackers. Thus, the false belief task has long been considered a canonical measure of whether children are able to simulate the mental states of others, which, in principle, should be an important foundation of the ability to deceive (i.e., change another's mental state via lying).

To test this relation between ToM and understanding of lies, a study examined children between the ages of 3- and 8-years old (Talwar & Lee, 2008). Results suggested that initial denials (e.g., the ability to produce a false statement in order to deceive someone) were related to a child's first-order belief ToM understanding, or understanding that others can have beliefs different from the child's own and from reality (e.g., the child is aware of what their friend thinks). Additionally, children's ability to maintain these lies were related to their second-order belief ToM understanding, or understanding that other people also have a theory of mind (e.g., the child is aware of what the teacher thinks about their friend's thoughts; Talwar, & Lee, 2008). Although this study was

correlational, another study experimentally investigated the relation between ToM and the emergence of lying (Ding, Wellman, Wang, Fu, & Lee, 2015). Children (3-year-olds) participated in a false belief ToM training. These children, who initially did not lie, began to lie consistently after this training ended (Ding et al., 2015). Thus, ToM appears to be a necessary component of deception.

As typical children (i.e., children who are not receiving special services or children who have not been diagnosed with a developmental issue) develop, ToM also becomes more sophisticated, corresponding with increases in deceptive ability. In middle childhood (ages 7-11), a child's second-order belief understanding was correlated with how sensitive they were to the lie that was told (Cheung et al., 2015). These findings suggest that ToM plays a large role in a child's ability to deceive others.

There are several explanations linking ToM and lying. When engaging in social interactions, we are constantly determining the most appropriate response. In these social interactions, the speaker has to decide if it is suitable to tell the truth, or to tell a lie (Lee, 2013). If the speaker decides to tell a lie, they must then determine what type of lie is the most appropriate (Lee, 2013). All of these decisions require ToM understanding because the speaker must be able to recognize the mental states of others.

One limitation of these findings, however, is that most of the recent research on deception focuses on the child's ability to understand false beliefs (e.g., the ability to generate ideas about what another person is thinking or feelings) (Williams, et al., 2016), in spite of mounting evidence that ToM is a complex and multifaceted ability including skills such as understanding sarcasm and processing mental states from facial expressions (Schaafsma et al., 2015). Given evidence that ToM is multifaceted, mapping the links

between various ToM measures and deceptive ability will help illuminate *how* ToM supports deception. That is, if this lying behavior is related to false belief tasks alone, then it would seem that the cognitive capacity to explicitly represent another's belief is the most important skill. If, on the other hand, ToM tasks involving understanding or reading emotions also predict lying, it would suggest that emotion understanding was an important component of successful lies.

Along with ToM, executive functioning (EF) has also been shown to play a role in children's lie-telling. To date, only two studies have examined the relationship between EF and lie-telling in children between 2 and 4 years of age (Evans & Lee, 2013; Williams et al., 2017). Overall across studies, between 29% and 40% of children denied peeking at a forbidden toy, which is a significantly lower rate of lie-telling behavior than is found in older children (aged 4 and above; e.g., Evans & Lee, 2011; Talwar & Lee, 2002, 2008). Furthermore, in Evans and Lee's (2013) research, a measure of working memory, in combination with inhibitory control (i.e., Shape Stroop), predicted lie-telling, while Williams et al. (2017) found that inhibitory control alone had an independent effect in young children's lie-telling behaviors.

## Group Bias & Social Cognition

As seen from research mentioned above, it is apparent that children's social skills are advancing as they develop. In addition to the emergence of lying, more recent work has suggested that group membership may also influence children's social behaviors. Children show in-group bias in a variety of social situations, including in-group bias induced by minimal group membership (i.e., simply being a member of an arbitrarily assigned group, such as being on the yellow or green team; Dunham et al., 2011). Moore

(2009) found that resource allocation was greatly affected by the recipient that the child was giving it to. Specifically, children preferred to distribute more resources to their friends, as opposed to strangers (Moore, 2009). Consistent with these results, Olson and Spelke (2008) found that 3.5-year-old children allocated more resources to a puppet friend compared to a nonfriend puppet.

Additionally, group bias increases in early childhood. For example, researchers found that when children could delegate stickers to either themselves, or to an ingroup or out-group member, 3- to 4-year olds did not treat in-group and out-group members differently (the children were labeled as "selfish" and kept the stickers for themselves; Yu, Zhu & Leslie, 2016). However, by the time these children were 5- to 6- years old, they began to show strong in-group favoritism (delegating more stickers to ingroup members when compared to out-group members; Yu, Zhu & Leslie, 2016).

There is some preliminary evidence that behaviors related to theory of mind and deception might also be influenced by group membership. For example, only children (3- to 6-years old) who failed false belief tasks calculated that it was acceptable to give unequal supplies to an out-group (Mulvey et al., 2016). Additionally, children use more mental-state words (i.e., she thought, he wondered, they were worried, etc.) when describing in-group members than out-group members (McLoughlin & Over, 2017; McClung & Reicher, 2017). Similarly, children were significantly less likely to tell secrets of those in the same group as them as opposed to out-group members (Misch et al., 2016). Hayashi and colleagues (2015) also found that 5- and 6- year olds' deception was affected by group membership; children told the truth to a friend puppet in a conflict situation but chose to give false information to the puppet that was labeled as their

enemy.

In spite of some links between ToM and the extent and manifestation of in-group bias, very little work has been dedicated to how these factors may interplay with the willingness to deceive. Thus, examining the interactions between types of deception, group membership biases, and theory of mind will offer important insight into children's social cognitive development.

## The Current Study

Research has been working to identify the links between how each of these cognitive skills influence lie-telling behavior as children develop. Although evidence for each of these constructs exists separately, this study was designed to help understand how more broad ToM measures relate to deception, how in-group bias relates to deception, and how ToM might moderate the links between group bias and deception (cf. Misch, Over & Carpenter, 2016). Determining the underlying structure of these components will yield a greater understanding of typically developing children's social behaviors.

We hypothesized that, in typical developing children (ages 4-7 years old), after controlling for executive function and IQ scores, (1) Lying would increase with age; (2) ToM would positively relate to lying; (3) there would be an interaction between group membership and type of lying, and (4) Children with higher ToM would show more selective lying based on group membership than children with lower ToM.

## II. METHOD

### Participants

Forty-one children (M= 6.1 years, SD= 1.2 years; 24 males) aged 4-7 were recruited for this study and in return were able to choose a toy (monetary value of approximately $5) from our prize box and the parent or guardian received $20 for the completion of the study. Experimenters were also made aware that one child was diagnosed with autism after the child had participated in the study. Because our study is focused on typically developing children, the child's data was excluded in subsequent analyses. After running the first ten typically-developing participants, we decided to add in additional conditions to our deception paradigm in which the child did not directly benefit from the lie, due to some ceiling effects on the deception task (60% of the sample lied on all trials of the lying task where they could directly benefit and all but one child lied on a majority of the trials). Thus, 30 participants (M= 5.9 years, SD= 1.2 years; 17 males) completed the entire battery of tasks for the study and were included in final analyses, although we note in our results section when we considered the full sample (n=40). Children were eligible if they were native English speakers, born full-term, had normal or corrected-to-normal hearing and vision, and had no first-degree relatives (e.g., a parent) with autism or schizophrenia.

### Procedure

An assent form was given to children that were aged 7 or older, as is consistent with the 1978 recommendations from the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. For children that were younger than 7, the study was explained to them in a kid-friendly manner to ensure that they

understood what they would be participating in. For all children, consent from the parent or a legal guardian was obtained.

Once consent and assent were completed, the children were taken to a quiet room in our laboratory to complete the study, which lasted about an hour and 30 minutes.

**Team allocation and comprehension.** First, children were randomly assigned to either a yellow or green team (yellow team= 20 children; green team= 21 children). This team association was displayed by using scarves for both the child and the puppets involved in this task, a procedure which is commonly used in developmental research (Baron & Dunham, 2015; Dunham, et al., 2015; McAuliffe & Dunham, 2017; Renno & Shutts, 2015).

Following this allocation, as a means of increasing the children's idea that their group shared experiences and preferences, children were shown a PowerPoint presentation on a lab computer that began with three pieces of playground equipment (i.e., a slide, a see-saw, and a swing). The child was asked which of these were their favorite toy. Once they answered, they were told that "people on the green/yellow team (the child's in-group, depending on what team the child was on) love that toy too". This same process was repeated for the children's preference for sports' balls (i.e., a baseball, a basketball, and a soccer ball; Watson-Jones, Whitehouse & Legare, 2016).

On the last slide, the child was presented with two zebras, in which one zebra was wearing a green scarf and the other was wearing a yellow scarf. The child was asked who they would rather play with, who they thought was nicer, and who they thought liked the same things that they liked and why they thought this. All but three children said that they would rather play with their in-group zebra (i.e., the zebra wearing the

same color scarf as their own). Further, the three children who did not choose to play with their in-group puppet were all four years of age. We repeated all analyses involving group membership excluding these children and it did not significantly change our results; therefore, we included them in later analyses and results.

**Deception paradigm.** In the deception paradigm, children had the opportunity to deceive a puppet about the location of a sticker. These puppets were also either wearing a green or yellow scarf to identify if they were on the same team as the child. Children played three different deception games: 1) Self-Benefit, 2) Other-Benefit and 3) No-Benefit. Each game was played with both in-group and out-group puppets.

In the Self-Benefit condition, children were presented with 2 cups and were given a sticker and asked to hide it inside one of the two cups. The cups had construction paper on one side and transparent plastic on the other. Thus, when the cups were placed in a row between the child and the puppet, the puppet was unable to see where the child hid the sticker; however, the child was able to see where the sticker was located without having to use working memory to remember where they put it (Yi & Lee, 2014). The puppet then asked the child, "Which cup is the sticker in?". The experimenter explained that the puppet would only look in the cup that the child pointed to, and that, if the puppet found the stickers, the puppet received the sticker. In contrast to this, if the puppet did not find the sticker, the child would get the sticker. Thus, a lie would result in the child keeping the sticker and the truth would result in the puppet keeping the sticker. This same process was repeated for the puppet wearing the alternate color scarf than in the first section.

In the Other-Benefit condition, the set-up of the game remained the same as in the

previous condition except that now both the in-group and out-group puppets were playing the hide-and-seek game simultaneously. The child was handed a sticker, like before, and was asked to hide it in one of the cups while the puppets were not watching. Once the child completed this, both of the puppets turned around and the puppet wearing the same scarf as the child (in-group) asked "Which cup is the sticker in?". The experimenter explained that if the puppet found the sticker, that puppet (in-group) received the sticker. In contrast to this, if the puppet did not find the sticker, then the other puppet (out-group) would get the sticker. This same process was repeated for the puppet wearing the alternate color scarf. If this out-group puppet found the sticker, they got to keep it; however, if they did not find it, the in-group puppet received the sticker. Thus, a lie to the in-group puppet would result in the out-group puppet getting a sticker and vice versa when lying to an out-group puppet.

In the No-Benefit condition, the set-up of the game remained the same except that each puppet (in-group and out-group) were playing with the child separately. The child hid the sticker in one of the cups and then the puppet turned around and asked the child "Which cup is the sticker in?". The experimenter explained that if the puppet found the stickers, the puppet would get to keep the sticker, but if the puppet did not find the sticker, then the sticker would go back in the experimenter's box and no one would get to keep the sticker. Thus, a lie would result in no one getting a sticker and the truth would result in the puppet getting a sticker. Once the first puppet played the game with the child, the puppet wearing the alternate color scarf then played the game.

To ensure the ability to compare results across individual children, in each of the conditions, the in-group puppet (i.e., a puppet wearing the same color scarf as the child)

always played with the child first. Subsequently, the out-group puppet (i.e., a puppet wearing a different color scarf than the child) always went second. Each child completed five trials of each game (Self-Benefit, Other-Benefit, and No-Benefit) with each puppet (in-group, out-group), for 30 total trials.

**Theory of mind battery.** Children then completed the ToM battery. This battery consisted of multiple tasks and was designed to assess ToM understanding in children (Anderson, Rice, Chrabaszcz & Redcay, 2015; Wellman & Liu, 2004). This battery included four measures: Reading the Mind in the Eyes (Baron-Cohen, Wheelwright, Scahill, Lawson & Spong, 2001), Appearance-Reality Emotion (Harris & Gross, 1988), canonical first- and second-order false belief tasks, and the Restricted View task (Lalonde & Chandler, 2002). Each of these tasks measure theory of mind because it requires the child to understand that others can have thoughts and beliefs different from their own and from reality.

Children completed the preschool version of the Reading the Mind in the Eyes test (Peterson & Slaughter, 2009) which was composed of 9 gray-scale photos of people that had been cropped so that only the eye area was visible to the child (Baron-Cohen, et al., 2001). Each photo was labelled with two emotions (i.e., serious or joking) which the experimenter read aloud before asking the child to select the word that best described how the person in the picture was feeling. If the child's response was correct, they received a 1; resulting in a final possible score of 0-9. These responses were then turned into percentages for later analyses.

For the Appearance-Reality Emotion portion of the ToM battery, each child listened to 5 stories. Before the children listened to the stories, the experimenter

confirmed that children understood different circumstances when the main character could feel happy, sad or okay. In each of the test stories, a situation was described where the main character felt a certain way, but had to hide her emotional state (e.g., she had a tummy ache and if her mother knew she had a tummy ache, she would not let her play outside; Harris & Gross, 1988). After the child listened to the story, the experimenter asked two important questions: how the main character really felt in the story, and how the main character tried to look in the story (Harris & Gross, 1988). Children received credit for each story if the difference between the felt and displayed emotion was in the right direction (i.e., the girl felt sad because she had a stomach ache, but she knew that she needed to display the emotion of being okay or happy so that her mom would let her play outside). Children could receive a possible total score of 0-5 that was used for later analysis.

Next, children watched four videos (that were created by the experimenters using wooden dolls) to assess their first order- (i.e., "Where will Sam look for the pencils?") and second order false belief understanding (i.e., "Where will Peter think that Sarah will look for her apple?"). In the first-order false belief tasks, children watched two videos where an item was moved from the original location while the main character was out of the room. Children were asked where they thought the main character would look for the item when they returned (i.e., Where will Sam look for the pencils?). If the child understood that main character would look in the last place that they left the item, they received 1 point; as this was the correct answer (Sabbagh, et al., 2009). The second-order false belief task was similar to the first-order false belief task except that a third character watched the second character move an item while the main character was out of the

room. After the video, children were asked to anticipate where they thought the third character would think the main character would look for the item (i.e., Where will Peter think that Sarah will look for her apple?). If the child understood that third character should predict that the main character would look in the last place that they left the item, they received 1 point. Two videos were shown to children for each of the tasks; resulting in a possible final score of 0-2 on both the first-order and second-order false belief tasks, which were combined into a composite score of 0-4.

Lastly, in the Restricted View task, children were shown a picture (e.g., of a cow) and were asked to describe what it depicted. Once the child answered what the picture was, the experimenter then flipped over a "cover" which consisted of a black sheet of paper with a section of the paper removed so that it only revealed a portion of the picture (e.g., just the back of the cow, which was not identifiable as part of a cow; Lalonde & Chandler, 2002). The experimenter then asked the child what they thought a doll, who had never seen this picture before, would think that it was. Children could receive 0-1 points for this answer, receiving zero points for answering with the full image (e.g., cow), 0.5 points for giving a 'contaminated' answer (e.g., cow's back), and one point for giving an answer uninfluenced by the full picture (e.g., globe). This process was repeated for a second doll, for which the child could also score 0-1 points. Finally, children could score an additional point for giving two different answers for the two different dolls (e.g., a globe and a cookie). Thus, children could score up to three points for each picture. Children saw two pictures, resulting in a range of 0-6 points for the entire task. Each of these ToM scores were converted into percentages of accuracy for later analyses.

**Executive functioning.** Next, we included an executive function measure because

children's executive functioning (EF) abilities facilitate deceptive behaviors (Evans & Lee, 2011; Talwar & Lee, 2008). Executive functioning (specifically inhibitory control) was also found to be strongly correlated to a child's ToM (Carlson & Moses, 2001). To measure inhibitory control, children completed the Dimensional Change Card Sort task (DCCS). In this task, children were asked to sort a series of test cards in one dimension (e.g., color) and then again in the alternate dimension (e.g., shape) (Zelazo, 2006). If the children got enough correct in these dimensions, they then proceeded to the border version of the task in which the sorting rule (color or shape) changed based on whether the card had a border. Children's answers were assigned 1 point if they passed ( > 5 of 6 correct) the pre-switch phase (i.e., sorting the first dimension correctly) but failed the post-switch phase, 2 points if they passed both the pre-and post-switch phase but failed the border version of the task, and 3 points if they passed both the standard version of the task (the pre- and post-switch phases) and they passed the border version of the task. Thus, children's total scores could range from 0-3.

**Intelligence quotient.** Lastly, children completed the Kaufman Brief Intelligence Test (KBIT-2) to assess both verbal and non-verbal intelligence (Kaufman & Kaufman, 2004). The first verbal subsection, Verbal Knowledge, contained 60 questions that required children to point to the picture that best matched the word or phrase that the experimenter said (i.e., "Point to the clock") In the second verbal subsection, Riddles, the experimenter said a phrase in the form of a riddle (i.e., "What hops, eats carrots, and has long ears?"), and the child was instructed to answer with a one-word response. The non-verbal portion, Matrices, contained 46 questions that assess pattern matching and pattern completion. The assessment thus resulted in a Verbal IQ, a Nonverbal IQ and IQ

Composite score. Our analyses controlled for IQ, which is important given the links between ToM and verbal ability.

## III. RESULTS

### Descriptive Statistics

Both the theory of mind and deception tasks produced large individual differences (Table 1). We examined relations between ToM tasks, controlling for verbal intelligence and age, and found no significant correlations either in the sample that completed all three lying tasks (n=30) or the sample that completed the Self-Benefit deception task only (n=40). Thus, we examined all four ToM tasks (Mind in the Eyes, Appearance-Reality Emotion, False Belief Composite, Restricted View) separately in later analyses. The Dimensional Change Card Sort task (measuring executive function) on the other hand, did not produce as much variation as other tasks in these children. About 50 percent of children passed the border version of the task, and 50 percent did not. Children who passed the border test were on average a year older than those who did not ($p<.001$), but did not significantly differ on our dependent measures of theory of mind and deception and we thus did not include EF in our analyses. Finally, since gender did not have any significant effects on deceptive behaviors, results for both genders were combined for all subsequent analyses.

**Table 1**. Individual differences in theory of mind and deception tasks.

| | Mean | Standard Deviation |
|---|---|---|
| **Theory of Mind Tasks** | | |
| Appearance Reality Emotion | 54% | 38.8% |
| Mind in the Eyes | 73% | 19% |
| Restricted View | 58.2% | 28.3% |
| False Belief Composite | 77.5% | 32% |
| **Deception Tasks** | | |
| Self-Benefit In-Group | 3.83 | 1.45 |
| Self-Benefit Out-Group | 3.75 | 1.46 |
| Other-Benefit In-Group | 1.34 | 1.12 |
| Other-Benefit Out-Group | 2.83 | 1.6 |
| No-Benefit In-Group | 1.23 | 1.19 |
| No-Benefit Out-Group | 2.45 | 1.84 |

Note: Only n=30 children completed the additional deception tasks (Other-Benefit and No-Benefit conditions) as they were added in after the initial 10 children had completed the study. Mean number of lies is based on children's rate of lying out of five opportunities in each condition (e.g., five chances to lie to an in-group member for self-benefit).

## Deceptive Behavior and Age

We first examined the relations between age and lying. We began with the full sample (n=40) who completed the Self-Benefit lying task (excluding the child that was diagnosed with autism) and collapsed across lies to in-group and out-group members. Given that the number of lies was not normally distributed, we used Spearman's rank order correlation and found no significant relationship between children's age and number of lies they told (rho=.091, $p$= .576).

We next examined relations for the smaller group (n=30) of children who completed all lying tasks. Again, we found that for this smaller group of children that the number of Self-Benefit lies was not related to age (rho=.029, $p$=.879), but the number of lies across the other two conditions was (rho=.389, $p$=.034; Table 2). Interestingly, separating across lies to the in-group versus out-group members, the increase with age was not significantly different across group membership category. Collapsing across all lie types (Self-, Other-, and No-Benefit for both in- and out-group), however, there was

no relation between lying and age (rho=.285, $p$=.127).

**Table 2.** Correlations between children's age and lying behaviors.

| | Age | Original Self-Benefit Condition | Other-Benefit and No-Benefit Condition |
|---|---|---|---|
| Age | - | | |
| Original Self-Benefit Condition | .029 | - | |
| Other-Benefit and No-Benefit Condition | .389* | .090 | - |

Note: Correlations are based on the number of children who completed all three conditions of the deception task (n=30) *, $p$<.05

## Deceptive Behavior and Theory of Mind

Next, we investigated our hypothesis that as children's ToM abilities increased, so would lying. Given our interest in how diverse ToM abilities relate to lying, we began by examining relations between lying and each theory of mind task. For the full sample of n=40 children, results from a Spearman's rho correlation indicated that there was no significant correlation between any of the ToM tasks and the total number of lies in the Self-Benefit condition of the deception paradigm ($p$s >.05). Considering just the sample that completed all three deception tasks, children's false belief composite scores were significantly related to children's total lies summed across Other-Benefit and No-Benefit conditions (rho=.428, $p$=.018), but not their Self-Benefit lies (rho=-.083, $p$= .662). However, this correlation between false belief understanding and Other-Benefit and No-Benefit lying did not hold after controlling for verbal IQ and age (rho=.281, $p$=.148).

## Deceptive Behavior and Group Membership

We examined the full sample (n=40) of children who completed the Self-Benefit condition of our deception paradigm and found no effect of group membership as indicated by a paired samples t-test (t(39)=.621, $p$=.538). Next, we examined rates of lying in a 3 (game type) x 2 (group membership) repeated measures ANOVA for the

n=30 children who played all three lying games. There were significant main effects of game type ($F(2,28)=26.081$, $p<.001$) and group membership ($F(1,29)= 19.278$, $p<.001$) as well as a significant interaction ($F(2,28)=7.505$, $p<.003$; Figure 1). Collapsing across group membership, post-hoc paired samples t-tests revealed that children lied the most in the Self-Benefit condition in comparison to both the Other-Benefit condition ($t(29)= -6.382$, $p<.001$) and the No-Benefit condition ($t(29)= 6.703$, $p<.001$). However, children lied equally to in-group and out-group members in the Self-Benefit condition ($t(29)=.441$, $p=.662$). Collapsing across group membership, children told marginally more lies in the Other- than No-Benefit condition ($t(29)= 1.71$, $p=.098$). Both conditions, however, also showed in-group bias. Children engaged in more lie-telling to out-group members in the Other-Benefit condition ($t(29)=-4.625$, $p<.001$) and in the No-Benefit condition ($t(29)=-2.481$, $p=.019$).

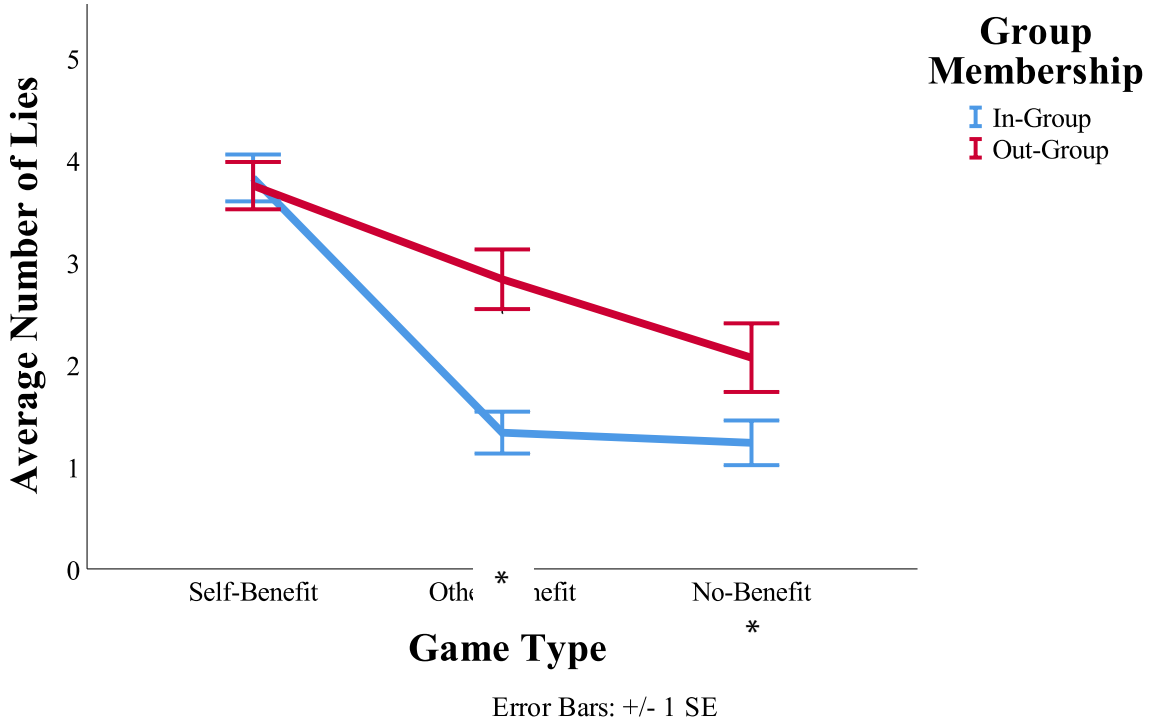


**Figure 1.** Children's lying is affected both by social context and in-group bias. A repeated measures ANOVA indicated that both group membership and game type had significant main effects on children's willingness to lie as well as a significant interaction (*p*s<.05). *, *p*<.05 in a post-hoc comparison.

### Theory of Mind's Effect on Group Membership and Deceptive Behaviors

Our final set of analyses investigated if children with higher ToM would show more selective lying based on group membership than children with lower ToM. We constructed a variable from the Other-Benefit condition that represented sensitivity to group membership: number of lies to the out-group to help the in-group minus the number of lies to the in-group to help the out-group. Higher values indicated a greater willingness to lie to help in-group members specifically. We selected this index because it captured both benefiting one puppet and depriving the other. We compared two groups of children: those with values greater than zero on this index (indicating in-group

sensitivity in lying; n=20) and those with values of zero or less (n=10). Then we conducted an independent samples t-test which revealed no significant differences in age or VIQ, but higher scores on the Restricted View task in children who were sensitive to group membership ($M$= 4, $SD$=1.38) when deceiving (t(28)= -2.05, $p$=.05) compared to those who were not sensitive to group membership ($M$=2.75, $SD$= 1.93). There were no significant differences on the other ToM measures.

## IV. DISCUSSION

The present study investigated the emergence of in-group bias and how it could affect lie-telling behaviors in children between the ages of 4 and 7. We examined the development of children's theory of mind, in-group bias, and their relationship with children's lie-telling behaviors. We hypothesized that age and ToM would be positively related to lying, that group membership would affect different lying contexts differently, and that children who displayed sensitivity in lying behaviors would have higher ToM scores.

### Deceptive Behavior and Age

Relations between children's age and their lying tendencies were not straightforward. Our results suggested that age did not relate to lying for the Self-Benefit condition of our task. Although Self-Benefit lies that children tell may increase as they get older, our particular task did not produce much variability, which may have concealed any age-related changes in children's lying. For the more complex tasks (the Other-Benefit and No-Benefit conditions), lying significantly increased with children's age. One possible explanation for this association could be that children's age is related to their understanding of the task. Perhaps the older children are better able to grasp the rules of these two conditions, which then translates to a better understanding of why lying matters in these tasks and thus a greater willingness to lie. Arguing against this, however, is the fact that we checked comprehension of all game rules and all children understood the tasks.

Alternatively, the relation between children's age and their lying tendencies in the Other- and No-Benefit conditions could reflect meaningful changes in children's

willingness to lie (either to help another puppet or simply out of spite). The notion that children's Self-Benefit lies was not related to age could mean that lying to benefit oneself develops at a younger age and that the more complicated antisocial lies are still developing through the age of seven. Future studies should aim to obtain a larger sample size to strengthen effects of the results that were found in the current study and to better understand this relationship between children's age and their deceptive behaviors.

**Deceptive Behavior and Theory of Mind**

We expected robust correlations between lying and children's ToM abilities, but correlations were weak and were task dependent. In the paper by Ding and colleagues (2015), once the 3-year-olds received false belief ToM training, they began to engage in more lie-telling behaviors. However, in our condition most similar to that paradigm (Self-Benefit), we found no relations between lying and children's ToM. Our null finding may be because Ding and colleagues found these relations in younger children and our paradigm assessed 4- to 7-year-olds. It could be that false belief tasks performance does not specifically predict lying in children who are at older ages because they all perform at ceiling on these tasks. This explanation, however, does not account for the lack of relationship in our sample between lying and the more advanced ToM tasks.

An alternative explanation could be that no ToM measure predicts lying in children at older ages because their lie-telling behavior is better explained by individual differences in other social cognitive skills (i.e., generosity, kindness, etc.) Future research should aim to consider these variables to help better explain children's variability in lying.

## Deceptive Behavior and Group Membership

Although recent work has examined the idea of in-group bias (e.g., Moore, 2009; Olson & Spelke, 2008; Yu, Zhu, & Leslie, 2016), no research has been dedicated to how it may factor in with the willingness to deceive. Our study assesses this gap in the literature by shedding more light on this relationship. We found that when children are presented with a situation in which they can lie to different in-group and out-group members, in-group bias does emerge. Our results depicted that children engage in more lie-telling to out-group members in both the Other-Benefit condition and in the No-Benefit condition. This is especially interesting given that children's membership was based on minimal groups (i.e., yellow vs. green team as opposed to girls vs. boys)

An explanation of why we do not see this same in-group bias in the Self-Benefit condition as well could be that children's tendencies to be selfish outweigh certain social cues and group biases. Previous research found that when children had the opportunity to delegate stickers either to themselves, or to an in-group or out-group member, 3- to 4-years olds did not seem to treat these two groups differently because they exhibited "selfish tendencies," although this impulse lessened as children got older (Yu, Zhu & Leslie, 2016). Our results did not indicate age-related differences in these selfish tendencies, but such patterns might emerge in larger samples.

To learn about group membership and lying, researchers could develop different tasks or paradigms. For example, a child and an in-group or out-group member could be alone in the lab, temporarily. The member could ask the child to hand them the pencil (that is designed to break) and when they hand it to them, it breaks (Chandler, Fritz & Hala, 1989; Ceci & DeSimone Leichtman, 1992). The experimenter would then return

and upon seeing the broken pencil, become very upset about it and ask the child if they were the one that broke the pencil, or if it was their in-group or out-group member. The child would then have the choice to tell the truth (i.e., say that they were the one who broke the pencil), or lie and blame it on one of the members. This different antisocial task could present different findings than our study because rather than children having the opportunity to lie for direct personal gain, they have the option to deceive someone in order to avoid loss or avoid consequences of certain actions. Additionally, rather than depriving someone else of gain, this type of lie exposes someone else to punishment. Especially interesting would be to compare rates of lying across both tasks in a single sample.

**Theory of Mind's Effect on Group Membership and Deceptive Behaviors**

In addition to examining how children's ToM abilities related to overall lying, we assessed whether ToM was related to sensitivity to group membership. We found that children who had higher scores on the Restricted View task were more sensitive to group membership when deceiving. This may be because in order to excel at the Restricted View task, children must be able to generate an answer for two different people that is based not on what the child knows, but the other person's knowledge. Therefore, children that perform better on this task could have a better understanding of how certain behaviors affect other's thoughts and knowledge (i.e., understanding that a lie could benefit a certain team and hurt the alternate team). Previous research has found that performance on the Restricted View task is related to prosocial lying in children (i.e., lying to protect someone else's feelings; Hsu & Cheung, 2012). Potentially, children who have a better understanding of when it is deemed "appropriate" to tell a prosocial lie (i.e.,

telling someone they look great when they are sick) have more sophisticated social understanding overall, and thus have a better grasp of when they can tell a lie to help benefit not only themselves, but also their team (i.e., in-group puppets).

Future research should aim to examine the relationship between ToM and group membership sensitivity longitudinally. This will help illuminate the underlying processes by which ToM could lead to different deceptive behaviors based on this group membership. By examining children over time, researchers could better identify if it seems that children develop ToM understanding first which then allows them to become sensitive to group membership, or if the trajectory is the other way around.

### Willingness to Spite

In our study, we implemented a task where kids' lying did not help anyone (No-Benefit condition). If children lied to puppets in this condition, it only hurt the puppet and did not benefit anyone. Therefore, this type of lying was considered to be from spite and was the least common type (only about half as common as lying in the Self-Benefit condition). Still, children did engage in this spiteful lying and they showed it more for out-group than in-group puppets. Most work on spite has examined simple resource allocation, but this paradigm adds an extra dimension by requiring a lie. There is some evidence from this prior work that spitefulness is negatively associated with social components of ToM, in that those who engage in more spiteful tendencies often exhibit difficulty in ToM tasks (Ewing, Zeigler-Hill & Vonk, 2016). Although we did not find a link between spiteful lies and children's ToM abilities, this relation might emerge in a larger sample.

It is apparent that these spiteful behaviors are present in children at a very young

age. Fehr and colleagues found that 22% of children between the ages of three and four portrayed signs of spiteful behavior (2008). By the time children reach the age of seven to eight, however, this percentage drops to 14% (Fehr, Bernhard, & Rockenbach, 2008). Our findings indicated that children did behave spitefully to their out-group members, but it seems that as the children in our study aged, we did not see the same decline that Fehr and colleagues found; indeed, we found that 83% of children engaged in at least one spiteful lie and this lying increased as children got older. Perhaps our results did not align with past research because our study added in more complex social skills (i.e., understanding group allocation) that were associated with children's deception and spiteful behaviors. Additionally, if we followed children to older ages, spitefulness might also decline even on our task. For example, in 2013, Fehr, Glatzle-Rutzler and Sutter found that as children got older (8-17 years old) their spitefulness decreased, although there was still a strong in-group and out-group divide between their behaviors. That study provides evidence that although children's spiteful tendencies may decline as children get older, there is still a difference in how egalitarian children are toward in-group versus out-group members.

Future research should investigate not only other variables that could be related to spitefulness and deception in children (i.e., altruism, jealousy, egalitarianism, aggression, personality, etc.), but also should examine the children who did not show any spiteful behaviors. By understanding the individual differences between children who are willing to spite and those who are not, we may be better able to predict children's lie-telling tendencies and why they do (or do not) lie to certain people or groups.

## Conclusion

In conclusion, children are able to flexibly apply a complex social skill (i.e., deception) based on group membership and task demands. These results suggest that lying behavior is sensitive to group membership, but only in certain social situations. Specifically, when children are able to lie to benefit themselves, they do not show in-group bias. Such bias emerges, however, in cases when children can preferentially help their in-group over the other group or when they have the chance to spite an out-group member. Taken together, the current study extends previous findings by demonstrating that children not only understand the differences between groups but also incorporate this understanding when lying. Understanding the emergence of children's group bias has important implications for children's education, political psychology, and intergroup relations.

## APPENDIX

Full-Battery Script

Experimenter: "Today we are going to watch videos and look at pictures. The videos and the pictures are going to be about other people. I am also going to ask you some questions about the pictures and the videos. I am interested in finding out what children your age think about the things people do. There are no right or wrong answers. This is not a test. No one will see your answers. So just tell me what you think. Each time we finish a group of videos or pictures, you get to put a tiny sticker on this paper. When you're all done, you can take your sticker sheet home with you! Do you have any questions?"

Assign them to a Team

Experimenter: "When you're playing games with us today, you're going to be on the GREEN/YELLOW team. So you can wear this bandana on your wrist. You can know who else is on your team by what bandana they are wearing. Here is my friend, Elephant (Elephant is wearing a green scarf). What team is Elephant on? Is that the same as your team? Here is my other friend, Lion (Lion is wearing a yellow scarf). What team is Lion on? Is that the same as your team? So there are two teams today. The green team and the yellow team."

Warm up task

OPEN UP THE POWER POINT

Experimenter: Look at these things from a playground. Which of these is your favorite toy? **once child points** Oh wow! Everyone on the GREEN/YELLOW (in group team) likes that toy, too! Everyone on the GREEN/YELLOW team hates that toy!

GO TO NEXT SLIDE

Experimenter: Look at these sports balls. Which of these is your favorite ball? **once child points** Oh wow! Everyone on the GREEN/YELLOW (in group team) likes that ball, too! Everyone on the GREEN/YELLOW team hates that ball!

GO TO NEXT SLIDE

Experimenter: Look two zebras! One zebra is on the GREEN team and one zebra is on the YELLOW team. Remember you are on the YELLOW/GREEN team

Who would you rather play with?

ZEBRA (GREEN) ZEBRA (YELLOW)

Who do you think is nicer?

ZEBRA (GREEN) ZEBRA (YELLOW)

Who do you think likes the same things you like?

ZEBRA (GREEN) ZEBRA (YELLOW)

Antisocial Lying Paradigm

BASELINE (WARM-UP):

Experimenter: "Okay, now we are going to play with some stickers. Pick which stack of stickers you would like to play with today. (show two stacks of two stickers) Great! Now, let's play a game! This is a hide-and-seek game. I have a sticker in my hand and I am going to hide it in one of the two cups here *(point to cups).* You have to find where the treat is hidden. If you find it, you win and you get the sticker. If you don't find it, I win and I get the sticker. Do you understand? Ok, close your eyes and no peeking."

- *cups should be covered on the side where the children cannot see inside the cup*
- *If the child guessed the location of the hidden treat correctly, they are allowed to keep it and are told that they won. If they guessed it incorrectly, the experimenter would keep the treat and that they lost.*

  -leave the room after you say no peeking

  -when you get back ask Experimenter: "Did you peek? Okay, remember, you get one guess and if you guess right and you get to keep the sticker. If you guess wrong, I get to keep the sticker. Which up do you think the sticker is in?

Experimenter: "Okay now, I will give you a sticker. You have to hide in one of these cups *(point to cups on table)*. I have to find where you hid it. If I find it, I win and I get the sticker. If I don't find it, you win and you get the sticker. Now you are going to hide the sticker in one of these cups and then turn the cups over. When you turn them over, be sure that the paper blocks my side so that I cannot see where you hid it. Okay? Now I will close my eyes and you tell me when you are done hiding the sticker."

- *cups should be covered on the side where the experimenter cannot see inside the cup*
- *Once child is done hiding the treat* Experimenter: "Where did you hide the sticker? (Whichever cup the child points to, you MUST look in that cup. If the experimenter finds the sticker, they get to keep it. If they don't, the child gets to keep the sticker.)

INGROUP:

Experimenter: "Here is Bear. They are wearing a YELLOW/GREEN scarf, just like you! You both are on the same team. You are going to hide the sticker and Bear is going to look for it. You are going to play this game five times with Bear and then you will play five times with someone else. Turn around Bear so Bear can't see which cups the stickers go in!"

- *Bear before turning around: Oh yay! I noticed we are on the same team. We are teammates! Our team is great!*
- *Bear and Bear handler should turn around so as not to see the child hiding the prize.*
- *Experimenter shows the child the two cups and asked the child to hide the prize in one of them.*

Experimenter: "Okay. Now you are going to hide the sticker in one of these cups and then turn the cups over. When you turn them over, be sure that the paper blocks this side so that the Bear cannot see where you hid it. Okay? Remember, if Bear finds the sticker, they get to keep it and it stays here. If they do not find it, you get to keep the sticker."
Comprehension check: Experimenter: "So what happens to the stickers that Bear finds?

What happens to the stickers that Bear does not find?"

Bear turned back around and asked the child, Bear: ''Which cup is the sticker in?''

- *After each trial children were provided with feedback on whether Bear found the prize or not. Bear can only look where the child told them to look.*
- Experimenter: "Bear found the sticker. That means they get to keep the sticker."

  OR "Bear did not find the sticker. That means you get to keep the sticker"

Bear: "Oh yay! I got a sticker!"

OR

Bear: "Oh no! I did not get a sticker."

- child will complete 5 trials of this
- once the child is done, take the stickers that they won and set them to the side. Instruct that the child will still receive these stickers, but move them out of sight.

OUTGROUP:

Experimenter: "Here is Raccoon. They are wearing a YELLOW/GREEN scarf. You guys are NOT on the same team. You are going to hide the sticker and Raccoon is going to look for it. You are going to play this game 5 times. Turn around Raccoon so you can't see which cups they go in!"

- *Raccoon before turning around: Oh hi. I see we are not on the same team. We are not teammates. My team is great!*
- *Raccoon and Raccoon handler should turn around so as not to see the child hiding the prize.*
- *Experimenter shows the child the two cups and asked the child to hide the prize in one of them.*

Experimenter: “Okay. Now you are going to hide the sticker in one of these cups and then turn the cups over. When you turn them over, be sure that the paper blocks this side so that the Raccoon cannot see where you hid it. Okay? Remember, if Raccoon finds the sticker, they get to keep it and it stays here. If they do not find it, you get to keep the sticker.”

Comprehension check: Experimenter: “So what happens to the stickers that Raccoon finds? What happens to the stickers that Raccoon does not find?”

Raccoon turned back around and asked the child, Raccoon: ‘‘Which cup is the sticker in?’’

- *After each trial children were provided with feedback on whether Raccoon found the prize or not. Raccoon can only look where the child told them to look.*

Raccoon: “Oh yay! I got a sticker!”

OR

Raccoon: “Oh no! I did not get a sticker.”

add sticker to the correct side of the sheet that designates who gets the sticker

- child will complete 5 trials of this

OTHER-BENEFIT (INGROUP)

Experimenter: “Okay now, we are going to play another game with Bear AND Raccoon. Each time, you will hide a sticker. First, Bear will look for it. If they find it, they get to keep it. If they don’t find it, Raccoon gets to keep it. I will give you the sticker to hide.

- <both puppets come back out>
- Bear: Oh yay! I remember--we are on the same team! We are teammates. Our team is great!

- Raccoon: Oh yes! I remember—we are not on the same team. We are not teammates. My team is great!
- *Bear, Raccoon, and their handler should turn around so as not to see the child hiding the prize.*
- *Experimenter shows the child the two cups and asked the child to hide the prize in one of them.*

Experimenter: "Okay. Now you are going to hide the sticker in one of these cups and then turn the cups over. When you turn them over, be sure that the paper blocks this side so that Bear cannot see where you hid it. Okay? Remember, if Bear finds the sticker, they get to keep it. If they do not find it, Raccoon gets to keep the sticker. You do not get to keep the stickers during this game. You will play this game with Bear 5 times"

Comprehension check: Experimenter: "So what happens to the stickers that Bear finds? What happens to the stickers that Bear does not find?"

Bear turned back around and asked the child, Bear: ''Which cup is the sticker in?''

- *After each trial children were provided with feedback on whether Bear found the prize or not. Bear can only look where the child told them to look.*

Bear: "Oh yay! I got a sticker!" & Raccoon: "Oh no, I did not get a sticker"

OR

Raccoon: "Oh yay! I got a sticker!" & Bear: "Oh no, I did not get a sticker"

add sticker to the correct side of the sheet that designates who gets the sticker

Before starting the next game, move all the stickers off the table.

OTHER-BENEFIT (OUTGROUP_

Experimenter: "Okay now, you are going to play this same game with Raccoon. Each

time, you will hide a sticker. First, Raccoon will look for it. If he finds it, he gets to keep it. If he doesn't find it, Bear gets to keep it. I will give you a sticker to hide.

- *Bear, Raccoon, and their handler should turn around so as not to see the child hiding the prize.*
- *Experimenter shows the child the two cups and asked the child to hide the prize in one of them.*

Experimenter: "Okay. Now you are going to hide the sticker in one of these cups and then turn the cups over. When you turn them over, be sure that the paper blocks this side so that the Raccoon cannot see where you hid it. Okay? Remember, if Raccoon finds the sticker, they get to keep it. If they do not find it, Bear gets to keep the sticker. You do not get stickers during this game. You will play this game with Raccoon 5 times"

Comprehension check: Experimenter: "So what happens to the stickers that Raccoon finds? What happens to the stickers that Raccoon does not find?"

Raccoon turned back around and asked the child, Raccoon: ''Which cup is the sticker in?''

- *After each trial children were provided with feedback on whether Bear found the prize or not. Bear can only look where the child told them to look.*

Raccoon: "Oh yay! I got a sticker!" & Bear: "Oh no, I did not get a sticker"

OR

Bear: "Oh yay! I got a sticker!" & Raccoon: "Oh no, I did not get a sticker"

- once the child is done, take all the stickers and move them out of sight.

NO-BENEFIT (INGROUP)

- Experimenter: "Okay now, we are going to play another game with Bear. Each time, you will hide a sticker. First, Bear will look for it. If he finds it, he gets to keep it. If he doesn't find it, no one gets to keep it and it goes back in the box. I will give you a sticker to hide.
- <Bear comes back out> & says before turning around: Oh yay! I remember--we are on the same team! We are teammates! Our team is great!
- *Bear and Bear handler should turn around so as not to see the child hiding the prize.*
- *Experimenter shows the child the two cups and asked the child to hide the prize in one of them.*

Experimenter: "Okay. Now you are going to hide the sticker in one of these cups and then turn the cups over. When you turn them over, be sure that the paper blocks this side so that the Bear cannot see where you hid it. Okay? Remember, if Bear finds the sticker, they get to keep it. If they do not find it, no one gets the sticker and it goes back in the box. You do not get to keep the sticker. You will play this game with Bear 5 times"

Comprehension check: Experimenter: "So what happens to the stickers that Bear finds? What happens to the stickers that Bear does not find?"

Bear turned back around and asked the child, Bear: ''Which cup is the sticker in?''

- *After each trial children were provided with feedback on whether Bear found the prize or not. Bear can only look where the child told them to look.*

Bear: "Oh yay! I got a sticker!" OR Bear: "Oh no, I did not get a sticker"

- NO-BENEFIT (OUTGROUP)

- Experimenter: "Okay now, we are going to play that game with Raccoon. Each time, you will hide a sticker. First, Raccoon will look for it. If he finds it, he gets to keep it. If he doesn't find it, no one gets to keep it and it goes back in the box. I will give you a sticker.
- <Raccoon comes back out> and says: Oh yes! I remember--we are not on the same team! We are not teammates! My team is great!
- *Raccoon, and Raccoon handler should turn around so as not to see the child hiding.*
- *Experimenter shows the child the two cups and asked the child to hide the prize in one of them.*

Experimenter: "Okay. Now you are going to hide the sticker in one of these cups and then turn the cups over. When you turn them over, be sure that the paper blocks this side so that the Raccoon cannot see where you hid it. Okay? Remember, if Raccoon finds the sticker, they get to keep it and it stays here. If they do not find it, no one gets the sticker and it goes back in the box. You will play this game with Raccoon 5 times"

Comprehension check: Experimenter: "So what happens to the stickers that Raccoon finds? What happens to the stickers that Raccoon does not find?"

Raccoon turned back around and asked the child, Raccoon: ''Which cup is the sticker in?''

- *After each trial children were provided with feedback on whether Raccoon found the prize or not. Raccoon can only look where the child told them to look.*

Raccoon: "Oh yay! I got a sticker!" OR Raccoon: "Oh no, I did not get a sticker"

GUESS WHAT SHE'S FEELING (Mind in the Eyes, Theory of Mind Task #1)

Experimenter: First were going to play a game that is called "Guess What She's Feeling". I'm going to show you a picture of someone's eyes, and then I am going to tell you two feelings, like happy and sad. Your job is to tell me which feeling matches what the person is feeling based on how their eyes look. Does that make sense?

Okay, here's the first picture. This is just a practice.

Here is a man. Is he serious or joking? [Hit the number corresponding to the correct answer after they figure out the task]

Good job! Now here's a few more:

[These are going to come up in a random order and the words are going to switch places on the screen. For each one say:

Here is a man/[lady]. Is he/[she] X or is he/[she] Y?

Where X is the word on the right and Y is the word on the left. After the child picks their answer, hit the corresponding key on the keyboard]

Great job!

WHAT IS IT? (First-order false belief, Theory of Mind Task #2)

For the next part, we're going to listen to some stories on TV.

The first story is a video about Sam and some pencils. After the video is over, I will ask you some questions. Sometimes I will ask you the same question more than once. Remember, this is not a test. I just want you to do the best you can.

COMPUTER STORY: Sam and pencils

1. When Sam comes back inside from recess, where will he look for the pencils first? When he first comes in the room where is the first place he'll go to?

(IF THE PARTICIPANT SAYS 'EVERYWHERE', ASK THEM WHERE SAM WILL LOOK FIRST)

BOX CABINET

2. Why will Sam look there first?

_____

3. What is the name of Sam's teacher?

_____

4. Did Sam see where Mrs. Jones put the pencils?

YES NO

5. Where are the pencils really located?

BOX CABINET

COMPUTER STORY: Crackers

6.When the other children come back in from playing outside, what will they think is in the crayon box?

CRAYONS CRACKERS

7.Why will they think that?

---

8.Did the children who were playing outside see Mary put the crackers in the box?

YES NO

9.What is really in the crayon box?

CRAYONS CRACKERS

Great job! Pick out a sticker to put on your sheet.

FEELINGS (Appearance-Reality Emotion, Theory of Mind Task #3)

Next we're going to listen to some stories about how people feel on the inside and how they look on the outside. First, I am going to talk to you about some feelings, using this picture. [We're checking for emotion understanding. Make sure the child understands before you play the stories]

This is Diana when she feels happy [point to happy]. This is Diana when she feels okay [point to okay]. This is Diana when she feels sad [point to sad].

How does Diana feel when it's her birthday? [If the child doesn't answer verbally, prompt him to say his answer or point]

How does Diana feel when she is sick? [If the child doesn't answer verbally, prompt him to say his answer or point]

How does Diana feel when nothing special is happening—nothing bad and nothing good? [If the child doesn't answer verbally, prompt him to say his answer or point]

[put the pictures away]

Great job! Now we're going to listen to some stories together. After each story, I will ask you some questions. I just want you to do the best you can.

COMPUTER STORY: Telling mean jokes

10. What did the other children do when Rosie told a mean joke about Diana?

_____

11. In the story, what would the other children do if they knew how Diana felt?

_____

12. So, how did Diana really feel, when everyone laughed? Did she feel happy, sad, or okay?

HAPPY SAD OKAY

13. How did Diana try to look on her face, when everyone laughed? Did she look happy, sad, or okay?

HAPPY SAD OKAY

COMPUTER STORY: Losing a game

14. What happens at the end of the game?

_____

15. What will Diana's friend do if she knows how Diana feels?

_____

16. How does Diana really feel when she wins the game? Happy, sad or okay?

HAPPY SAD OKAY

17. How does Diana try to look on her face when she wins the game? Happy, sad or okay?

HAPPY SAD OKAY

COMPUTER STORY: Tummy ache

18. What was the matter with Diana?

_____

19. What will Diana's Mom say if she knows that Diana has a tummy ache?

_____

20. How did Diana really feel when she had a tummy ache? Happy, sad or okay?

HAPPY SAD OKAY

21. How did Diana try to look on her face when she had a tummy ache? Happy, sad or okay?

HAPPY SAD OKAY

COMPUTER STORY: Boy falls over

22. What happens to the big boy?

_____

23. What will he do if Diana shows how she feels?

_____

24. How does Diana really feel when the boy falls over? Happy, sad or okay?

HAPPY SAD OKAY

25. How does Diana try to look on her face when the boy falls over? Happy, sad or okay?

HAPPY SAD OKAY

COMPUTER STORY: Teasing

26. What is Diana's brother doing?

_____

27. What will he do if he knows how she feels?

28. How did Diana really feel when her brother teased her? Happy, sad or okay?

HAPPY SAD OKAY

29. How did Diana try to look on her face when her brother teased her? Happy, sad or okay?

HAPPY SAD OKAY

Great job! Pick out a sticker to put on your sheet.

WHAT DID PETER SEE? (Second Order False Belief, Theory of Mind Task #2., Part 2)

Now we're going to do is watch some videos about a group of friends. After each video, I am going to ask you some questions. Remember, this is not a test. I just want you to do the best you can.

COMPUTER STORY: Apple

30. Where will Peter think that Sarah will look for her apple?

(IF THE PARTICIPANT SAYS 'EVERYWHERE', ASK THEM WHERE SAM WILL LOOK FIRST)

BAG CABINET

31. Why does Peter think that?

_____

32. Where is the apple really?

BAG CABINET

33. Where did Sarah put the apple in the beginning?

BAG CABINET

COMPUTER STORY: Banana

34. Where will Peter think that Sarah will look for her banana?

(IF THE PARTICIPANT SAYS 'EVERYWHERE', ASK THEM WHERE SARAH WILL LOOK FIRST)

BAG CABINET

35. Why does Peter think that?

_____

36. Where is the banana really?

BAG CABINET

37. Where did Sarah put the banana in the beginning?

BAG CABINET

Great job! Pick out a sticker to put on your sheet. Look at that! You did a really super job!

FINISH THE PICTURE (Restricted View, Theory of Mind Task #4)

Next we're going to play with some toys and look at pictures. I am going to ask you some questions about the pictures. There are no right or wrong answers. I just want to know what you think. [Take out the dolls and the houses]

This is Andrea and this is Allison. This is Andrea's house and this is Allison's house. [put dolls in their houses] When Andrea and Allison are inside their houses, they can't hear what we're saying and they can't see what we're doing.

38. Can Andrea and Allison hear us right now?

YES NO

39. Can Andrea and Allison see us right now?

YES NO

[If yes to both questions, continue. If not, verbally re-explain setup]

(Take out the Winnie the Pooh picture)

40. What do you think this is a picture of?

Andrea and Allison have never seen this picture before. Let's get Andrea out of her house and show her this picture. But we're going to show her the picture like this (close cover, so it's just the restricted view). (Get Andrea out of her house). Now Andrea has never seen this picture before.

41. What will Andrea say this is?

Let's get Allison out of his house and show her this picture. (Get Allison out of her house). Now, Allison has never seen this picture before.

42. What will Allison say this is?

Let's put them back in their houses and show you another picture (put dolls back)

(Take out the cow picture)

43. What do you think this is a picture of?

Andrea and Allison have never seen this picture before. Let's get Andrea out of her house and show her this picture. But we're going to show her the picture like this (close cover, so it's just the restricted view). (Get Andrea out of her house). Now Andrea has never seen this picture before.

44. What will Andrea say this is?

_____

Let's get Allison out of his house and show her this picture. (Get Allison out of her house). Now, Allison has never seen this picture before.

45. What will Allison say this is?

---

Experimenter: "Here is another sticker! Add it to your chart! You are doing a great job!"

Dimensional Change Card Sort (DCCS)

1. Decide which dimension will be relevant during the pre-switch phase of the standard version. In the examples, the color dimension has been chosen as the pre-switch dimension.
2. During the demonstration phase, place the two sorting trays side by side in front of the child. Sit beside the child so that you are able to view the sorting boxes. Place a picture of the blue rabbit on the child's left and a red boat on the child's right.

   Experimenter: "Here is a blue rabbit and here's a red boat. Now, we're going to play a card game. This is the color game. In the color game, all the blue ones go here (point to tray on the left) and all the red ones go here (pointing to tray on the right). **grab a blue boat** See, here's a blue one. So it goes here. **Place face down in the box to the left** So, if it is blue, it goes here and if it is red, it goes here. **grab the red rabbit** Now, here's a red one. Where does this one go? **if the child takes the card and sorts it correctly** Very good. You know how to play the color game. **if they sort wrong** No, this one's red so it has to go over here in the color games."
3. Pre-switch phase: First trial, Experimenter: "Now it's your turn. So remember, if it's blue it goes here, but if its red it goes there." **select a random card** "Here is a red/blue one. Where does this one go?" Whether or not they got it correct say, "Let's do another one." Repeat the pre-switch rules each time and label it only by the relevant dimension (i.e., "Here is a blue one. Where does this one go?") ** six trials of this- scoring the correct or incorrect response each time**

4. Experimenter: “Now we are going to play a new game. We’re not going to play the color game anymore. We’re going to play the shape game. In the shape game, all the rabbits go here (pointing to the tray on the left) and the boats go here (pointing to the tray on the right). Remember, if it’s a rabbit it goes here, but if it’s a boat, it goes here. Okay?” **do not remove the cards that were sorted in the pre-switch phase** **select a card** “Here is a rabbit/boat. Where does this one go?” Whether or not they got it correct say, “Let’s do another one.” Repeat the post-switch rules each time and label it only by the relevant dimension (i.e., “Here is a boat. Where does this one go?”) ** six trials of this- scoring the correct or incorrect response each time**
5. If the child scores 5 out of 6 post-switch correctly, move on to the border task.
6. **Remove cards that were previously sorted** **pull out four red rabbits and three blue boats and set the rest of the cards aside** Experimenter: “Okay. You played really well. Now I have a more difficult game to play. In this game, you sometimes get cards that have a black border around it like this one (showing child a red rabbit with a border). If you see a card with a black border, you have to play the color game. In the color game, the red ones go here and the blue ones go there (pointing to appropriate trays). This card’s red, so I’m going to put it right there. But if the card’s do not have a border like this one, (showing them a red rabbit without a border) you play the shape game. In the shape game, the rabbits go here and the boats go there. This one’s a rabbit, so I’m going to put it right there. Okay? Now it’s your turn.” **12 trials: repeat rules each time with marking a correct or incorrect answer; ***REMEMBER TO SAY EVERY TIME WHAT

THE RULES OF THE BORDER GAME ARE*** children pass if they get 9 out of 12 correct**

Experimenter: “Great job! Let’s put a sticker on your chart since you finished that!”

Deception Score Sheet

Participant ID: _____
Date: _____

Self-Benefit Condition

| In-group | | |
|---|---|---|
| Number | Lie? | No Lie? |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

| Out-group | | |
|---|---|---|
| Number | Lie? | No Lie? |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

Other-Benefit Condition

| In-group | | |
|---|---|---|
| Number | Lie? | No Lie? |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

| Out-group | | |
|---|---|---|
| Number | Lie? | No Lie? |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

No-Benefit Condition

| In-group | | |
|---|---|---|
| Number | Lie? | No Lie? |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

| Out-group | | |
|---|---|---|
| Number | Lie? | No Lie? |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

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