2013-01-01

The Effect of Co-witness Information and Individual Differences in Cognitive Abilities on the Suggestibility of Pre-school children

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THE EFFECT OF CO-WITNESS INFORMATION AND INDIVIDUAL DIFFERENCES IN COGNITIVE ABILITIES ON THE SUGGESTIBILITY OF PRE-SCHOOL CHILDREN

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by

Rachell Leanne Jones

2013
For my parents, Veronica and John Davis, and Pawpaw – Who have patiently and tirelessly supported my strange endeavors through the years. Thank you. For Matt Stone and Trey Parker, whose brilliance and humor allowed my sanity to remain intact.
Screw you guys, I’m going home.
THE EFFECT OF CO-WITNESS INFORMATION AND INDIVIDUAL DIFFERENCES IN COGNITIVE ABILITIES ON THE SUGGESTIBILITY OF PRE-SCHOOL CHILDREN

by

RACHELL LEANNE JONES, M.S.

DISSERTATION

Presented to the Faculty of the Graduate School of The University of Texas at El Paso in Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

Department of Psychology
THE UNIVERSITY OF TEXAS AT EL PASO December 2013
Acknowledgements

I would like to thank Dr. Matthew Scullin, Dr. James Wood, and Dr. Christian Meissner for their guidance and support throughout my graduate career at UTEP. I also want to thank the members of my committee for their support and willingness to work with me despite various roadblocks along the way. Special thanks to Penny and Zenaida for their assistance, kindness, and laughter over the years. I would also like to thank Dr. Ted Cooper for his continued encouragement and entertainment.

I also want to thank previous lab members, namely Claudia Ornelas, Catherine Camilletti, Abbie Moore, and Elizabeth Uhl for their assistance and camaraderie over the years. Special thanks to my awesome “army” of research assistants, whose help with this project was invaluable. Thank you Todd England (aka Paco Perez), Reyna Puentes, Jasmine Lopez, Adrian Medrano, Sandi DeJonge, Gabby Griego, Sarai Banuelos, Alejandra Sanchez, Erika Alcala, and so many others! I would also like to the UTEP Graduate School for their funding and support of this dissertation. I would also like to thank the following El Paso preschools and daycares, for without them, this project would not have been possible: Jewish Community Center, Montessori Learning Center, YWCA, Westside KinderCare, Immanuel Christian School, Grammies, and Children’s Kingdom Learning.

Finally, I would like to thank my friends and family for your encouragement and confidence in me. Thank you mom, Johnny (the best step-father I could have asked for), Kandie Robertson, Lera Seymour, Mosi Dane’el, Tamara Kang, Linsa Jabeen, Stephen Michael, Michael Sawyer, Travis Barker and family, the entire Memorial Hermann Baptist Hospital Beaumont Accounting Department (my other parents), and the Zephyr Works crew. To the El Paso Skeet and Trap Club members, thanks for all the dead birds and smiles!
Abstract

Despite nearly 25 years of research, psychologists are still learning new ways in which various demographic, psychological, social, and cognitive factors contribute to child suggestibility. Numerous facets of each area have been studied independently, but as a field, it is becoming apparent that suggestibility is also affected by complex interactions between these various components (Scullin, Kanaya, & Ceci, 2002). The current study investigated several forensic interviewing techniques and psychosocial and cognitive factors that were hypothesized to influence child suggestibility. One hundred children were randomly assigned to five interview conditions after viewing a live event. The supposed statements of a co-witness about the event and the credibility of the co-witness were manipulated as independent variables. Results indicated that children who had been told about the statements of the co-witness were more suggestible than children in a control condition. No significant effect was found for a high-status co-witness versus a low-status co-witness or for the interviewer’s endorsement of the co-witness. As predicted, younger children were significantly more suggestible than older children and exhibited expected developmental gains in theory of mind and executive function. Children with theory of mind and better executive function and language abilities were less suggestible overall. Overall, the findings indicate that telling a child about the statements of a co-witness can significantly increase suggestibility, and that the suggestive effect bears little relationship to the status of the co-witness. These findings are relevant to best practices regarding forensic interviewing of children. This study also provided further clarification for the interrelatedness of theory of mind and executive function, suggesting that executive function is crucial for the manifestation of theory of mind.
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The Effect of Co-Witness Information and Individual Differences in Cognitive Abilities on the Suggestibility of Pre-school Children

The purpose of the current study is to examine the interplay of individual differences and social mechanisms that play pivotal roles in child suggestibility. Cognitive and psychosocial factors that influence child suggestibility will be discussed in terms of both individual differences and situational factors. The field of child suggestibility was born out of the child daycare abuse scandals in the 1980s and early 1990s, when the lives of many preschool and daycare workers were turned upside down after children started making bizarre claims of abuse across the country. From the McMartin Preschool case to the Kelly Michaels case, there were outbreaks of mass hysteria, in which people believed that ritualistic satanic and sexual abuse were rampant in preschool and daycare centers (see Wood, Nathan, Nezworski, & Uhl, 2009 for a review). Many people believed that children were innately naïve and incapable of making up allegations of sexual abuse. It seemed inconceivable that children could actually fabricate these extreme allegations, which ranged from relatively plausible claims like being photographed or videotaped performing sexual acts to more bizarre claims like swords being stuck in their genitals and being flown in airplanes or taken on boat rides (see Nathan & Snedeker, 1995).

During the height of the hysteria, the children were often simply taken at their word. Even when medical examinations failed to find actual physical evidence, amazing claims were made in support of the allegations from doctors who testified in court as expert witnesses (Nathan & Snedeker, 1995). Individuals who doubted the children were ignored, censured, or vehemently reproached for not believing the children. Over time, these disbelievers could not be ignored and through the diligent work of various psychological researchers and others, doubts were raised about the bizarre allegations. Research began to show that false allegations could be
created through the leading interviewing techniques used with the children (Bruck & Ceci, 1995; Ceci & Bruck, 1995; Garven, Wood, & Malpass, 2000; Garven, Wood, Malpass, & Shaw, 1998; Gilstrap, 2004; Ornstein, Baker-Ward, Gordon, & Merritt, 1997; Poole & Lindsay, 1998). Research has subsequently demonstrated that such suggestive and misleading interview techniques reliably lead to false allegations from children in a variety of settings (for a review, see Bruck & Ceci, 1995).

While the incidence of such extreme cases of false allegations elicited from children at the hands of poor interviewers has dramatically decreased over the last 20 years, new cases are still being reported (Hall, 2009; Wood et al., 2009). In Tyler, Texas, four people have been sentenced to life in prison based on claims of an alleged sex ring involving children who were interviewed in highly suggestive conditions (Hall, 2009). The same techniques identified by Garven et al. (1998; 2000) that were used in the daycare cases 20 years ago have been found in the transcripts of the interviews conducted in Tyler, Texas. Further research is still needed to address why these injustices surrounding errors in investigative techniques continue to occur. By further clarifying and understanding the influence of these interviewing techniques, researchers can better inform public policy with regards to interviewing of children in abuse cases. Suggestibility will be discussed in terms of both individual differences and situational circumstances to inform the aims of the current study.

Suggestibility

Definitions of Suggestibility

Suggestibility has been defined in various ways. According to Ceci and Bruck (1993), child suggestibility is “the degree to which children’s encoding, storage, retrieval, and reporting of events can be influenced by a range of social and psychological factors” (p. 404). Gudjonsson
and Clark (1986) conceptualized interrogative suggestibility as “the extent to which, within a closed social interaction, people come to accept messages communicated during formal questioning, as the result of which their subsequent behavioural response is affected” (p. 84). In general however, suggestibility is defined according to how it is measured.

**Measurement of Suggestibility**

Suggestibility has been measured in various ways over time. Frequently, researchers use a live event that incorporates several memorable details (e.g., Garven et al., 1998). After a period of delay, researchers interview the children suggestively, often manipulating different aspects of suggestibility across and within studies (e.g., social pressure, conformity). Other researchers have developed and standardized suggestibility scales for use with different populations. The Gudjonsson Suggestibility Scale (GSS) is a measure of interrogative suggestibility in which individuals listen to an audio taped story and are subsequently interviewed in a suggestive manner (Gudjonsson, 1984, 1987). The GSS is based on a two-factor model comprised of yield and shift measures of suggestibility. According to Gudjonsson (1984, 1987), yield is how likely an individual will acquiesce to misleading false information, and shift is how likely an individual will respond to, or change their answers in response to pressure. The audio format of the GSS may be problematic with younger populations. As a result, researchers developed the Book Suggestibility Scale for Children (BSSC; Warren, Scullin, & Ceci, 1999, as cited in Melinder, Scullin, Gunnerød, & Nyborg, 2005), and the Video Suggestibility Scale for Children (VSSC; Scullin & Ceci, 2001), as more appropriate measures of suggestibility for ages three to five. The BSSC and the VSSC were modeled after the
principles of the GSS, measuring yield and shift, as well as memory recall. However, the BSSC uses a storybook that is read to children, whereas the VSSC uses a video of a birthday party that children watch.

In the current study, suggestibility was measured in two ways. Children participated in a live event that will be discussed in greater detail below, after which they were suggestively interviewed. Children’s suggestibility was also assessed through a revised version of the VSSC. The VSSC is generally more predictive of suggestibility under greater social pressure. However, the VSSC has been criticized for a lack of equality in the number of true and false questions, and the internal consistency of the Shift (social pressure) factor of the VSSC is poor (e.g., Melinder et al., 2005). Therefore, the psychometric properties of the revised version of the VSSC were also evaluated in the current study.

**Individual Differences in Suggestibility**

Examining how the individual characteristics of children influence their memory and memory reports is vital for contributing to our holistic understanding of suggestibility. Individual difference characteristics that have been reported to affect suggestibility include theory of mind (ToM), executive function (EF), vocabulary skill, self-esteem, social understanding, intelligence to some degree, age, and many more (e.g., Bruck, Ceci, & Hembrooke, 2002; or Bruck & Melnyk, 2004 for a review).

Many of these relationships are more complicated than they at first appear. For example, most researchers find that better ToM and EF (which will be explained in detail below), tend to decrease suggestibility, while other studies have found these characteristics lead to increased suggestibility (for a discussion, see Bruck & Melnyk, 2004). Similarly, while age is more often related to decreased suggestibility, there are studies with contradictory results (e.g., Bruck et al.,
2002; Finnila, Mahlberg, Santtila, Sandnabba, & Niemi, 2003). As a result, the relationship between many of these factors and suggestibility is still in need of further clarification. Theoretically, these concepts likely interact in different ways across different situations, which is important to understand when considering the legal context of an abuse investigation.

**Cognitive and social issues.**

*Executive function and theory of mind.* Executive function (EF) is frequently conceptualized as a central executive or control station that allows us to achieve the cognitive abilities to problem solve, plan, and carry out various representational functions, and is usually operationally defined according to the type of tasks used to measure it (e.g. Baddeley, 1999; Luria, 1973; Miyake, Friedman, Emerson, Witzki, & Howarter, 2000; Normal & Shallice, 1986; Zelazo & Müller, 2011). According to Astington (1993), theory of mind (ToM) is our ability to ascribe unobservable internal states to others and ourselves. These unobservable mental states include thoughts, emotions, beliefs, desires, and knowledge, which are vital in successful human social interactions (e.g. Liu, Sabbagh, Gehring, & Wellman, 2009; Liu, Wellman, Tardif, & Sabbagh, 2008; Wellman & Liu, 2004).

Both EF and ToM in isolation have a rich and detailed history of research that spans a wide variety of domains. More recently, researchers have begun to explore the inherent relationship between EF and ToM (e.g. Carlson & Moses, 2001; Carlson, Moses, & Breton, 2002). Also, children with better EF and ToM generally tend to be less suggestible, but this relationship is contradictory and in need of further clarification. In order to fully understand this complex relationship, both EF and ToM will be explained in more detail, illustrating their individual and interactional contributions to cognitive development and suggestibility.
Executive function. While there are numerous and varied ways of defining and conceptualizing EF, common themes emerge. Converging evidence points towards a useful conceptualization of EF as both a unitary and nonunitary construct with clearly distinct yet related constructs (see Baddeley, 1999; Garon, Bryson, & Smith, 2008; Miyake et al., 2000; Zelazo, Müller, Frye, & Marcovitch, 2003). Evidence for both approaches comes from recent confirmatory factor analyses and structural equation modeling techniques with various EF tasks (e.g. Huizinga, Dolan, & van der Molen, 2006; Lehto, Juujärvi, Kooistra, & Pulkkinen, 2003; and Miyake et al., 2000).

In general, EF is thought to have three main subcomponents or parts, namely working memory (updating), inhibition, and attention shifting, with slight variations across theoretical models (e.g. Diamond, 2006; Miyake et al., 2000). Working memory or updating is the ability to keep information in mind and use that same information representationally, via a central executive or control center and two slave storage units Baddeley called the visuospatial sketchpad and phonological loop (see Baddeley, 1986). Inhibition is typically thought of as the ability to inhibit or suppress behavior, often demonstrated with sorting tasks that involve pre- and post-switch rules requiring individuals to inhibit the initially learned response while producing a newly learned response (Zelazo et al., 2003). Finally, shifting is a person’s capacity for being able to switch attention between different tasks or to disengage or switch mental sets within the same task (Miyake et al., 2000).

Miyake et al. (2000) and Huizinga et al. (2006) performed confirmatory factor analyses on numerous EF tasks designed to measure these different components of EF. Each of the three factors (updating, inhibition, shifting) loaded appropriately in Miyake et al.’s (2000) sample, and to some degree in Huizinga et al.’s (2006) sample, providing support for the nonunitary
conceptualization of EF. The caveat with the nonunitary conceptualizations is that despite clearly loading on different factors, each factor is also clearly correlated with the others, suggesting that there is still some common unitary EF structure (Miyake et al., 2000). In addition, a common criticism of these conceptualizations and conclusions drawn based on confirmatory factor analyses is that the tasks themselves may not be purely tapping into just a single given construct, but may be tapping overlapping constructs, accounting for some of the overall factor intercorrelations (e.g. Garon et al., 2008; Lehto et al., 2003; Miyake et al., 2000). Nonetheless, researchers are beginning to accept that EF consists of both unique and overlapping factors, and are moving forward to further clarify what EF entails.

Even though the specific trajectory and underlying mechanisms of EF are not fully understood, researchers agree EF develops in sequence (see Garon et al., 2008; Zelazo et al., 2003). In a review of EF in preschoolers, Garon et al. (2008) illustrate the possible hierarchical nature of EF throughout development. Prior to and during the preschool years is a time of critical, albeit slow growth and development of the prefrontal cortex. During this time period, cognitive structures and EF abilities are developing in parallel, and as Garon et al. (2008) state, laying the foundation for later higher order cognitive abilities. Specifically, Garon et al. (2008) suggest that the attention aspect of EF is key for the future development of inhibition control, which is also significantly related to decreased suggestibility. For the current study, the developmental pattern of EF is important to consider in relation to that of ToM and suggestibility. ToM will be discussed, followed by the relationship between ToM and EF, and their impact on suggestibility.
Theory of mind. Similarly to EF, ToM has also been conceptualized in various ways. Researchers have proposed both a unitary perspective, as well as a more diverse scaling approach to understanding ToM, which will be discussed below (see Wellman, 2011; Wellman & Liu, 2004). Early on, ToM was examined and captured by researchers using mostly the concept of false belief understanding. False belief is a person’s ability to understand that what they believe may not always match up to reality or what they see, and may also differ from what others believe (Wellman & Liu, 2004). However, as Wellman (2011) stated, ToM is more than this, and should be conceptualized along much broader lines. Just as EF, cognitive, and neural development advances through the preschool years, so does ToM. Wellman and Liu (2004) hypothesized that ToM develops in predictable and sequential ways across this time period. To capture this progress, Wellman and Liu (2004) first conducted a meta-analysis to determine which ToM concepts develop at which points in time. They then devised a ToM scale with different tasks designed to measure the successive expression of ToM constructs. Results from their meta-analysis and their ToM scale suggest distinct patterns of ToM development.

Children generally develop the ability to understand people’s desires first, and realize that others may like or want different things than they do (Wellman & Liu, 2004). Soon after, children realize that people may also have different beliefs than they do about reality. Once children can recognize this, they are then able to understand that people may hold false beliefs about reality as well. Lastly, children develop the ability to distinguish between what a person really feels versus what they may actually express (e.g., real and apparent emotion; Wellman & Liu, 2004). Also in support of a developmental progression in ToM, Liu et al. (2009) used event-related brain potentials to examine the neural and cognitive development of ToM (specifically false-beliefs) of adults and children. As with EF (Garon et al., 2008), Liu et al.
(2009) found the prefrontal cortex to be vital in the sequential formation, emergence, and expression of ToM. These results also hold up cross-culturally, further bolstering support for these conceptualizations (see Liu et al., 2008; Wellman, Fang, Liu, Zhu, & Liu, 2006).

Given the support for a developmental progression of both EF and ToM independently, and their reliance on similar cognitive structures and development, it stands to reason these two concepts are likely related (see Carlson et al., 2002; Melinder, Endestad, & Magnussen, 2006). Researchers have identified similarities between the progression of development of EF and ToM (e.g. Kochanska, Murray, Jacques, Koenig, & Vandegeest, 1996; Zelazo, Frye, & Rapus, 1996). Carlson et al. (2002) have identified from the literature two potential theoretical accounts of the relationship between EF and ToM. According to the expression hypothesis, ToM is pre-existing, and EF plays a role in how ToM abilities are expressed (Carlson et al., 2002). In other words, children may have ToM capabilities already in place, but depending on their EF skills, their ToM may be inhibited. On the other hand, Carlson et al. (2002) suggested that EF might first be necessary for ToM to even emerge. In other words, according to this emergence hypothesis, certain EF may need to be present before ToM abilities can emerge (Carlson et al., 2002). Researchers are still unraveling these concepts, and the causal direction of the relationship is still unclear, but initial evidence suggests that EF is critical for ToM development (Carlson et al., 2002). These findings are relevant to the discussion of how ToM and EF interact with suggestibility.

As previously mentioned, an inverse relationship generally exists between ToM and suggestibility, and between EF and suggestibility. However, these relationships are not always consistent, and not every facet of EF is equally related to suggestibility (Melinder et al., 2006). In general, the inhibitory subtype of EF is the key to predicting ToM (Carlson et al., 2002).
Likewise, the inhibitory subtype of EF is a stronger predictor of suggestibility than other subtypes of EF (e.g., Carlson & Moses, 2001; Melinder et al., 2006; Scullin & Bonner, 2006). The relationships among these three variables were examined in more detail in the current study, to further elucidate this complex relationship.

**Language/vocabulary ability.** Bruck and Melnyk’s (2004) review established that cognitive factors (e.g. EF, language ability) are more closely related to child suggestibility more consistently than are differences in personality and interpersonal style (e.g. self-esteem, relationship styles, temperament). Language ability, when assessed through comprehensive batteries versus single vocabulary measures, has consistently shown a negative correlation with suggestibility (see Bruck & Melnyk, 2004). Several researchers have used various measures of language ability, including the Adaptive Language Inventory Preschool Language Scale-Revised (Clarke-Stewart, Malloy, & Allhusen, 2004), a German language battery test (Roebers & Schneider, 2005), the Wechsler Preschool and Primary Scale of Intelligence Revised (WPPSI-R; McFarlane, Powell, & Dudgeon, 2002), and the Peabody Picture Vocabulary Test (PPVT; e.g., Burgwyn-Bailes, Baker-Ward, Gordon, & Ornstein, 2001). Rather than simple vocabulary skill like that measured with the PPVT, research shows that it is the higher order cognitive abilities associated with language that are more predictive of suggestibility (e.g., Geddie, Fradin, & Beer, 2000; McFarlane et al., 2002). Thus, children who are better able to comprehend, listen, and express language fluently are less suggestible (McFarlane et al., 2002; Roebers & Schneider, 2005).
Event (Situational) Characteristics

While individual characteristics are crucial to consider, situational or event characteristics can strongly influence child suggestibility as well. There are several factors to consider regarding situational effects surrounding child suggestibility. In criminal cases, children are often interviewed repeatedly by several different adults, including their parents, teachers, police officers, lawyers, and so forth. Aspects of the interviews themselves can contribute to suggestibility, including how the interviewers talk to the children, what techniques they use, what tools or props they may use, how they formulate their questions, and so forth. The effects of repeated interviews, suggestive techniques, and co-witnesses will be discussed in relation to the current study.

Repeated interviews. Numerous studies have shown that children who are interviewed repeatedly or even repeatedly asked the same questions within a single interview are more likely to shift their answers (see Bruck & Ceci, 1995; Goodman & Quas, 2008). But as Goodman and Quas (2008) point out, plenty of other studies have not found such effects of repeated interviewing. Goodman and Quas (2008) criticized the extant literature on repeated interviewing by stating that strictly dichotomous interpretations of contradictory findings are generally unhelpful, and there may be other factors that play an interactive role with repetition in creating increased suggestibility. Instead, Goodman and Quas (2008) suggest that researchers should focus on uncovering the differences between situations in which repeated interviewing increases or decreases suggestibility, thereby contributing to the overall understanding of how repetition influences suggestibility.

The research conducted by Chan and others has begun to address these issues with repeated interviewing. In general, most research into the effects of repeated suggestion center
around whether or not individuals later incorporate false suggestions into their memories (e.g., see Zaragoza, Belli, & Payment, 2007 for a brief review). As Zaragoza et al. (2007) point out, isolating the effects of repeated interviewing on suggestibility or false memory creation is a difficult task given so many potential confounds. However, Zaragoza and colleagues have a clever body of research demonstrating that repeated suggestions do in fact contribute unique variance in explaining the development of subsequent false memories, calling their findings the repeated-exposure effect.

Similarly, Chan and colleagues have also developed a clever series of experiments in which they have tested the effects of repeated exposure to misinformation. There is a wealth of information in the education field and it is now common knowledge that repeated testing increases memory for a variety of things. Chan, Thomas, and Bulevich (2009) modified a traditional misinformation paradigm (e.g., see Loftus, 2005) to include an immediate or initial recall of an event prior to actually introducing misinformation. As Chan et al. (2009) reasoned, this situation is ecologically valid, given that witnesses or victims of crimes often have to recall details of an event to either law enforcement personnel or perhaps even a 911 operator. They hypothesized that this retrieval process should decrease an individual’s susceptibility to later misleading information, but found just the opposite, which they have termed retrieval enhanced suggestibility or RES. Instead of inoculating individuals against misinformation, immediate retrieval was shown to increase suggestibility in participants.

Interestingly, Chan and Langley (2011) also showed that immediate retrieval increased overall accuracy for events as well as suggestibility. Chan and Langley (2011) also demonstrated that the RES is a very robust phenomenon, which persists over at least a one-week delay. However, further studies conducted by Chan and LaPaglia (2011) demonstrated that the
RES can be affected by the amount of time delay between retrieval and exposure to the misinformation. Namely, the longer the delay, the better participant’s memories were, and the more resistant to the RES they were. The RES effect was also found in an otherwise classic lineup identification task, in which participant’s memory for a face was impaired when required to verbally recall the face immediately prior to exposure to misinformation regarding the face (LaPaglia & Chan, 2012).

While research into the RES is relatively new, these findings are very curious, and have direct implications for forensic settings in which children may be interviewed. Children, like adults, are frequently asked to provide an account of a witnessed or experienced event. It is well established that children are more suggestive overall than adults, and have fewer cognitive resources for accurate recall of events. The RES phenomenon will no doubt be extended to child participants and will provide even more pieces of the child suggestibility puzzle.

**Suggestive techniques.** In addition to repeated interviews, the structure of the interviews themselves can increase suggestibility. Pulling from more basic psychological principals of confirmation bias, Bruck and Ceci (1995) reviewed literature that illustrates the effects that prior knowledge or biases on the part of the interviewer can have on suggestibility. The McMartin Preschool cases provided a wealth of information for researchers to explore. Garven et al. (1998) reviewed the interviews from the McMartin Preschool cases and identified several different techniques that were frequently used. These techniques included suggestive questions or introducing information, other people, positive and negative consequences, asked-and answered questions, and inviting speculation (Garven et al., 1998).

*Introducing information* is when an interviewer supplies information to the child that the child has not mentioned on its own. The use of *other people* (OP) is when the interviewer
indicates to the child that someone else other than the child, that is a co-witness, has mentioned something or said something related to the case. Positive and negative consequences are when the interview uses praise or disapproval when the child answers ‘correctly’ or ‘incorrectly.’ Asked-and answered questions are when the interviewer repeats a question the child has just answered, and inviting speculation is when the interviewer asks the child to imagine or speculate about what could have happened.

These techniques have mostly been researched in combination to determine their effects on child suggestibility. While some of the techniques such as positive and negative consequences (e.g., Garven et al., 2000), and inviting speculation (e.g., Schreiber, Wentura, & Bilsky, 2001) have been studied in isolation to determine their effects on suggestibility, others have not. The present study examined the OP technique. Specifically, the status and credibility of the co-witness was manipulated to gain a better understanding of the situations in which this technique is most influential. Is it simply the mention of another person that leads to more suggestibility, or does it actually matter who that other person is? In addition, is it the mention of a co-witness, in itself, that increases suggestibility, or does the importance that the interviewer places on the information from that other person matter more? The effect of these two situations on children’s suggestibility was examined in the current study.

Despite the somewhat limited direct examination of the OP technique specifically, researchers have examined this technique in more general terms. Garven et al. (1998) examined the OP technique directly using just low status individuals, namely, other children, as co-witnesses, and did not find increased suggestibility. Ceci, Ross, and Toglia (1987) however, found that preschoolers were more likely to succumb to misleading information when an authority figure versus their peers provided the misinformation. Furthermore, Tobey and
Goodman (1992) demonstrated that children further differentiate between the statuses of different adults, showing increased suggestibility when interviewed by higher status individuals (e.g. police officers). More recently, Carol (in press) found that children from age 7 to 18 were more suggestible when the OP technique was used with a high status co-witness. Carol (in press) used very similar methodology to the present study, including a high status co-witness (adult) or low status co-witness (peers). Children were more suggestible across all ages with an adult source versus a peer co-witness. These factors combined will be addressed in the current study. In addition, research on co-witnesses and conformity bears relevance to the OP technique and is discussed below.

**Co-witnesses.** The presence of multiple witnesses (co-witnesses) creates opportunities for memory contamination through complex interactions between both social (situational) and cognitive (individual) mechanisms. According to Luus and Wells (1994), *co-witness information* consists of information passed between two or more witnesses to a crime, either directly or indirectly. Information can be shared directly between the witnesses when they discuss their experiences of the event, or indirectly through a third party (Luus & Wells, 1994). This postevent information via a third party may take many different forms, including an actual person such as a teacher or police officer, or through media outlets like television or newspapers (Wright & Davies, 1999). For example, during the course of an investigation a police officer may tell one witness what the other witness said, or a witness may see news reports on television that reveal information about the crime.

Over 30 years of research driven largely by Elizabeth Loftus and others has demonstrated how postevent information deleteriously affects the memory of people of all ages, which is often referred to in the literature as the misinformation effect (see Loftus, 2005 for a detailed review).
The usual misinformation paradigm used by Loftus and others over the years requires participants to view some stimuli they are required to remember, such as a video or slide presentation. After a time delay, participants are then presented with written stimuli that contain false or misleading information about the originally viewed stimuli. Finally, participants are asked to remember the original event. As the name suggests, participants frequently erroneously report the misinformation as part of the original event. The misinformation effect has been found across numerous different situations (Loftus, Miller, & Burns, 1978), ages (Ackil & Zaragoza, 1995), types of people, and even other species (Loftus, 2005).

Theoretical explanations of the misinformation effect suggest numerous different possibilities for just how it affects original memories (see Ayers & Reder, 1998 for a review). Loftus et al. (1978) originally suggested that the misinformation was incorporated into the original memory, thereby altering it and/or even replacing it, often referred to as the impairment hypothesis. Other researchers have examined whether the misinformation instead simply co-exists with the original memory (Greene, Flynn, & Loftus, 1982). Greene et al. (1982) suggested that if the memories co-exist, then warnings regarding the misinformation should decrease the likelihood of the misinformation effect. If the co-existence theory was correct, warning participants they will be exposed to misinformation should enable them to ignore the misinformation later, allowing them to report the original memory with no inaccuracies. This finding would give support to the fact that memories are not altered, but instead simply co-exist. However, Greene et al. (1982) found that the warnings only tended to reduce the misinformation effect if given prior to the presentation of the misinformation, leading to the conclusion that perhaps the memories do not coexist.
Other researchers further tested the co-existence theory by increasing the strength of the warning and did find support for the theory (e.g. Christiaansen & Ochalek, 1983; Eakin, Schreiber, & Sergent-Marshall, 2003). However, warnings seem to provide limited support and only in certain circumstances. According to the suppression theory, instead of replacing or altering the original memory, it may be that warnings are helpful in suppressing the misinformation, but generally only in situations where the misinformation is not easily accessible, thereby rendering the original memory inaccessible as well (e.g., Bekerian & Bowers, 1983; Bowers & Bekerian, 1984; Eakin et al., 2003).

Other researchers have suggested that no actual memory impairment occurs because of misinformation (e.g., McCloskey & Zaragoza, 1985; Zaragoza, McCloskey, & Jamis, 1987). Instead, McCloskey and Zaragoza (1985) claimed that people are simply reporting the misinformation because they never actually encoded (or cannot recall) the original memory, so they are more easily led astray by the misinformation. McCloskey and Zaragoza (1985) criticized the methodology commonly used by researchers who support the impairment hypothesis, suggesting that the method of forcing participants to choose between the original memory and the misinformation has an inherent response bias. To overcome this, they designed a modified recognition test that allowed participants to choose between the original stimulus and a completely novel stimulus instead of the suggested misinformation stimulus. This modified test methodology did indeed reduce the likelihood of the misinformation effect, although the findings were not consistent (Ayers & Reder, 1998).

Countless other theories have been proposed in attempts to understand just how misinformation affects original memories. As Ayers and Reder (1998) point out, no one theory can account for all of the variance in the misinformation effect, but each theory contributes to
our total knowledge. They proposed a spreading activation-based model of memory to provide a cohesive understanding of the misinformation effect, which would allow for predictions based on each of the various theoretical accounts. As with most concepts in psychological research, the focus should not be on which one theory is right, but instead, on figuring out in which situations the various theories can better explain the phenomenon.

Despite the uncertainty about the actual nature of what causes the misinformation effect, the fact that it occurs in itself is worthy of continued research. The legal applicability is clear and present. When a co-witness is thrown into the mix, additional memory impairments are inevitable. In addition to the effects of ToM and social understanding previously mentioned, basic social conformity research is applicable to the misinformation effect as well. Asch’s (1952, 1956) now classic conformity experiments, which have been replicated and demonstrated across a vast array of conditions, illustrate how the presence of other people can lead individuals to change their responses in order to conform to other’s versions of events.

Similar to the misinformation effect, there are various theoretical accounts for why people conform, including cognitive and social accounts (see Weldon, 2000, for a review). Some people may doubt their cognitive abilities and assume another’s memory is better and so must be a more accurate portrayal of reality. Deutsch and Gerard (1955) referred to this type of conformity or social influence as informational social influence. Such individuals who conform do not do so out of social pressure but instead because of their lack of confidence in their own cognitive abilities. On the other hand, some people conform to another’s version of reality in order to be accepted which reinforces positive feelings of group or social cohesiveness (Deutsch
& Gerard, 1955). Rather than actually doubting their memory, Deutsch and Gerard proposed that individuals who conform out of this normative social influence still believe they are right, but proceed to agree with the group to be accepted or not cause dissonance with the other(s).

Taking this a step further with co-witnesses, Roediger, Meade, and Bergman (2001) suggest that when an individual encounters post-event information either directly through talking with a co-witness or indirectly through a third party, they may actually incorporate that information into their own memory, a phenomenon they have termed social contagion. This in effect leads people to develop false memories directly as a result of a third party. While most of the research into the effects of co-witnesses has been laboratory driven, some researchers have tried to determine the real world incidence of co-witness discussions (e.g. Paterson & Kemp, 2006; Skagerberg & Wright, 2008). This is an important endeavor for understanding the true applicability and relevance for the legal system. It is one thing to assume that eyewitnesses to a crime talk and interact with each other, but we need to know as a field if this occurs, how frequently, and in what situations. Patterson and Kemp (2006) found that 86% of people they surveyed admitted to discussing aspects of an event with a co-witness when one was present. Furthermore, those surveyed discussed events regardless of whether or not they were victims or mere witnesses (Patterson & Kemp, 2006). Skagerberg and Wright (2008) found less striking results with real eyewitnesses in the United Kingdom. While 88% of witnesses confirmed that the presence of a co-witness, only 58% reported discussing the event with a co-witness. Even so, it is apparent that witnesses do talk in real world settings; therefore it is important to continue investigating how the presence of co-witnesses affects individual’s memories and reports.

According to Roediger et al. (2001), memory is often studied and conceptualized as an individual process. However, as has been demonstrated, memory is also a social process that is
often adversely affected by others. In a legal context, these findings are incredibly important to consider. Crimes are often committed that involve multiple witnesses so it is imperative that we continue to further refine our understanding of the both the individual and interactive effects of cognitive and social factors on memory. Furthermore, while the misinformation effect has been shown to occur across the board, children are at an increased risk (e.g. Ackil & Zaragoza, 1995; Cassel, Roebers, & Bjorklund, 1996; Ceci & Bruck, 1993; Thierry & Spence, 2002). As victims of crimes, children are often interviewed either formally or informally numerous times. Each interaction with another person creates situations that can compound and foster these socially driven misinformation effects.

The Current Study

The current study investigated the role three broad topics: 1) the effect of the OP technique and endorsement of a co-witness on suggestibility, 2) the relationship of ToM, EF, age, and language/vocabulary skills with child suggestibility, and 3) the relationships among different measures of suggestibility (e.g., VSSC Yield, VSSC Shift, and Total Interview Suggestibility in the Paco Perez interviews).

While the suggestive interviewing techniques identified by Garven et al. (1998, 2000) have been studied together, the effect of each technique has not been extensively studied in isolation. This study examined the effects of the OP technique on child suggestibility, while manipulating the status of the co-witness and endorsement (believability) of the co-witness as well. Despite the fact that Garven et al. (1998, 2000) did not consistently find an effect with the OP technique, drawing on the research with co-witnesses (and their status) and conformity mentioned previously, it was hypothesized that using the OP technique would increase child suggestibility on its own, and that manipulating the status of the co-witness would further
influence suggestibility in children. In addition, from anecdotal evidence from real life taped interviews of children, the presence of an endorsement statement by the interviewer (e.g., “I believe them”) was also expected to increase suggestibility even further.

Considering the external situation when evaluating a child’s memory is paramount. However, it is equally important to consider internal characteristics unique to a given child. In the current study, the influence of several individual difference variables on children’s suggestibility was also examined. Consistent with previous research, both ToM and EF were predicted to negatively correlate with suggestibility, such that children with higher scores on ToM and EF tasks would be less suggestible overall. Similarly, children with higher vocabulary scores were predicted to be less suggestible overall.

Lastly, the relationships among the three suggestibility measures -- VSSC Shift, VSSC Yield, and Total Interview Suggestibility for the Paco Interview 1 -- were explored in the current study. The VSSC is a standardized measure of suggestibility and was included in this study to serve as a criterion to assess whether or not the Paco Interview 1 suggestive questions adequately assessed child suggestibility. The Paco Interview 1 suggestive questions are similar in concept to the VSSC Yield construct, and were predicted to correlate with each other. The VSSC Shift construct has generally been found to be a poor predictor of suggestibility and was not expected to relate strongly to the Paco Interview 1 Total Interview Suggestibility measure.

Preschool aged children (3- to 5-year olds) were chosen as the target population for important theoretical reasons. As previously discussed, this period of development is critical for both ToM and EF constructs, which significantly relate to suggestibility. Children three years of age have generally not obtained ToM. As they approach five and six years of age, most children will have gained ToM (Bruck & Melnyk, 2004). The developmental progression of EF follows
similar patterns, with children’s EF skills increasing dramatically from age three to five (e.g., Kochanska et al., 1996; Zelazo et al., 1996). Research has clearly established that children become less suggestible as they age, and are most susceptible to suggestion on average in the preschool years (e.g., Roebers & Schneider, 2005). Given the similar developmental trajectories of ToM, EF, and suggestibility, from limited abilities at age three, to enhanced abilities at age five, this population is ideal for examining the relationships among these constructs.

One possible limitation of using children in this age range is the possibility of ceiling or floor effects with the novel suggestibility manipulations. Since younger children are more suggestible overall, it is possible that the endorsement condition may not increase suggestibility further due to the likelihood that the younger children will succumb to suggestion regardless.
Method

Participants

One hundred children from preschools and daycares in El Paso, Texas were recruited for this study. There were 54 males and 46 females. Children ranged in age from 36.53 months (2.95 years) to 71.92 months (5.99 years), with an average age of 54.30 months (4.53 years), including thirty 3-year-olds, forty-three 4-year-olds, and twenty-seven 5-year-olds. Children were tested at 10 different locations, with between 7 and 13 participants at each site. Informed consent was obtained from each school location and the parents before a child was allowed to participate in this study (see Appendix A).

The median educational level of both mothers and fathers was completed some college, although there was a wide range: Five of the 199 parents had not graduated from high school, and 33 had completed graduate school or beyond. Median family income was approximately $55,000, with again a wide range, including 12 reporting incomes of less than $25,000, and 26 with incomes of $70,000 or more. Children’s ethnicities were reported as 8% African-American, 2% Asian (including one child mixed Asian and other), and 14% as Non-Hispanic White. The remaining 76 children were classified as follows: 51% Hispanic, 4% Latino, 6% Mexican, and 15% Mexican-American. For ease of presentation, in the remainder of the analyses all these participants will simply be referred to as "Hispanic." Of the 100 children, 8% were reported to have attentional problems, 4% were reported to have a speech problem, and 4% were reported to have other behavioral or physical problems (e.g., behavior disorder, shyness, vision problems).

Regarding language use in the home, 12 parents did not complete this form. The Language Background Questionnaire scale ranges from 1 (exclusively English) through 5 (equal use of English and Spanish) to 9 (exclusively Spanish) on a number of questions. Overall scores
were computed as average scores on questions answered for both children and parents. For children, 35 used English exclusively and none used Spanish exclusively. The median score was 1.2 ($M = 2.1$, $SD = 1.7$), indicating that most of the children relied heavily on English. Only 10 children had average scores of 5 or above. For parents, 27 used English exclusively and only 1 used Spanish exclusively. The median score was 2.5 ($M = 3.1$, $SD = 2.2$), indicating that most of the parents also relied heavily on English. Among the parents, only 19 had average scores of 5 or above. Parents also provided information on whether or not their children mixed English and Spanish, with 26 children mixing, 61 not mixing, and 13 missing responses. For those children who mixed English and Spanish, 22 reportedly began mixing the languages at age 2 or below, and five began mixing after 2 years of age.

**Materials and Procedure**

**Design.** This study had a 2 x 2 plus hanging control design (see Appendix B) in which groups differed on the level of co-witness status (high or low), and the experimenter’s endorsement of the source’s credibility (present or absent). Children were randomly assigned to the five conditions. For the non-manipulated control condition, children were simply interviewed with suggestive misleading questions (see Appendix C). In the high status co-witness, no endorsement condition, children were interviewed with the same suggestive misleading questions, but were also told that their teacher said Paco did some things (see Appendix D). The high status co-witness, endorsement condition was similar to the high status co-witness, no endorsement condition, but the interviewer also said that they believed the teacher after half of the questions (see Appendix E). Both the low status co-witness, no endorsement
condition (see Appendix F), and the low status co-witness, endorsement condition (see Appendix G) were identical to the high status co-witness conditions in content, but rather than saying the teacher said so, the experimenter said that the other kids said so.

**Demographic information.** Demographic information was collected for the child and parents (see Appendix H). Parents were asked to provide basic information about their children’s mental and physical health, preferred language use, and proficiency level in each language spoken. Information about the child’s parents was also collected, including the parent’s level of education, socioeconomic background, and other relevant information.

**Language and vocabulary assessments.** Children’s level of language and vocabulary proficiency was assessed by three different tests on the WMLS-R and the Language Background Questionnaire (see below for individual task scoring and ranges). An overall language score was calculated for the WMLS-R by adding together the scores on the 3 subtests, providing a range of possible scores from 0 to 169.

**Language background measure for parents.** Parents completed a language background questionnaire regarding their own and their child’s language preferences. Parents were asked which language their child prefers to do various tasks in, like speaking in the home, with friends, and reading (see Appendix I). This questionnaire was created for the current study utilizing questions and information from various other sources (e.g. Millet, 2010).

**Woodcock-Muñoz Language Survey-Revised (WMLS-R).** Children completed the WMLS-R English (Woodcock, Muñoz-Sandoval, Ruef, & Alvarado, 2005a) and Spanish versions (Woodcock, Muñoz-Sandoval, Ruef, & Alvarado, 2005b) to assess their level of proficiency in either language, as well as their receptive vocabulary skills. The WMLS-R is a standardized normed measure that is appropriate to administer to English and Spanish speaking
people from age 2 to 90 and beyond (Alvarado, Ruef, & Schrank, 2005). For the preschool aged sample, the WMLS-R English version was normed on 1,143 children aged 2 to 5 (Alvarado et al., 2005).

The WMLS-R is comprised of 10 individually administered tests that provide information about a person’s Spanish and/or English language abilities and covers topics like listening, speaking, reading, writing, and comprehension. For the purposes of the current study, only the first three tests of the WMLS-R were administered. The Picture Vocabulary test was used to assess children’s lexical knowledge via word retrieval, requiring them to identify various pictures of objects increasing in difficulty until the child gets six consecutive items wrong, with scores ranging from 0 to 59 (Alvarado et al., 2005). According to Alvarado et al. (2005), the Picture Vocabulary test has a median reliability of .91 for ages 5 to 19. The Verbal Analogies test was used to measure children’s reasoning abilities using their lexical knowledge, requiring them to complete analogies increasing in difficulty until the child gets 6 consecutive items wrong, with scores ranging from 0 to 35. The Verbal Analogies test for ages 5 to 19 has a median reliability of .90 (Alvarado et al., 2005). The Letter-Word Identification test was the last language assessment administered and measures children’s basic abilities to identify letters and words, not their meanings. Children were presented with letters and words increasing in difficulty and were required to simply read them out loud until they got six consecutive items wrong, with scores ranging from 0 to 75 (Alvarado et al., 2005). This subtest of the WMLS-R has a median reliability of .97 for the 5 to 19 age range (Alvarado et al., 2005).
Paco Perez.

**Paco Perez initial visit.** A confederate named Paco Perez visited children’s classrooms. Two male undergraduate students in the Cognitive Development and Juvenile Justice Lab primarily played the role of Paco Perez. For every visit, the undergraduate students wore business casual attire, a silly brightly colored hat, funny glasses, and an oversized green bow tie. Paco’s visit was similar to that described by Garven et al. (2000) and Camilletti (2010). Paco walked into the room wearing his silly hat after being introduced by the children’s teacher or the experimenter. After saying hello, Paco let the children know that he was going to read them a story (see Appendix J for full script). Throughout the visit, Paco performed several actions that the children were later asked about (e.g., taking off his hat, putting on glasses, and putting a sticker on each child’s hand). Once each child was given a sticker, Paco said goodbye to the children and left. The entire presentation took approximately 20 minutes at each location and was videotaped to ensure reliability.

**Paco Perez interview 1.** Approximately one week after Paco visited the classroom, children were interviewed individually in one of the five conditions mentioned previously. Each interview was composed of 24 yes/no questions, with equal numbers of questions covering true events, misleading mundane events (e.g., did Paco tear the book?), and misleading fantastic events (e.g., did Paco taking you on a helicopter ride?). These questions follow the format of Garven et al. (2000), intending to approximate wrongdoing or improper acts in an ethically appropriate manner.

**Paco Perez interview 2.** Approximately two weeks after Paco’s initial visit, children were interviewed individually again about Paco’s visit. Similar to procedures used previously in the Cognitive Development and Juvenile Justice Lab at the University of Texas at El Paso (Uhl,
children were asked several free recall questions to elicit their memories for the Paco visit (see Appendix K). To determine whether or not children actually incorporated any of the misleading suggestions from the first interview into their free recall interviews, three independent coders blind to experimental condition counted the number of false reports children made about Paco Perez, and the number of other false reports children made. Fourteen children included suggestions from the first Paco interview into their free recall accounts, and thirty mentioned other false reports in their free recall reports. Inter-rater reliability was high for the number of false suggestions included from the first Paco interview into free recall ($ICC = .97, p < .001$), and for the number of other suggestions mentioned in their free recall reports ($ICC = .96, p < .001$). There were nineteen cases on which the coders disagreed about the presence of false reports. Upon meeting to discuss these disagreements, it was discovered that one coder was incorrectly including a comment children made (e.g., they were taken back to class) as a false report.

**Word count.** Children’s raw word count was also computed from the Paco free-recall interviews following the procedures outlined by Dickinson and Poole (2000). Transcribed interviews were simplified to include only words children mentioned in direct response to the Paco free-recall questions five through eleven. All interviewer comments and clarification questions from children were deleted. Three different individuals coded the raw word count for interviews, with high agreement between raters ($ICC = .998, p < .001$).

**Video Suggestibility Scale for Children.** Children completed the Video Suggestibility Scale for Children (VSSC) as an additional measure of suggestibility (Scullin & Ceci, 2001). Scullin and Ceci developed the original English version of the VSSC for 3 to 5 year olds, incorporating Gudjonsson’s (1984, 1987) concepts of yield and shift to assess children’s
likelihood of acquiescing to suggestive interview questions. Children are first shown a 5-minute video of a boy’s birthday party. Throughout the video, several memorable things happen (e.g., a fire-alarm goes off, the boy gets a broken toy as a present).

After a time delay in which the children completed the EF measures, they were interviewed individually about the videos in a suggestive manner. The VSSC includes three scales named Yield, Shift, and Total Suggestibility. The VSSC originally consisted of 18 yes/no questions split into two sections of nine questions each that are asked twice after telling the children they made a few mistakes. The current study extended the VSSC to balance the number of true and false questions. Based on a prior factor analysis of the VSSC, item numbers 15 and 17 were deleted, and 6 additional true items were added (see Appendix L).

For Yield, children received a score of 0 or 1, with a 1 indicating affirmative responses to the misleading questions prior to the feedback. For Shift, children received a score of 0 or 1, with 1 indicating a change in response after the feedback. Therefore, the Yield scores ranged from 0 to 12 as there are 12 misleading questions, and the Shift scores can range from 0 to 24. Scullin and Ceci (2001) reported an internal consistency of 0.85 for Yield and 0.75 for Shift on the original VSSC. The revised VSSC questions had an internal consistency of 0.76 for Yield, and 0.73 for Shift.

**Theory of mind tasks.** Scores for each of the seven individual ToM tasks were collected, with each task scored as 0 or 1 if correctly passed (see below for individual task scoring and ranges). A *ToM Aggregate Scale* was calculated, using scores from all ToM tasks except for the Contents and Locations control tasks, with scores ranging from 0 to 5. The Control ToM tasks were analyzed separately. Higher scores on the *ToM Aggregate Scale* indicate that children have achieved ToM.
**Diverse desires.** Following the procedures outlined by Wellman and Liu (2004), children saw a toy figure of an adult male named Mr. Jones along with a picture of a carrot and a gingerbread cookie. Children were asked if they would prefer the cookie or the carrot as a snack, which is the *own-desire* question. If the child chose the cookie, they were told that Mr. Jones really likes the carrot and does not like cookies (vice versa if the child chose the carrot). The children were then shown the toy figure of Mr. Jones and asked which snack he would choose now that it is snack time (which is the *target* question). In order to pass this task, the child must answer correctly that Mr. Jones would prefer the snack that is the opposite of their *own-desire* choice (see Appendix M). For each of the ToM tasks, children who passed received a score of 1, and children who failed received a score of 0.

**Knowledge-access.** Following Wellman and Liu’s (2004) procedure, children were shown a plastic box with a toy dog inside. The children were asked what they thought was inside the box, which could be anything they imagine, and they were free to say that they did not know. The experimenter then opened the box and showed the child that there was a toy dog inside. After closing the box, the experimenter asked the child what was actually in the box. Next the experimenter showed the children a toy figure of a girl named Polly, who has never seen the inside of the box before. The children were asked if Polly knows what is inside the box (the *target* question), and if she has ever seen inside the box (the *memory* control question). In order to pass this task, children must have responded no to both questions (see Appendix N).

**Contents false-belief.** Similar to Wellman and Liu (2004), children were shown a Band-Aid box and asked what they thought was inside of it. The experimenter then opened the box, showing the child that a plastic toy pig was actually inside of it. Next, the experimenter closed the box and introduced a toy figure named Peter who has never seen inside the Band-Aid box.
Children were asked what Peter thought was inside the box, with Band-Aids being the correct answer and target question. They were also asked if Peter has seen inside the box, which is the memory control question. In order to pass this task, children must have answered Band-Aids to the target question, and no to the memory control question (see Appendix O).

**Diverse beliefs.** Again following Wellman and Liu’s (2004) procedures, children were shown a toy figure of a girl named Linda along with a drawing of a garage and bushes. Children were told that Linda has lost her cat and really needs to find it, and that it might be hiding in the garage or in the bushes. For the own-belief question, children were asked if they thought the cat was hiding in the bushes or in the garage. If children choose the garage, they were told that Linda thinks her cat is actually in the bushes (and vice versa if they chose bushes). For the target question, children were asked where Linda would look for her cat. In order to pass this task, children must again have answered correctly that Linda will look in the opposite place than they would have (see Appendix P).

**Real-apparent emotion.** For this task (Wellman & Liu, 2004), children were shown a laminated piece of paper with happy, neutral, and sad smiley faces on it. Once the children’s understanding of each emotion was established, they were shown an expressionless stick figure drawing of a boy named Matt. The experimenter told the children a story about Matt who dislikes books and really wanted a toy car from his Aunt for his birthday. However, his Aunt bought him a book for his birthday, so Matt must hide how he really feels about his present so that he does not hurt his Aunt’s feelings. The children were then asked how Matt feels on the inside and asked to point to the corresponding facial expression. They were then asked to point
to the facial expression Matt will have when he thanks his Aunt for the book. In order to pass this task, the children must have pointed to the sad or neutral face when asked about how Matt really feels, and the happy or neutral face when asked how Matt will look for his Aunt (see Appendix Q).

**Contents.** Following the procedures of Carlson and Moses (2001), children were shown a small box and asked to open it and see what is inside of it. Initially there was a pig inside of the box. Once the child has discovered the pig, they were told that the horse should be put in the box instead. After placing the horse inside the box, the experimenter asked the child what is inside the box now. Then the experimenter asked the children what was inside the box when they first opened it. In order to pass the task, children must have answered the last question with pig (see Appendix R).

**Location.** For this task (Carlson & Moses, 2001), children were shown a blue box, a green box, and a small toy car that fits inside the boxes. The children were first asked to place the figure inside the blue box. Then they were asked to take the figure out of the blue box and put it into the green box. The experimenter then asked the child where the figure is now, and then where the figure was at when it was first put into a box, before it was moved. In order to pass this task, children must have answered the *now* question with green, and the *before* question with blue (see Appendix S).

**Executive function battery.** Scores for each of the seven individual EF tasks were collected (see below for individual task scoring and ranges), along with an aggregate EF score. The *EF Aggregate Scale* was comprised of all EF tasks, and could range from 0 to 71. Additional summary scores for each subtype of EF were computed, including *EF Working Memory Subtype*, which could range from 0 to 37, *EF Inhibitory Subtype*, which could range
from 0 to 32, and *EF Delay Subtype*, which could range from 0 to 2. For all of the EF measures, higher scores are indicative of better EF performance.

**Delay of gratification.** Children completed a delay of gratification task modeled after Mischel, Shoda, and Rodriguez’s (1989) paradigm. Parent’s permission to give their child a treat (marshmallows, goldfish crackers, etc.) was obtained prior to the administration of this task. Children were told that the experimenter forgot some things and had to leave the room for a while to find them. Two bowls were placed on the table in front of the children. The experimenter filled each bowl with either 2 or 10 of the child’s preferred treats. The experimenter then told the child they needed to leave the room to get other materials ready, and that if they could wait in their seats until the experimenter returned, they could have the larger portion size. However, if they did not want to wait, they could ring a bell left on the table and have the smaller portion at any time. The experimenter left the room for one minute, or until the child rang the bell or ate the treats. Scoring consisted of 3 latency measures recorded in seconds, including the time it took for the child to touch the bell, the bowl, and the time it took to touch or eat the treats. In addition, a simple dichotomous (yes or no) score was obtained of whether or not the child ate the treats before the time was up (see Appendix T).

**Dimensional Change Card Sort task.** Children completed a Dimensional Change Card Sort (DCCS) task based on the procedures of Zelazo et al. (2003). Children were asked to place a series of cards into sorting trays according to an initial criterion of color (brown or purple) and then by a different criterion of shape (monkey or elephant). After children passed an initial training on each sorting dimension, they completed eight pre-switch test trials on the first dimension (color). Children were then told the rules have changed and then completed eight post-switch test trials on the other dimension (shape). Administration of the two different sorting
dimensions was counterbalanced, with half of the children sorting first by color and half sorting first by shape. Accuracy was assessed on the pre-switch trials to ensure children performed adequately. Scoring consisted of the total number of correctly sorted cards for the post-switch test trials, ranging from 0 to 8 (see Appendix U).

**Digit span.** A forward digit span task was included as a measure of short-term working memory. Children were asked to repeat a series of numbers that were read out loud by an experimenter. There were a total of 10 possible trials, increasing in difficulty by adding one number after each level, beginning with two digits, and ending with 11 digits. At each level, children had two chances (different number sets) to pass and move on to the next level. The task stopped when the child completed or failed both chances at a given level. Scores could range from 0 to 10, representing the highest level completed (see Appendix V).

**Day/Night Stroop task.** Following the procedures outlined by Diamond, Kirkham, and Amso (2002), and Scullin and Bonner (2006), children were shown a series of two different types of cards: black cards with a moon and stars on them, and white cards with a yellow sun on them. Children were asked to say *night* when they saw the sun cards, and *day* when they saw the moon cards. After two practice trials (or until the child understood), children completed eight more trials, with four sun cards and four moon cards presented in a fixed randomized order. Scoring consisted of the total number correct (ranging from 0 to 8), as well as summary scores of the day and night trials (ranging from 0 to 4; see Appendix W).

**Tower of London.** Following the procedures outlined by Bull, Espy, and Senn (2004), children were told that they were going to play a game which requires them to move three colored balls from one peg to another following three rules: 1) only one ball can be moved at a time; 2) balls have to stay on the pegs when they aren’t being moved; and 3) a given move is
over once they remove their hand from the ball. After establishing that the children understood the rules the experimenter went through a practice trial with the child, showing them the target position from the book and asking the child to make their balls look the same. Once children understood, they completed six trials increasing in difficulty, with testing stopped if the child failed four trials in a row. Each trial was assigned a point value based on the minimum number of moves required for a solution, beginning with a 2 move minimum and increasing successively until a 7 move minimum. Therefore, scores could range from 0 to 27 (see Appendix X).

**The Hand Game.** Hughes (1996, 1998) and Carlson, Mandell, and Williams (2004) modified the original task designed by Luria, Pribram, and Homskaya (1964) to be used with children. Children were initially told to copy the hand gestures of the experimenter, which could be a fist or a pointed finger. After successfully completing the imitation phase for six consecutive trials, children were told that the rules are changing. They were then asked to produce the opposite hand gesture from what the experimenter presents. Therefore, if the experimenter presented a fist, children should have produced a pointed finger, and vice versa. After establishing that the children fully understood the rule-switch with four practice trials, the experimenter proceeded with 16 anti-imitation trials, with scores ranging from 0 to 16, with one point awarded for each correct trial (see Appendix Y).

**Gift delay.** As another measure of delay of gratification, children were told that the experimenter has a present for them, but it is not ready yet, it needs to be wrapped (Carlson & Moses, 2001). The experimenter asked the child to turn around in their chair while they spent 60 seconds noisily wrapping the gift (timed with a stop watch). The total number of times the child peeked was recorded, as well as the time it took before the child peeked for the first time.
In addition, whether or not the child turned around fully and peeked, if they peeked over their shoulder, or if they did not attempt to peek at all was recorded (see Appendix Z).

**Procedure**

**Session one.** Table 1 provides a brief timetable of the procedures. At session one, children were visited by Paco Perez who read them a story and performed various actions. Paco’s performance was videotaped to ensure reliability.

**Session two.** Approximately one week after Paco’s visit, children were interviewed individually about it in one of the five previously mentioned conditions. To assess their language and vocabulary skills, children completed the WMLS-R. Children then completed the ToM battery.

**Session three.** Approximately two weeks after Paco’s initial visit, children were re-interviewed individually about his visit and completed the remaining tasks. First, children were asked to provide a free recall report of what they remembered about Paco’s visit. After this interview, children were shown the VSSC video. Afterwards, they completed the EF battery. Finally, children were given the VSSC interview. Once all tasks were completed, children were debriefed (see Appendix AA), thanked for their participation, and given a small prize.
Table 1

*Procedures and Tasks in Order of Administration by Session*

<table>
<thead>
<tr>
<th>Session 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>1. Paco Perez Story Time</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>1. Paco Perez Suggestive Interview 1</td>
</tr>
<tr>
<td>2. Woodcock-Muñoz Language Survey-Revised:</td>
</tr>
<tr>
<td>3. Theory of Mind Battery:</td>
</tr>
<tr>
<td>Diverse Desires, Knowledge Access, Contents False Belief, Diverse Beliefs,</td>
</tr>
<tr>
<td>Real-Apparent Emotion, Contents, Location</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>1. Paco Perez Free Recall Interview</td>
</tr>
<tr>
<td>2. VSSC – Video</td>
</tr>
<tr>
<td>3. Executive Function Battery:</td>
</tr>
<tr>
<td>Delay of Gratification, DCCS, Digit Span, Day/Night Stroop, Tower of London,</td>
</tr>
<tr>
<td>Hand Game, Gift Delay</td>
</tr>
<tr>
<td>4. VSSC – Suggestive Questions</td>
</tr>
<tr>
<td>5. Debriefing</td>
</tr>
</tbody>
</table>

Note: VSSC = Video Suggestibility scale for Children; DCCS = Dimensional Change Card Sorting.

**Hypotheses**

Eight hypotheses were tested in the current study. 1) Children questioned about a classroom visitor by interviewers who used the OP technique (i.e., telling the child what a co-witness had supposedly reported) were expected to be more suggestible during the interview than children who were questioned without the technique. 2) Children questioned with the OP technique were expected to be more suggestible during the interview if the co-witness had high status (teacher) than if the co-witness had low status (classmates). 3) Children interviewed with
the OP technique were expected to show greater suggestibility during the interview if the interviewer endorsed the co-witness’s credibility (“And I believe them”) than if the interviewer did not endorse the co-witness. 4) Consist with prior research, children with higher EF scores were expected to be less suggestible than other children. 5) Consistent with prior research, children with higher ToM scores were expected to be more suggestible than other children. 6) The relationship between EF and ToM was further explored in this study to contribute to the emergence/expression literature. It was expected that ToM effects would be overshadowed by the EF effects and would not contribute unique variance. The EF Inhibitory subtype was expected to account for the most variance in suggestibility. 7) Consistent with prior research, younger children were expected to be more suggestible than older children. 8) Consistent with prior research, children with higher language and vocabulary skills were expected to be less suggestible overall.
Results

Power Analysis

An apriori power analysis for a linear multiple regression was conducted using the software package, GPower 3.0 (Faul, Erdfelder, Lang, & Buchner, 2007). A sample size of 138 was recommended using nine total predictors (gender, race, socioeconomic status, and age in months controlled for) and five tested predictors (co-witness status, endorsement, EF, ToM, and language/vocabulary skill). The alpha level used for this analysis was $p < .05$. The apriori analyses revealed the statistical power for this study was .95 for detection of a moderate to large effect size ($f^2 = .15$). This effect size was chosen given the general results from previous suggestibility studies finding medium to large effects (e.g., McFarlane et al., 2002; Melinder et al., 2005; Scullin et al., 2002).

Descriptive Statistics for Suggestibility Measures

There were two central sets of dependent variables for this study: VSSC scores and scores for Paco Interview 1. For the VSSC, two separate scores were analyzed. A Yield score was obtained that could range from 0 to 12, and a Shift score was obtained that could range from 0 to 24. For each measure, higher scores indicate more suggestibility.

For Paco Interview 1, two scores were obtained. 1) Yes answers to true events (correct responses) can range from 0 to 8, with higher scores indicating better memory. A proportion score was calculated for this variable by dividing by 8 and was titled Accuracy for True Events. 2) Total yes answers to Misleading questions were calculated by adding the Mundane and Fantastic scores together (which are both incorrect responses), which can range from 0 to 16, again with higher scores indicating more suggestibility. A proportion score, Total Interview Suggestibility score, was calculated by dividing the raw number of yes answers by 16. Table 1
presents the descriptive statistics for the dependent variables in raw score form with associated percentages in parentheses. Henceforth, all variables will be reported in terms of proportions/percentages for ease of interpretation and for comparison to similar studies.

Children in this study said yes to misleading questions in a suggestive control condition 19% of the time. In comparison, preschool aged children in similar suggestive control conditions in prior studies acquiesced 27% (Camilletti, 2010), 15% (Uhl, 2011), and 16.7% (Garven et al., 1998). Similarly, VSSC Yield scores of children in this study indicated that children said yes to 53% of misleading questions, compared to 59% (McFarlane & Powell, 2002), 49% (Karpinski & Scullin, 2009), and 39% for older preschool aged children and 53% for younger preschool aged children (Scullin et al., 2002), 45% (Melinder et al., 2005), 61% (Spanish version of VSSC: Ornelas, 2009), and 51% (Karpinski, 2006). Children shifted answers on average 32% of the time in the current study, compared to 20% (McFarlane & Powell, 2002), 27% for older preschool aged children and 26% for younger preschool aged children (Scullin et al., 2002), 29% (Melinder et al., 2005), 21% (Spanish Version of VSSC: Ornelas, 2009), and 30% (Karpinski, 2006).

Table 2

<table>
<thead>
<tr>
<th>Measure</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>No. (%)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paco Perez</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Interview Suggestibility</td>
<td>0</td>
<td>16</td>
<td>5.85 (37%)</td>
<td>5.70</td>
<td></td>
</tr>
<tr>
<td>Accuracy for True Events</td>
<td>2</td>
<td>8</td>
<td>6.59 (82%)</td>
<td>1.45</td>
<td></td>
</tr>
<tr>
<td>Video Suggestibility Scale for Children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yield</td>
<td>0</td>
<td>12</td>
<td>5.34 (53%)</td>
<td>3.22</td>
<td></td>
</tr>
<tr>
<td>Shift</td>
<td>0</td>
<td>15</td>
<td>6.45 (32%)</td>
<td>3.90</td>
<td></td>
</tr>
</tbody>
</table>
The Effect of Co-witness Status and Interviewer Endorsement on Suggestibility

Descriptive statistics for dependent variables, by experimental condition. There were five different experimental conditions in all: a non-manipulated control condition, high status co-witness, no endorsement, high status co-witness, endorsement, low status co-witness, no endorsement, and low status co-witness, endorsement conditions. Chi square analyses indicated that these five groups did not differ in respect to gender, but differed slightly by ethnicity, $\chi^2(24, N = 100) = 37.6, p = .038$. This difference was primarily due to there being a disproportionate number of Non-Hispanic Whites in the low status co-witness, no endorsement condition, and Hispanics in the non-manipulated control condition. Table 3 displays descriptive statistics by experimental condition for the dependent variables in Paco Interview 1.

Table 3

Paco Interview 1. Descriptive Statistics for Dependent Variables, by Experimental Condition

(n = 20 for each group)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Control</th>
<th>High Co-witness Status</th>
<th>Low Co-witness Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Not Endorsed</td>
<td>Endorsed</td>
</tr>
<tr>
<td>Total Interview</td>
<td>Mean</td>
<td>0.19</td>
<td>0.45</td>
</tr>
<tr>
<td>Suggestibility</td>
<td>SD</td>
<td>0.22</td>
<td>0.35</td>
</tr>
<tr>
<td>Accuracy for True Events</td>
<td>Mean</td>
<td>0.81</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>0.18</td>
<td>0.15</td>
</tr>
</tbody>
</table>
Analysis of variance results for main experimental manipulation. To test the effects of the experimental manipulation on suggestibility, a $2 \times 2$ (Co-witness status: high vs. low) X 2 (Endorsement: present or absent) ANOVA was conducted for Total Interview Suggestibility in Paco Interview 1. Contrary to hypotheses 1, 2, and 3, no significant main effects of co-witness status or endorsement were found, and no significant interactions (see Table 4).

Analysis of covariance results for main experimental manipulation with age as a covariate. As reported later in the results, significant effects of children's age were found for several variables. Therefore, as a secondary analysis, the ANOVA reported in the previous section was supplemented by a follow-up analysis of co-variance (ANCOVA), with co-witness status and endorsement as the independent variables, Total Interview Suggestibility as the dependent variable, and age in months as the covariate. Table 5 shows the number of children by age per condition. Table 6 provides the results of the ANCOVA. As can be seen, including age as a covariate did not substantively change the results: as in the ANOVA, no significant main effects of co-witness status or endorsement, and no significant interaction were found.

Table 4

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>$df$</th>
<th>Mean Square</th>
<th>$F$</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Endorsement</td>
<td>.00</td>
<td>1</td>
<td>.00</td>
<td>.01</td>
</tr>
<tr>
<td>(B) Co-witness Status</td>
<td>.35</td>
<td>1</td>
<td>.35</td>
<td>2.50</td>
</tr>
<tr>
<td>A X B (interaction)</td>
<td>.09</td>
<td>1</td>
<td>.09</td>
<td>.63</td>
</tr>
<tr>
<td>Error</td>
<td>10.48</td>
<td>76</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>24.30</td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>10.89</td>
<td>79</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5

*Number of Children Per Age Group Within Each Experimental Condition*

<table>
<thead>
<tr>
<th>Age</th>
<th>Control</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High Co-witness Status</td>
<td>Low Co-witness Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not Endorsed</td>
<td>Endorsed</td>
<td>Not Endorsed</td>
<td>Endorsed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 year olds</td>
<td>6</td>
<td>8</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>4 year olds</td>
<td>9</td>
<td>8</td>
<td>12</td>
<td>5</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>5 year olds</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>8</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

Table 6

*Summary of Analysis of Covariance with Age as a Covariate for Total Interview Suggestibility by Experimental Conditions*

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in months (Covariate)</td>
<td>1.95</td>
<td>1</td>
<td>1.95</td>
<td>17.22</td>
<td>.19***</td>
</tr>
<tr>
<td>(A) Endorsement</td>
<td>.00</td>
<td>1</td>
<td>.00</td>
<td>.04</td>
<td>.00</td>
</tr>
<tr>
<td>(B) Co-witness Status</td>
<td>.11</td>
<td>1</td>
<td>.11</td>
<td>.98</td>
<td>.01</td>
</tr>
<tr>
<td>A X B (interaction)</td>
<td>.03</td>
<td>1</td>
<td>.03</td>
<td>.25</td>
<td>.00</td>
</tr>
<tr>
<td>Error</td>
<td>8.51</td>
<td>75</td>
<td>.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>24.30</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>10.89</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***p < .001.

A multiple regression analysis was also conducted with age, co-witness status, endorsement, and their interactions as predictors of Total Interview Suggestibility. For all analyses with co-witness status and endorsement, the following coding schemes were used. Co-witness status was coded as follows: high status (1), low status (0), and control (-1). Endorsement was coded as follows: endorsement (1), no endorsement and control (-1). The
linear combination of these predictors was significantly related to Total Interview Suggestibility, $R^2 = .25, F(5, 94) = 6.20, p < .001$. Children’s age was the strongest predictor of suggestibility, $(\beta = -38, p < .001)$, followed by co-witness status $(\beta = .24, p = .01)$. However, there was no effect of endorsement $(\beta = .04, p = .71)$, and no significant interaction between age and co-witness status $(\beta = -.10, p = .31)$, or age and endorsement $(\beta = -.08, p = .43)$.

**Follow up analyses.**

*Memory check.* Several ANOVAs were conducted to assess how accurate children’s memory was for the Paco Interview 1 questions. There was no significant difference in Accuracy for True Events across the endorsement manipulation, $F(1, 76) = 2.91, p = .092$, or the co-witness status manipulation, $F(1, 76) = 1.18, p = .281$. There was also no significant interaction between co-witness status and endorsement $F(1, 76) = .02, p = .877$. Children’s memory was also assessed by age within each condition. There were no significant differences by age in each condition for Accuracy for True Events, $F(2, 68) = .27, p = .762$.

**Follow up analyses for the non-manipulated control condition versus the other people conditions.** Analyses were also carried out to see whether the four groups that were administered the OP manipulation differed from the no-manipulation control group. Results of an overall one-way ANOVA, using condition as the independent variable (e.g., *non-manipulated control, high status co-witness, no endorsement, high status co-witness, endorsement, low status co-witness, no endorsement, and low status co-witness, endorsement*), are summarized in Table 7. There were no differences across the five conditions for Accuracy for True Events. However, the experimental condition significantly affected children’s performance on Total Interview Suggestibility (see Table 7).
Because the overall ANOVA revealed a significant effect of the OP technique on Total Interview Suggestibility, follow-up contrasts were performed for this variable. Table 8 shows results of contrasts between the non-manipulated control condition, and the other conditions combined and individually. Children in both high co-witness status conditions scored significantly higher on Total Interview Suggestibility than children in the non-manipulated control condition. However, children in the low co-witness status conditions did not significantly differ from children in the non-manipulated control condition. Since age was related to the results reported above for the manipulations, it was included, as a covariate, in ANCOVAs that paralleled the analyses just reported (see Table 9). Including age as a covariate slightly strengthened the effects of the manipulations.

Table 7

*Results of One-way ANOVA Across All Conditions, for Paco Interview 1 Questions. (N = 100)*

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Interview Suggestibility</td>
<td>Between</td>
<td>1.20</td>
<td>4</td>
<td>.30</td>
<td>2.50</td>
<td>.05*</td>
</tr>
<tr>
<td></td>
<td>Within</td>
<td>11.37</td>
<td>95</td>
<td>.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Corrected Total</td>
<td>12.57</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy for True Events</td>
<td>Between</td>
<td>.14</td>
<td>4</td>
<td>.04</td>
<td>1.08</td>
<td>.37</td>
</tr>
<tr>
<td></td>
<td>Within</td>
<td>3.11</td>
<td>95</td>
<td>.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Corrected Total</td>
<td>3.25</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .05.
Table 8

Contrasts between the Non-Manipulated Control Condition and all Other Conditions for Total Interview Suggestibility in Paco Interview 1. \((N = 100)\)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Contrast: Non-Manipulated Control vs. …</th>
<th>(t_{(95)})</th>
<th>(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Interview Suggestibility</td>
<td>All others combined</td>
<td>2.53</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>High co-witness status, not endorsed</td>
<td>2.34</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>High co-witness status, endorsed</td>
<td>2.86</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>Low co-witness status, not endorsed</td>
<td>1.74</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td>Low co-witness status, endorsed</td>
<td>1.06</td>
<td>.29</td>
</tr>
</tbody>
</table>

Table 9

Results of Contrasts Between the Non-Manipulated Control Condition and Other Conditions, for Paco Interview 1 Questions, After Controlling for Age. \((N = 100)\)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Contrast: Non-Manipulated Control vs. …</th>
<th>(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Interview Suggestibility</td>
<td>All others combined</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>High co-witness status, not endorsed</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>High co-witness status, endorsed</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Low co-witness status, not endorsed</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>Low co-witness status, endorsed</td>
<td>.09</td>
</tr>
</tbody>
</table>
Results of a follow-up hierarchical regression including parents income and the OP manipulations revealed parent’s income ($\beta = -.04, p = .668$) was unrelated to Total Interview Suggestibility, $R^2 = .002, F(1, 98) = .19, p = .668$. Income ($\beta = -.08, p = .41$) remained a non-significant predictor of suggestibility after including the OP manipulation ($\beta = .26, p = .01$). Similarly, parental income was not significantly related to suggestibility on VSSC Yield, $R^2 = .01, F(1, 98) = .49, p = .49$, or VSSC Shift $R^2 = .002, F(1, 98) = 1.18, p = .28$.

**Within-subjects effect of endorsement.** The endorsed/not endorsed questions were not independent of (crossed with) the types of questions. The endorsement conditions were randomly assigned to question type. Specifically, only three of the eight misleading mundane questions were endorsed by interviewers, and only six of the eight misleading fantastic questions were endorsed. Table 10 compares children's assent rates for endorsed and non-endorsed misleading questions, with results reported separately for misleading mundane and misleading fantastic questions. Only children in the two endorsement conditions are included, because children in the other conditions did not receive any endorsement. As Table 10 shows, some results were the opposite of what might be expected. Specifically, in the misleading fantastic condition, children were more likely to answer "yes" to non-endorsed questions than to endorsed questions.

To explore whether the higher assent rates for non-endorsed questions might be due to differential qualities of the questions themselves rather than to the effects of endorsement, follow-up analyses were performed using all other participants. As Table 11 shows, the children who did not receive the endorsement manipulation also showed a greater likelihood of responding yes to the questions selected to be non-endorsed in the **endorsed condition.** In other words, it appears that the non-endorsed questions had a higher assent rate, whether or not
endorsement had actually occurred. Thus, the paradoxical finding that endorsement caused children to give fewer assents to misleading questions should be interpreted very cautiously.

Table 10


<table>
<thead>
<tr>
<th>Question</th>
<th>Endorsement</th>
<th>Mean</th>
<th>SD</th>
<th>t(39)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misleading Mundane</td>
<td>Endorsed</td>
<td>.37</td>
<td>.37</td>
<td>-1.45</td>
<td>.16</td>
</tr>
<tr>
<td></td>
<td>Not Endorsed</td>
<td>.43</td>
<td>.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misleading Fantastic</td>
<td>Endorsed</td>
<td>.38</td>
<td>.42</td>
<td>-2.16</td>
<td>.04*</td>
</tr>
<tr>
<td></td>
<td>Not Endorsed</td>
<td>.46</td>
<td>.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>True Event</td>
<td>Endorsed</td>
<td>.74</td>
<td>.29</td>
<td>-1.97</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>Not Endorsed</td>
<td>.83</td>
<td>.21</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05.
Table 11

Proportion of Children Assenting to Misleading Questions in the “Endorsed” Group, Misleading Questions in the “Non-Endorsed” Group, and True Events. By Mundane or Fantastic Questions. Only for Children Who Did Not Receive the Endorsement Manipulation. (N = 60)

<table>
<thead>
<tr>
<th>Question</th>
<th>Endorsement (in Endorsed Group)</th>
<th>Mean</th>
<th>SD</th>
<th>t(99)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misleading Mundane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Endorsed</td>
<td></td>
<td>.36</td>
<td>.35</td>
<td>-0.78</td>
<td>.94</td>
</tr>
<tr>
<td>Not Endorsed</td>
<td></td>
<td>.36</td>
<td>.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misleading Fantastic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endorsed</td>
<td></td>
<td>.29</td>
<td>.36</td>
<td>-2.47</td>
<td>.02*</td>
</tr>
<tr>
<td>Not Endorsed</td>
<td></td>
<td>.38</td>
<td>.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>True Event</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endorsed</td>
<td></td>
<td>.88</td>
<td>.20</td>
<td>2.10</td>
<td>.04*</td>
</tr>
<tr>
<td>Not Endorsed</td>
<td></td>
<td>.82</td>
<td>.20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05.

Individual Differences

Descriptive statistics. Table 12 presents descriptive statistics for children's performance on measures of language/verbal ability, executive function (EF), and theory of mind (ToM).

Table 12

Descriptive Statistics for Individual Difference Predictors. All Participants (N = 100)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodcock Total English</td>
<td>12</td>
<td>87</td>
<td>41.8</td>
<td>15.1</td>
</tr>
<tr>
<td>Woodcock Total Spanish</td>
<td>0</td>
<td>79</td>
<td>14.5</td>
<td>15.3</td>
</tr>
<tr>
<td>Theory of Mind Aggregate</td>
<td>0</td>
<td>5</td>
<td>2.6</td>
<td>1.4</td>
</tr>
<tr>
<td>Executive Function Aggregate</td>
<td>1</td>
<td>65</td>
<td>27.2</td>
<td>12.1</td>
</tr>
<tr>
<td>Executive Function Inhibitory</td>
<td>0</td>
<td>32</td>
<td>21.0</td>
<td>9.4</td>
</tr>
<tr>
<td>Executive Function Working Memory</td>
<td>0</td>
<td>32</td>
<td>4.9</td>
<td>4.6</td>
</tr>
<tr>
<td>Executive Function Delay</td>
<td>0</td>
<td>2</td>
<td>1.3</td>
<td>0.7</td>
</tr>
</tbody>
</table>
The internal consistency of the ToM scale was found to be acceptable ($KR-20 = .68$). However, the internal consistency of a composite combining the seven EF tasks was poor ($\alpha = .57$). A composite based on the three EF subscales (e.g., Inhibitory, Working Memory, and Delay) also had unacceptable internal consistency ($\alpha = .37$; if Working Memory deleted, $\alpha = .46$). Separately, the Delay subscale comprised of two items had unacceptable internal consistency ($KR-20 = .23$). The Working Memory subscale comprised of two items also had unacceptable internal consistency ($\alpha = .17$). The Inhibitory subscale, comprised of three items, was slightly better but still had poor internal consistency ($\alpha = .57$).

**Language/verbal ability.** Children's scores on the WMLS-R English and Spanish subtests indicated that children were generally fluent in English, but with a wide range of scores on Spanish. Figure 1 shows children ordered by their Spanish scores. Each blue bar shows the English score of one child, followed immediately by that same child’s Spanish score in red (including 10 scores of 0). Figure 1 shows that almost all children had higher scores on English than Spanish. The right side of the chart illustrates that only 13 children’s Spanish scores were higher than their English scores.

As expected, scores on the Language Background Questionnaire ($N = 88$), which is based on parent report, correlated strongly with the WMLS-R scores (with English: $r = -.21, p = .046$; with Spanish: $r = .70, p < .001$). However, the two WMLS-R measures ($N = 100$) were not significantly related ($r = .05, p = .584$).

Language ability as measured by the Language Background Questionnaire was significantly related to suggestibility. In addition, children who spoke Spanish more in the home had lower Accuracy for True Events than children who spoke English more in the home ($r = .23, p = .034$). Children with better language abilities as measured by the Woodcock English Total
scores had better ToM ($r = .25, p = .012$), better EF ($r = .27, p < .001$), yielded less on the VSSC ($r = -.40, p < .001$), exhibited greater EF inhibitory abilities ($r = .30, p = .003$), and greater EF working memory abilities ($r = .33, p = .001$). Children’s Spanish language ability on the WMLS-R was similarly significantly related to better overall EF ($r = .43, p < .001$), better inhibitory EF ($r = .35, p < .001$), EF working memory ($r = .40, p < .001$), and EF delay, ($r = .23, p = .019$).

![Figure 1. Comparison between each child’s English and Spanish score, ordered by Spanish score.](image)

**Age differences in children's suggestibility.** Table 13 illustrates that children exhibited the expected developmental gains in resistance to suggestibility. Post hoc comparisons showed the expected developmental differences as well, with three-year-olds significantly higher than four- and five-year olds on Total Interview Suggestibility and on the VSSC Yield scale. Contrast analyses indicated there were no significant differences between the four- and five-year olds.
Table 13

*Mean Proportions of Children’s Suggestible Responses as a Function of Age. (One-Way ANOVA Results. Standard Deviations in Parentheses)*

<table>
<thead>
<tr>
<th>Suggestibility Measures</th>
<th>Age</th>
<th>Age Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3-Year-Olds</td>
<td>4-Year-Olds</td>
</tr>
<tr>
<td></td>
<td>(n = 30)</td>
<td>(n = 43)</td>
</tr>
<tr>
<td>Total Interview Suggestibility</td>
<td>0.56 (0.35)</td>
<td>0.32 (0.34)</td>
</tr>
<tr>
<td>Accuracy for True Events</td>
<td>0.85 (0.21)</td>
<td>0.84 (0.13)</td>
</tr>
<tr>
<td>VSSC Shift</td>
<td>0.34 (0.23)</td>
<td>0.31 (0.17)</td>
</tr>
<tr>
<td>VSSC Yield</td>
<td>0.73 (0.30)</td>
<td>0.49 (0.28)</td>
</tr>
</tbody>
</table>

Note: VSSC = Video Suggestibility Scale for Children.

**p < .01, ***p < .001.

**Age differences in theory of mind and executive function.** Children exhibited the expected developmental patterns on most ToM and EF tasks (see Table 14 and Table 15). There were age effects for both ToM and EF Aggregate scores. Post hoc comparisons revealed the expected developmental differences as well, with three-year-olds performing significantly more poorly than four- and five-year olds on the aggregated ToM tasks. There were no significant contrasts between the four- and five-year olds on the ToM tasks. Post hoc comparisons also revealed that each age group differed significantly from the others on the aggregated EF tasks, with five-year-olds performing the best overall, as expected. Taken together, these results provide support for hypothesis 7 and bolster previous findings regarding the developmental patterns of EF and ToM.
Table 14

Mean Theory of Mind (ToM) Performance as a Function of Age and One-Way ANOVA Results

<table>
<thead>
<tr>
<th>Theory of Mind Measures:</th>
<th>3-Year-Olds (n = 30)</th>
<th>4-Year-Olds (n = 43)</th>
<th>5-Year-Olds (n = 27)</th>
<th>Age Difference</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diverse Desires</td>
<td>0.63 (0.49)</td>
<td>0.86 (0.35)</td>
<td>0.89 (0.32)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge Access</td>
<td>0.23 (0.43)</td>
<td>0.58 (0.50)</td>
<td>0.74 (0.45)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contents-False Belief</td>
<td>0.00 (0.00)</td>
<td>0.21 (0.41)</td>
<td>0.52 (0.51)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diverse Belief</td>
<td>0.53 (0.51)</td>
<td>0.72 (0.45)</td>
<td>0.67 (0.48)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real-Apparent Emotion</td>
<td>0.27 (0.45)</td>
<td>0.49 (0.51)</td>
<td>0.37 (0.49)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Content</td>
<td>0.27 (0.45)</td>
<td>0.56 (0.50)</td>
<td>0.67 (0.48)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>0.33 (0.48)</td>
<td>0.60 (0.50)</td>
<td>0.74 (0.45)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ToM Aggregate Score</td>
<td>1.67 (0.96)</td>
<td>2.86 (1.34)</td>
<td>3.19 (1.30)</td>
<td>12.73</td>
<td>.000***</td>
<td></td>
</tr>
</tbody>
</table>

***p < .001.
Table 15

Mean Executive Function (EF) Performance as a Function of Age and One-Way ANOVA Results

<table>
<thead>
<tr>
<th>Executive Function Measures</th>
<th>Age Difference</th>
<th>3-Year-Olds (n = 30)</th>
<th>4-Year-Olds (n = 43)</th>
<th>5-Year-Olds (n = 27)</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay of Gratification</td>
<td>0.60 (0.50)</td>
<td>0.72 (0.45)</td>
<td>0.74 (0.09)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DCCS</td>
<td>2.97 (3.48)</td>
<td>4.84 (3.48)</td>
<td>5.81 (2.77)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digit Span</td>
<td>1.67 (0.92)</td>
<td>2.56 (0.98)</td>
<td>3.22 (1.55)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day/Night Stroop</td>
<td>3.77 (3.21)</td>
<td>5.70 (2.57)</td>
<td>6.22 (2.44)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tower of London</td>
<td>1.07 (1.64)</td>
<td>2.28 (4.27)</td>
<td>4.19 (5.55)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand Game</td>
<td>6.60 (6.13)</td>
<td>12.16 (5.17)</td>
<td>14.70 (2.69)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gift Delay</td>
<td>0.37 (0.49)</td>
<td>0.72 (0.45)</td>
<td>0.81 (0.08)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EF Aggregate Score</td>
<td>17.03 (9.91)</td>
<td>28.98 (9.76)</td>
<td>35.70 (9.59)</td>
<td>27.24</td>
<td>.000***</td>
<td></td>
</tr>
</tbody>
</table>

Note: DCCS = Dimensional Change Card Sorting; EF = Executive Function

***p < .001.

Table 16 shows the correlations among the overall summary scores on the ToM tasks, EF tasks, the Paco Interview 1 questions, and the VSSC questions. Consistent with hypotheses 1 and 2, children with better ToM and EF were less suggestible overall. Better ToM and EF were significantly correlated with all measures of suggestibility except VSSC Shift. Shift was not significantly related to any ToM measures, and only approached significance with the EF Inhibitory subtype. Consistent with previous literature, the relationship between EF, ToM, and suggestibility appears to be driven primarily by the Inhibitory subtype of EF: overall ToM and suggestibility correlated more strongly with the Inhibitory subtype of EF, than with working memory, or delay.
Table 16

Correlations Theory of Mind (ToM), Executive Function (EF), Age, Language/Vocabulary Ability, and Suggestibility Measures. \(N = 100\)

<table>
<thead>
<tr>
<th>Measure</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
<th>8.</th>
<th>9.</th>
<th>10.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ToM Aggregate</td>
<td>.45**</td>
<td>.44**</td>
<td>.25*</td>
<td>.30**</td>
<td>- .23*</td>
<td>.03</td>
<td>- .35**</td>
<td>.42**</td>
<td>.25*</td>
</tr>
<tr>
<td>2. EF Aggregate</td>
<td>.93**</td>
<td>.68**</td>
<td>.29**</td>
<td>- .46**</td>
<td>- .15</td>
<td>- .46**</td>
<td>.64**</td>
<td>.37**</td>
<td></td>
</tr>
<tr>
<td>3. EF Inhibitory</td>
<td>.38**</td>
<td>.22**</td>
<td>- .42**</td>
<td>- .18</td>
<td>- .36**</td>
<td>.60**</td>
<td>.30**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. EF Working Memory</td>
<td>.16</td>
<td>- .29**</td>
<td>- .02</td>
<td>- .43**</td>
<td>.41**</td>
<td>.33**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. EF Delay</td>
<td>- .25*</td>
<td>- .06</td>
<td>- .28</td>
<td>.35**</td>
<td>.14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Total Interview Suggestibility</td>
<td>- .07</td>
<td>.60**</td>
<td>- .40**</td>
<td>- .18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. VSSC Shift</td>
<td>.04</td>
<td>- .07</td>
<td>- .08</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. VSSC Yield</td>
<td>- .35**</td>
<td>- .40**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Age in Months</td>
<td>.24*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Woodcock English</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: VSSC = Video Suggestibility Scale for Children.

\*p < .05, \**p < .01, \***p < .001

When controlling for age, gender, and language abilities on the WMLS-R English and Spanish tests, partial correlations revealed the relationships between ToM and suggestibility generally became smaller and non-significant, whereas the relationship between EF and suggestibility persisted (see Table 17). This is consistent with findings reported by Carlson and Moses (2001), and specifically with the Inhibitory EF subtype being the most predictive.
Table 17

Partial Correlations between Theory of Mind (ToM), Executive Function (EF), and Suggestibility Measures controlling for Age in Months, Gender, and Language/Vocabulary Ability

<table>
<thead>
<tr>
<th>Measure</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
<th>8.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ToM Aggregate</td>
<td>.26*</td>
<td>.25*</td>
<td>.08</td>
<td>.17</td>
<td>-.07</td>
<td>.079</td>
<td>-.21*</td>
</tr>
<tr>
<td>2. EF Aggregate</td>
<td>.89***</td>
<td>.53***</td>
<td>.07</td>
<td>-.26**</td>
<td>-.14</td>
<td>-.24*</td>
<td></td>
</tr>
<tr>
<td>3. EF Inhibitory</td>
<td>.08</td>
<td>.00</td>
<td>-.23*</td>
<td>-.17</td>
<td>-.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. EF Working Memory</td>
<td>-.02</td>
<td>-.13</td>
<td>.00</td>
<td>-.27**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. EF Delay</td>
<td>-.13</td>
<td>-.06</td>
<td>-.19</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Total Interview Suggestibility</td>
<td>-.13</td>
<td>.53***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. VSSC Shift</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. VSSC Yield</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: VSSC = Video Suggestibility Scale for Children.

*p < .05, **p < .01, ***p < .001.

Correlations among theory of mind and executive function tasks. The partial correlations among all ToM tasks and all EF tasks are reported in the tables below, controlling for age, gender, and language/vocabulary ability. Table 18 shows the partial correlations among all ToM tasks. The ToM aggregate score used in most analyses reported in this study consists of all of the ToM tasks.

Table 19 shows the partial correlations among all EF tasks, subscales, and overall aggregate EF score. The EF Inhibitory subscale was comprised of the DCCS, Day/Night Stroop,
and Hand Game tasks. The EF Working Memory subscale was comprised of the Tower of London and Digit Span tasks. The EF Delay subscale was comprised of the Delay of Gratification and Gift Delay tasks. The EF aggregate score used in most analyses reported in this study consists of all EF tasks. These categories of subscales were used based on prior research generally demonstrating these tasks load on similar factors. Table 20 shows the partial correlations among all ToM and EF tasks, and the three EF subscales (Inhibitory, Working Memory, and Delay).

Table 18

*Partial Correlations of Theory of Mind Tasks Controlling for Age, Gender, and Language/Vocabulary Ability. (N = 100)*

<table>
<thead>
<tr>
<th>Measure</th>
<th>KA</th>
<th>CFB</th>
<th>DB</th>
<th>RAE</th>
<th>C</th>
<th>L</th>
<th>Aggregate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diverse Desires</td>
<td>.12</td>
<td>.02</td>
<td>.21*</td>
<td>.09</td>
<td>.04</td>
<td>-.05</td>
<td>.47***</td>
</tr>
<tr>
<td>Knowledge Access (KA)</td>
<td>.18</td>
<td>.14</td>
<td>.21*</td>
<td>.38***</td>
<td>.34**</td>
<td>.60***</td>
<td></td>
</tr>
<tr>
<td>Contents False Belief (CFB)</td>
<td>.07</td>
<td>.22*</td>
<td>.16</td>
<td>.16</td>
<td>.16</td>
<td></td>
<td>.49***</td>
</tr>
<tr>
<td>Diverse Belief (DB)</td>
<td>.20</td>
<td>.07</td>
<td>.31**</td>
<td>.60***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real Apparent Emotion (RAE)</td>
<td></td>
<td>.21*</td>
<td>.19</td>
<td></td>
<td></td>
<td></td>
<td>.64***</td>
</tr>
<tr>
<td>Contents (C)</td>
<td></td>
<td></td>
<td></td>
<td>.31**</td>
<td>.31**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location (L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.35***</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01, ***p < .001.
**Table 19**

*Partial Correlations of Executive Function Tasks Controlling for Age, Gender, and Language/Vocabulary Ability. (N = 100)*

<table>
<thead>
<tr>
<th>Measure</th>
<th>DCCS</th>
<th>DS</th>
<th>D/N</th>
<th>ToL</th>
<th>HG</th>
<th>GD</th>
<th>Aggregate</th>
<th>Inhibitory</th>
<th>WM</th>
<th>Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay of Gratification (DoG) - Delay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensional Change Card Sorting (DCCS) - Inhibitory</td>
<td>.15</td>
<td>.09</td>
<td>-10</td>
<td>.17</td>
<td>.16</td>
<td>.45***</td>
<td>.58***</td>
<td>-.06</td>
<td>-.04</td>
<td></td>
</tr>
<tr>
<td>Digit Span (DS) - WM</td>
<td>.26*</td>
<td>-.04</td>
<td>.23*</td>
<td>.11</td>
<td>.37***</td>
<td>.31**</td>
<td>.22*</td>
<td>.10</td>
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<td></td>
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<td>Day/Night Stroop (D/N) - Inhibitory</td>
<td>.10</td>
<td>.26*</td>
<td>.02</td>
<td>.55***</td>
<td>.58***</td>
<td>.16</td>
<td>-.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tower of London (ToL) - WM</td>
<td>.09</td>
<td>-.13</td>
<td>.49***</td>
<td>.05</td>
<td>.97***</td>
<td>-.02</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand Game (HG) - Inhibitory</td>
<td></td>
<td></td>
<td></td>
<td>.03</td>
<td>.75***</td>
<td>.82***</td>
<td>.15</td>
<td>.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gift Delay (GD) - Delay</td>
<td>.09</td>
<td>.09</td>
<td>-.10</td>
<td>.72***</td>
<td>.09</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Aggregate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.88***</td>
<td>.57***</td>
<td>.09</td>
<td></td>
</tr>
<tr>
<td>Inhibitory Subscale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.13</td>
<td>.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working Memory Subscale (WM)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05, **p < .01, ***p < .001.

**Table 20**

*Partial Correlations of Theory of Mind (ToM) and Executive Function (EF) Tasks, Controlling for Age, Gender, and Language/Vocabulary Ability. (N = 100)*

<table>
<thead>
<tr>
<th>Theory of Mind Measures</th>
<th>DoG</th>
<th>DCCS</th>
<th>DS</th>
<th>D/N</th>
<th>ToL</th>
<th>HG</th>
<th>GD</th>
<th>Aggregate</th>
<th>Inhibitory</th>
<th>WM</th>
<th>Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diverse Desires</td>
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<td>.19</td>
<td>.09</td>
<td>.19</td>
<td>.07</td>
<td>.18</td>
<td>.11</td>
<td>.27**</td>
<td>.27**</td>
<td>.09</td>
<td>.08</td>
</tr>
<tr>
<td>Knowledge Access</td>
<td>.09</td>
<td>.11</td>
<td>.26**</td>
<td>.05</td>
<td>-.03</td>
<td>.14</td>
<td>.17</td>
<td>.16</td>
<td>.15</td>
<td>.04</td>
<td>.17</td>
</tr>
<tr>
<td>Contents False Belief</td>
<td>-.01</td>
<td>.17</td>
<td>.14</td>
<td>.15</td>
<td>-.10</td>
<td>.07</td>
<td>.14</td>
<td>.12</td>
<td>.18</td>
<td>-.06</td>
<td>.08</td>
</tr>
<tr>
<td>Diverse Beliefs</td>
<td>-.05</td>
<td>.10</td>
<td>-.02</td>
<td>.06</td>
<td>.14</td>
<td>-.02</td>
<td>.11</td>
<td>.11</td>
<td>.05</td>
<td>.13</td>
<td>.04</td>
</tr>
<tr>
<td>Real Apparent Emotion</td>
<td>.09</td>
<td>.01</td>
<td>.12</td>
<td>-.01</td>
<td>-.06</td>
<td>.10</td>
<td>.06</td>
<td>.05</td>
<td>.06</td>
<td>-.03</td>
<td>.11</td>
</tr>
<tr>
<td>Contents</td>
<td>-.034</td>
<td>.09</td>
<td>.28</td>
<td>.04</td>
<td>.12</td>
<td>.25*</td>
<td>.09</td>
<td>.27**</td>
<td>.22*</td>
<td>.19</td>
<td>.03</td>
</tr>
<tr>
<td>Location</td>
<td>.11</td>
<td>-.04</td>
<td>.13</td>
<td>-.04</td>
<td>.14</td>
<td>-.05</td>
<td>-.08</td>
<td>.02</td>
<td>-.07</td>
<td>.16</td>
<td>.02</td>
</tr>
<tr>
<td>ToM Aggregate</td>
<td>.04</td>
<td>.19</td>
<td>.21*</td>
<td>.14</td>
<td>.01</td>
<td>.16</td>
<td>.21*</td>
<td>.24*</td>
<td>.24*</td>
<td>.06</td>
<td>.17</td>
</tr>
</tbody>
</table>


*p < .05, **p < .01.
Relationship of each theory of mind and executive function task with suggestibility.

As previously discussed, the EF subscales in this study did not have strong coherence within themselves. Table 21 provides partial correlations (controlling for age, gender, and language/vocabulary ability), of the individual ToM tasks and the individual EF tasks with the three measures of suggestibility used in this study (VSSC Yield, VSSC Shift, and Paco Total Interview Suggestibility). The EF Inhibitory subscale was comprised of the DCCS, Day/Night Stroop, and Hand Game tasks. The EF Working Memory subscale was comprised of the Tower of London and Digit Span tasks. The EF Delay subscale was comprised of the Delay of Gratification and Gift Delay tasks.
Table 21

Partial Correlations Among each individual difference measure with VSSC Yield, VSSC Shift, and Total Interview Suggestibility, Controlling for Age, Gender, and Language Ability. (N = 100)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Suggestibility Measure</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VSSC Shift</td>
<td>VSSC Yield</td>
<td>Total Interview Suggestibility</td>
</tr>
<tr>
<td>ToM Diverse Desires</td>
<td>.01</td>
<td>-.01</td>
<td>.03</td>
</tr>
<tr>
<td>ToM Knowledge Access</td>
<td>.08</td>
<td>-.37***</td>
<td>-.19</td>
</tr>
<tr>
<td>ToM Contents False Belief</td>
<td>.18</td>
<td>-.14</td>
<td>-.11</td>
</tr>
<tr>
<td>ToM Divers Beliefs</td>
<td>-.07</td>
<td>-.15</td>
<td>.01</td>
</tr>
<tr>
<td>ToM Real Apparent Emotion</td>
<td>.03</td>
<td>.09</td>
<td>.07</td>
</tr>
<tr>
<td>ToM Contents</td>
<td>.03</td>
<td>-.28**</td>
<td>-.14</td>
</tr>
<tr>
<td>ToM Location</td>
<td>-.03</td>
<td>-.22*</td>
<td>.09</td>
</tr>
<tr>
<td>EF Delay Subscale Tasks:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EF Delay of Gratification</td>
<td>.07</td>
<td>-.04</td>
<td>.03</td>
</tr>
<tr>
<td>EF Gift Delay</td>
<td>-.15</td>
<td>-.25*</td>
<td>-.24*</td>
</tr>
<tr>
<td>EF Inhibitory Subscale Tasks:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EF DCCS</td>
<td>-.09</td>
<td>-.08</td>
<td>-.14</td>
</tr>
<tr>
<td>EF Day/Night Stroop</td>
<td>-.21*</td>
<td>.02</td>
<td>-.13</td>
</tr>
<tr>
<td>EF Hand Game</td>
<td>-.04</td>
<td>-.15</td>
<td>-.19</td>
</tr>
<tr>
<td>EF Working Memory Subscale Tasks:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EF Digit Span</td>
<td>.06</td>
<td>-.19</td>
<td>-.12</td>
</tr>
<tr>
<td>EF Tower of London</td>
<td>.02</td>
<td>-.22*</td>
<td>-.10</td>
</tr>
</tbody>
</table>

Note: VSSC = Video Suggestibility Scale for Children; ToM = Theory of Mind; EF = Executive Function; DCCS = Dimensional Change Card Sorting. *p < .05, **p < .01, ***p < .001.
Hierarchical multiple regressions examining how the individual difference factors are related to children’s suggestibility as measured by VSSC Yield, VSSC Shift, and Total Interview Suggestibility. Three hierarchical multiple regressions were performed to examine the relationship of individual difference variables (age, language/vocabulary ability, ToM, EF, EF Inhibitory subtype, EF Working Memory Subtype, and EF Delay subtype) with child suggestibility (VSSC Yield, VSSC Shift, and Total Interview Suggestibility).

In the first multiple regression, VSSC Yield was the criterion. In the first step of the regression, age and language/vocabulary ability were entered as predictors. The model was significant at the first step, $R^2 = .23$, $F(2, 97) = 14.44$, $p < .001$. Both age ($\beta = -.28$, $p = .003$) and language/vocabulary ability ($\beta = -.33$, $p < .001$) were significant predictors at this step. In the second step of the regression, all of the remaining individual difference predictors were entered as predictors (ToM, EF, EF Inhibitory subtype, EF Working Memory Subtype, and EF Delay subtype). The model was also significant at the second step, $\Delta R^2 = .10$, $F(4, 93) = 3.37$, $p = .01$. The only individual difference predictor entered in the second step that significantly predicted VSSC Yield was the EF Working Memory subtest, ($\beta = -.24$, $p = .014$). In addition, language/vocabulary ability still significantly predicted suggestibility ($\beta = -.23$, $p = .02$).

In the second multiple regression, VSSC Shift was the criterion. The predictors were entered hierarchically as already described for VSSC Yield. In the first step (entering age and language/vocabulary ability as predictors) the model was non-significant $R^2 = .01$, $F(2, 97) = .43$, $p = .65$. In the second step (entering all remaining individual difference predictors) the model remained non-significant, $\Delta R^2 = .05$, $F(4, 93) = 1.10$, $p = .36$. 
In the third multiple regression, Total Interview Suggestibility was the criterion. In the first step of the regression, age and language/vocabulary ability were entered as predictors. The model was statistically significant at the first step, $R^2 = .16, F(2, 97) = 9.54, p < .001$. Age significantly predicted suggestibility ($\beta = -.37, p < .001$) at this step, but language/vocabulary ability did not ($\beta = -.09, p = .34$). In the second step of the regression, co-witness status and endorsement were entered as predictors. Co-witness status was coded as follows: high status (1), low status (0), and control (-1). Endorsement was coded as follows: endorsement (1), no endorsement, and control (-1). The model was statistically significant at the second step, $\Delta R^2 = .08, F(2, 95) = 5.20, p = .007$. Significant predictors at this step were age ($\beta = -.35, p < .001$), and co-witness status ($\beta = .29, p = .004$). In the third step of the regression, all remaining individual difference variables were entered. The model was statistically significant at the third step, $\Delta R^2 = .05, F(4, 91) = 1.76, p = .14$. At this step, only co-witness status remained significant ($\beta = .27, p = .007$).

**Relationships Among Suggestibility Measures**

A hierarchical multiple regression was conducted to further explore the relationship between the VSSC measures of suggestibility and the Paco Total Interview Suggestibility. Age and the OP experimental condition were entered at the first step. The OP condition was coded as 1, while the non-manipulated control condition was coded as 0. VSSC Yield and VSSC Shift were entered at the second step. The model was significant at step one, $R^2 = .22, F(2, 97) = 14.04, p < .001$. Both age ($\beta = -.41, p < .001$) and the OP manipulation ($\beta = .26, p = .004$) significantly predicted suggestibility, as previously found. The second step was also significant, $\Delta R^2 = .22, F(2, 95) = 19.19, p < .001$. The VSSC Yield measure ($\beta = .50, p < .001$) significantly
predicted Paco Total Interview Suggestibility, controlling for age (β = -.23, p = .006), and the OP condition (β = .23, p = .004). The VSSC Shift measure was not a significant predictor of Total Interview Suggestibility, (β = -.05, p = .499). Similar analyses were conducted coding the experimental manipulations as co-witness status and endorsement, with essentially the same results as above.

**Differences Across Locations Used in the Current Study**

The effect of location (preschools and daycares) on a number of background variables, as well as the individual difference variables, and suggestibility variables was examined. Location was coded as nine dummy variables coded with 1’s and 0’s. Children differed significantly by location on age, \(F(9, 90) = 3.54, p = .001\), mother’s education level, \(F(9, 90) = 2.57, p = .01\), father’s education level, \(F(9, 90) = 7.71, p < .001\), and parent’s income level, \(F(9, 90) = 5.65, p < .001\). Regarding the other individual difference measures, children differed significantly by location on EF Aggregate scores, \(F(9, 90) = 3.27, p = .002\), EF Inhibitory scores, \(F(9, 90) = 2.38, p = .018\), EF Working Memory scores, \(F(9, 90) = 2.90, p = .005\), EF Delay scores, \(F(9, 90) = 2.67, p = .009\), and on language/vocabulary ability, \(F(9, 90) = 4.29, p < .001\). Children also differed significantly by location on VSSC Yield scores, \(F(9, 90) = 2.17, p = .03\). No significant differences were found for the remaining variables.

Children were randomly assigned to experimental conditions independent of location. Thus location was not confounded with experimental condition and was appropriately used as a covariate. A multiple regression was conducted, including location at step one, and the OP manipulation at step two to determine if location affected Total Interview Suggestibility. Locations were dummy coded, resulting in 9 different dummy variables coded with 1’s and 0’s, and the OP manipulation was coded as OP manipulation (1), and control condition (0). The
model was not significant at the first step, $R^2 = .12$, $F(9, 90) = 1.35$, $p = .221$, indicating no differences in suggestibility across locations. The model was significant at the second step, $\Delta R^2 = .05$, $F(1, 89) = 5.40$, $p = .02$. These results indicate that even though there were differences among the locations/preschools in the study, these differences did not account for the main experimental findings regarding the impact of the OP manipulation on Total Interview Suggestibility.

**Exploratory Analyses**

**Paco interview 2 free recall.** As previously mentioned, few children made false reports during the free recall task at Paco Interview 2. The video recordings of the second Paco free-recall task were transcribed and coded for (a) the number of false reports made about Paco Perez that reflected the suggestive questions from Paco Interview 1 (Paco False Recall) and (b) the number of false reports made about other topics (Other False Recall). There were no significant differences across the experimental conditions for children who reported Paco False Recall items, $\chi^2 (4) = 1.16$, $p = .884$. However, there was a significant difference for children who reported Other False Recall items across conditions, $\chi^2 (4) = 11.91$, $p = .018$). Children in the high status, endorsement condition provided the most Other False Recall statements during their free-recall interviews, and children in the low status, endorsement condition provided the least amount of Other False Recall statements. There were also significant differences between age groups for both the Paco False Recall items, $\chi^2 (2) = 6.05$, $p = .049$, and Other False Recall items $\chi^2 (2) = 7.26$, $p = .027$. Three and four year olds provided many more Other False Recall and Paco False Recall items than five year olds. No five year olds provided Paco False Recall items.
Paco False Recall items included statements such as Paco said a bad word, told a secret, and threw a crayon at a child. The other false reports ranged from relatively innocent statements (e.g., “he broke a crown,” Child 010; “ripping papers,” Child 011), to more serious allegations, (e.g., “I fell down, Paco pushed mommy, put blood on her, mommy had to go to hospital…he pushed me, bit my arm,” Child 001; “he found a lady bug…he changed my name to knuckles…he punched me off my chair,” Child 006; “got shot,” Child 018; “got spanked by mom and dad,” Child 013).
Discussion

The current study examined the influence of social pressure and individual differences on preschool children's suggestibility. Several findings were notable. First, children's willingness to assent to false accusations was significantly increased if they were told that a co-witness (another child or a teacher) had made similar accusations. However, no significant effect of co-witness status (high vs. low) or endorsement was found. Second, replicating findings from previous studies, younger children were found to be significantly more suggestive than older children. Third, consistent with previous research findings, children exhibited expected developmental gains in ToM and EF between the ages of three and five years old. Additionally, children with ToM and better EF and language/vocabulary abilities tended to be less suggestible overall. Fourth, suggestibility as measured by the VSSC Yield factor was significantly and substantially correlated with suggestibility as measured by the Paco Perez interview. The following sections will discuss each of these points.

The Effect of the Other Person Technique on Child Suggestibility

The "Other People" (OP) interviewing technique (Garven et al., 1998) involves telling a child what another witness to an event (i.e., a co-witness) has supposedly reported. In the current study, the status and credibility of the co-witness was manipulated to better understand the technique's effects. Prior research on the OP technique has not consistently found that it increases suggestibility. As previously discussed, Carol (in press) found that older children and young adults were more suggestible when the co-witness was of high status than when the witness was of low status. However, Garven et al. (1998) did not find an effect of the technique with younger children.
The current study examined the OP technique among preschool aged children. It was hypothesized that children would be more likely to assent to false accusations against a classroom visitor if the accusations supposedly originated from a high-status co-witness (a teacher) rather than a low-status witness (a peer). This hypothesis was not supported by the findings (see Tables 3 and 4). Although children made more false assents when the status of the co-witness was high rather than low (48% versus 34%), the difference was not statistically significant. Given the well-established pattern of decreased suggestibility over the ages of three to five, follow-up analyses were performed in which age was included as a covariate to determine if co-witness status had any additional effect on suggestibility. However, as before, no significant effects emerged for co-witness status when controlling for age (see Table 6).

Additional analyses were conducted to examine the effects of the OP technique, independent of the effects of co-witness status. It was found that children who were interviewed with the OP technique were significantly more likely to make false assents than control children who were questioned in a suggestive manner but without the OP technique (see Table 8). Previous researchers have used a similar suggestive control condition (e.g., see Camilletti, 2010; Garven et al., 1998; Garven et al., 2000; Uhl, 2011). These findings indicate that the OP technique increased children’s suggestibility, even though co-witness status had little additional effect.

In the second experimental manipulation in this study, the accusations of the other witness were either endorsed as believable, or not endorsed at all, by the interviewer. Anecdotal evidence indicates that such endorsements are sometimes offered by interviewers in real world child abuse cases. For example, interviewers sometimes make statement such as: “Your teacher said it happened and I believe her.” In the present study, it was hypothesized that such
interviewer endorsements would increase the number of false assents made by children. However, contrary to this hypothesis, interviewer endorsements did not significantly increase children's false assent rates in the present study (see Table 4). It should be noted, however, that the endorsements in the present study were delivered only at "half-strength." That is, when children in the endorsement condition were questioned, the experimental protocol dictated that interviewers give endorsements following only approximately half of the misleading questions. It is possible that if endorsements had been delivered at "full-strength," with interviewers giving endorsements following all misleading questions, an experimental effect might have been observed.

Overall, children did not incorporate many misleading suggestions from Paco Interview 1 into their free recall reports a week later during Paco Interview 2. However, some interesting findings emerged. Children in the high status, endorsement condition provided more Other False Recall, including statements such as Paco “punched me off my chair…got shot…broke a crown.”

Interestingly, five year olds did not report any Paco False Recall statements, and provided significantly fewer Other False Recall statements than three and four year olds. The absence of false recall among five year olds was somewhat unexpected in light of prior research. For example, a study by Uhl (2011) using a similar recall task found that false recall reports occurred among children as old as nine years old. However, the children in Uhl's study had been questioned suggestively using reinforcement during a previous interview, with a very high rate of false assents (approximately 40%). Perhaps these earlier false assents primed children in the Uhl study to give false recall reports later. In contrast, children in the present study had a
substantially lower false assent rate when questioned suggestively and therefore were less primed for later false recall than the children in the Uhl study.

**The Developmental Trajectory of Suggestibility, Theory of Mind, and Executive Function**

Age has been recognized for many years as a consistent predictor of suggestibility (e.g., see Bruck et al., 2002; Bruck & Melnyk, 2004). In general, younger children are more suggestible than older children and young adults (but see Finnila et al., 2003). In the current study, younger children were indeed more suggestible than older children (see Table 13). Three year olds (56%) acquiesced to misleading questions more than the four (32%) and five (22%) year olds. This may simply be due to an acquiescence bias in younger children.

Similar results were found using the VSSC outcome measures with age. Consistent with previous research, age effects for the Shift factor of the VSSC were not significant. However, VSSC Yield was significantly correlated with age, such that younger children were more suggestible than older children (see Table 16). Furthermore, the strength of the VSSC Yield findings provided further support that younger children may have an acquiescence bias.

As Carlson et al. (2002) and other researchers have demonstrated, children rapidly develop ToM and EF abilities during the preschool years. Most children have developed ToM by age five or six, and exhibit better EF abilities by then as well. The results of this study bolster these findings. Children exhibited expected developmental gains in both ToM and EF abilities, with older children performing significantly better than younger children on these constructs.
Relationships Among Theory of Mind, Executive Function, Language/Vocabulary Abilities, and Suggestibility

Consistent with previous research, children in the present study who exhibited higher language and vocabulary skills were less suggestible, and exhibited better ToM and EF abilities (see Table 16 and Table 17). Of particular interest in the current study was the relationship between ToM and EF abilities. As previously discussed, the relationship between ToM and EF is still a subject of debate. Researchers have proposed two possible explanations for the ToM and EF relationship, including an emergence and expression hypothesis (e.g., Carlson & Moses, 2001; Carlson et al., 2002). According to Carlson et al. (2002), the issue comes down to whether or not EF abilities allow ToM to emerge, or if they simply allow pre-existing ToM capacities to manifest themselves. In addition, while both these constructs are related to suggestibility, results have been inconsistent regarding their interactive effects on suggestibility.

Results from the current study provide some clarifications to this debate. As expected, ToM and better EF abilities were significantly related to decreased suggestibility. To determine if these results were simply an effect of age, partial correlations of ToM and EF with suggestibility were calculated controlling for age, gender, and language/vocabulary ability (see Table 17). Intriguingly, the correlation of ToM with suggestibility decreased to non-significance, while the correlation of EF (particularly the Inhibitory subtype) with suggestibility remained significant. This study cannot directly assess whether ToM and EF are causally related. However, the finding that EF correlated more strongly with suggestibility than did ToM provides evidence that cognitive factors greatly influence suggestibility.
Relationships Among Different Measurements of Suggestibility

Children’s suggestibility has been measured in numerous ways, including through the use of auditory recordings, storybook readings, standardized scales, and even live events (e.g., Garven et al., 1998; Gudjonsson, 1984, 1987; Scullin & Ceci, 2001; Warren et al., 1999, as cited in Melinder et al., 2005). The current study used both a live event (the Paco interview), and a standardized measure of suggestibility (e.g., the VSSC). For the live event, children were asked misleading questions about what happened when a confederate, Paco Perez, came to read them a story. For the VSSC, children watched a video taped birthday party and then asked misleading questions. Children were questioned for the Paco visit in a similar manner to the VSSC.

As expected, the VSSC Yield subscale was significantly related to the Paco Total Interview Suggestibility score for the live event even after controlling for age and language/vocabulary ability, ($r = 53$, $p < .001$). This is a very strong correlation for behavioral measures, and results of a regression also indicated the VSSC Yield subscale was a strong predictor of Total Interview Suggestibility ($\beta = .50$, $p < .001$). Additionally, the VSSC was administered at Session 3, one week after the Paco suggestive interviews. It is particularly impressive that these two behavioral measures correlated so strongly despite being administered one week apart.

This finding is of particular importance when considering ecological validity. Researchers use live events to mimic a real life situation a child may encounter as closely as possible. Few studies have assessed whether or not these live events are related to standardized measures of child suggestibility. Scullin, Kanaya, and Ceci (2002) found that Yield as measured on the VSSC significantly predicted younger children’s likelihood of saying yes to misleading questions in a suggestive interview about true and false events children participated in. In a
similar study, Karpinski and Scullin (2009) found Yield to be significantly related to suggestibility in a pressured interview following a live magic show. The current study provides evidence that such live events measures, such as the Paco Interview, and the Yield scale of the VSSC have good concurrent validity as indicators of child suggestibility.

**Practical Implications and Future Directions**

Despite more than twenty-five years of research into child suggestibility, results of this study and other prior studies reveal there is still much to learn. Real life interviews of children in sexual abuse and other forensic cases sometimes include a variety of suggestive interviewing techniques (e.g., see Garven et al., 1998). While in a real forensic case an interviewer may intertwine these techniques, it is important to experimentally disentangle their effects. This study isolated the effect of using the OP technique on children’s suggestibility. Results of the current study suggest that children acquiesce to misleading information more when an interviewer states that another person (i.e., a co-witness) has already confirmed this information as true. This finding is forensically relevant, given that real life interviewers sometimes mention another witness’s statement when interviewing children. The present study indicates that mentioning the statements of other witnesses can cause children to become suggestible and conform their own reports to what those witnesses have said.

In addition, while children did not provide many false allegations during the follow-up free recall task in Paco Interview 2, the false allegations they did provide were somewhat alarming in their forensic relevance. Several children mentioned direct physical assaults from Paco, and another mentioned that Paco assaulted one of their parents. This has important policy implications for forensic interviewers. Interviewers who question a child in a forensic context should avoid mentioning what other people have reported, to reduce the likelihood of false
allegations. Similarly, because younger children were more suggestible than older children, special care should be taken when forensically interviewing preschool aged children.

There were several limitations to the current study. Given the small sample size of preschool children, and the multiple statistical tests conducted, results must be interpreted with caution due to the fact that power may have been substantially reduced, and the family-wise experimenter error rate inflated. Results regarding the measures of functioning must also be interpreted with caution because of the low reliability of most EF measures in this study. However, it is notable that measures of Inhibitory EF repeatedly predicted suggestibility despite the rather poor reliability ($\alpha = .57$) of the composite measuring inhibitory EF. Efforts were made to obtain a wide variety of preschool and daycare locations in various demographic locations to ensure representativeness of El Paso, Texas children. Children were also randomly assigned, independent of manipulation and location. However, differences across location emerged, as one would expect, although these differences do not appear to have influenced the outcomes of the study's central analyses.

This study has provided several directions for future research. The interrelationships between ToM, EF, and suggestibility still require further exploration to clarify the causal relationships among these concepts. It is important to clarify this relationship to determine in which situations children are more or less suggestible given their abilities on these constructs.

Prior researchers have found that effects of the OP technique -- that is, the suggestive influence of mentioning statements from another witness -- can vary depending on the status of the witness (Carol, in press). Furthermore, research on co-witness effects indicates that even adults can be influenced by the statements of other witnesses (e.g., Deutsch & Gerard, 1955; Loftus, 2005; Roediger et al., 2001). Individuals are generally more susceptible to
misinformation from a higher status co-witness (e.g., a policeman), but as this study shows, this finding is not consistently demonstrated in the literature (e.g., see Ceci & Bruck, 1993; Ceci et al., 1987; Tobey & Goodman, 1992). This manipulation therefore deserves further exploration. Future studies could manipulate the credibility of the status source further, to determine if high status co-witnesses have a greater impact on suggestibility than low status co-witnesses do. Perhaps teachers are viewed as more or less authoritative, or peers are considered more credible, depending on the age of the child being questioned. This topic has important forensic relevance. Children in sexual abuse cases and other forensic investigations are often interviewed by various individuals formally or informally, which can include teachers, police officers, parents, and peers.

It is paramount to gain a better understanding of how and under what circumstances the OP technique and other forms of co-witness information affect child suggestibility. Interviewer endorsements of co-witness information also deserves further research. Future studies should attempt to manipulate this factor in several ways. Anecdotal evidence from real life interviews shows that forensic interviewers may sometimes implicitly or explicitly endorse statements from other witnesses, for example by treating those statements as if they were true.

Given the initial findings regarding decreased suggestibility in Spanish speaking children (despite the small number) in this study, and the results of previous studies examining the relationships between bilingualism, ToM, and EF (e.g., see Bialystok, 2010; Bialystok, Craik, Green, & Gollan, 2009; Carlson & Meltzoff, 2008), it would be useful to examine these constructs with truly bilingual children. Bialystok’s research has demonstrated that bilingual children tend to perform better on inhibitory EF tasks, perhaps related to the cognitive abilities required when processing two languages (e.g., inhibiting one to produce/process the other). It is
possible that bilingual children have an added advantage, or protective factor against suggestibility over and above monolingual children with similar EF abilities. This could be extremely useful in a forensic interview setting, in which bilingual children may be questioned by interviewers with differing translation abilities.
References


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Appendix A

University of Texas at El Paso (UTEP) Institutional Review Board
Informed Consent Form for Research Involving Human Subjects

Protocol Title: The Effect of Co-witness Credibility and Individual Differences on Child Suggestibility
Principal Investigator: Rachell Jones
UTEP: Psychology Department

In this consent form, “you” always means the study subject. If you are a legally authorized representative (such as a parent or guardian), please remember that “you” refers to the study subject.

1. Introduction
You and your child are being asked to take part voluntarily in the research project described below. Please take your time making a decision and feel free to discuss it with your friends and family. Before agreeing to take part in this research study, it is important that you read the consent form that describes the study. Please ask the study researcher or the study staff to explain any words or information that you do not clearly understand.

2. Why is this study being done?
You have been asked to take part in a research study of different factors that may influence a child’s memory for events. Approximately 150 preschoolers, aged three to five will be enrolling in this study around the El Paso County area. You are being asked to be in the study because your child is in preschool. If you decide to enroll in this study, your child’s involvement will last about 3 weeks. Your child will participate in 3 different sessions, one per week, with the first one lasting about 30-50 minutes, and the next 2 sessions lasting approximately 30-60 minutes.

3. What is involved in the study?
If you and your child agree to take part in this study, the following will occur: For the first session, Paco Perez will visit your child’s classroom and read a story. Your child’s vocabulary and language abilities will also be assessed at this session. For the second session, your child will be interviewed about Paco’s visit, administered the Theory of Mind battery tasks, which include game like activities that involve figuring out what other people feel and think, and watch a video of a birthday party which your child will be asked questions about later. For the third and final session, your child will complete the Executive Function battery tasks, which will include activities such as: identifying pictures of common items and activities, participating in a task in which your child will be able to win treats (such as M&Ms), answering questions about themselves, completing a short memory test, and holding back certain responses when asked to. Each session will be videotaped to ensure proper data collection procedures were followed.

4. What are the risks and discomforts of the study?
There are no known risks associated with this research

5. What will happen if I am injured in this study?
The University of Texas at El Paso and its affiliates do not offer to pay for or cover the cost of medical treatment for research related illness or injury. No funds have been set aside to pay or reimburse you in the event of such injury or illness. You will not give up any of your legal rights by signing this consent form. You should report any such injury to Rachell Jones, 915-747-8802 or Dr. James Wood, 915-747-6570 and to the UTEP Institutional Review Board (IRB) at (915-747-8841) or irb.orsp@utep.edu.

6. Are there benefits to taking part in this study?
There will be no direct benefits to you or your child for taking part in this study. This research may help us to understand the various factors that influence a child’s memory for an event.

7. What other options are there?
You and your child have the option not to take part in this study. There will be no penalties involved if you choose not to let your child take part in this study.

8. Who is paying for this study?
Internal Funding: Funding for this study is provided by UTEP Department of Psychology.

9. What are my costs?
There are no direct costs. You will be responsible for travel to and from the research site and any other incidental expenses.

10. Will I be paid to participate in this study?
You will be given a five-dollar gift card to Wal-Mart as a thank you for participation in this study.

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11. What if I want to withdraw, or am asked to withdraw from this study?
Taking part in this study is voluntary. You have the right to choose not to let your child take part in this study. If you do not let your child take part in the study, there will be no penalty. If you choose to let your child take part, you or your child have the right to stop at any time. However, we encourage you to talk to a member of the research group so that they know why you are leaving the study. If there are any new findings during the study that may affect whether you want to continue to let your child take part, you will be told about them. The researcher may decide to stop your child’s participation without your permission, if he or she thinks that being in the study may cause your child harm.

12. Who do I call if I have questions or problems?
You may ask any questions you have now. If you have questions later, you may call Rachell Jones at 915-747-8802, rlbarker@miners.utep.edu, or Dr. James Wood, 915-747-6570, jawood@utep.edu. If you have questions or concerns about your child’s participation as a research subject, please contact the UTEP Institutional Review Board (IRB) at (915-747-8841) or irb.orsp@utep.edu.

13. What about confidentiality?
1. You and your child’s part in this study is confidential. None of the information will identify your child by name. All records will be kept confidential and each child’s data will be kept anonymous. Data will be analyzed at a group (not individual) level and the group level findings may be presented or published.

2. Portions of the interviews and tasks completed will be videotaped so that the researchers can verify their data. The recordings will be used to make transcriptions of the interviews, which may be coded for later data analysis. They will also be used as a resource for any issues or questions that arise in the data, so the researcher can go back and review the recordings to resolve any discrepancies. Only the researchers and researcher’s assistants will have access to the videotapes. The recordings will be stored in a locked filing cabinet located in the researcher’s office. Once the project has been completed, all recordings will be destroyed.

14. Mandatory reporting
If information is revealed about child abuse or neglect, or potentially dangerous future behavior to others, the law requires that this information be reported to the proper authorities.

15. Authorization Statement
I have read each page of this paper about the study (or it was read to me). I know that being in this study is voluntary and I choose to allow my child to be in this study. I know I can stop being in this study without penalty. I will get a copy of this consent form now and can get information on results of the study later if I wish.

Participant Name: ___________________________________________ Date: ____________________

Participant or Parent/Guardian Signature: ____________________________________________

Consent form explained/witnessed by: __________________________________________________

Signature: ______________________ Date: __________ Time: __________
Appendix B

Study Design

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Appendix C

Paco Perez Non-Manipulated Control Questions – Interview One (VERSION 0)

I want to ask you some questions about the other day when Paco Perez came and read you the “Toy Story 3” story. He had on a silly hat didn’t he?

1. Yes / No Did Paco tell you a secret and say not to tell anyone?
2. Yes / No Did Paco drop the book and say how clumsy he was?
3. Yes / No Did Paco take off his funny hat?
4. Yes / No Did Paco tickle your tummy?
5. Yes / No Did Paco say abracadabra and disappear?
6. Yes / No Did Paco tear the book while he was here?
7. Yes / No Did Paco put on goofy glasses?
8. Yes / No Did Paco tell the children to sit quietly and listen?
9. Yes / No Did Paco throw a crayon at a kid who was talking?
10. Yes / No Did Paco ask you if you saw the TOY STORY 3 movie?
11. Yes / No Did Paco take you on a helicopter ride?
12. Yes / No Did Paco put a sticker on your hand?
13. Yes / No Did Paco say a bad word?
14. Yes / No Did Paco take you to a farm?
15. Yes / No Did you see animals on the farm?
16. Yes / No Did Paco give you a high five?
17. Yes / No Did Paco steal a pen from the teacher’s desk?
18. Yes / No Did Paco take you on a horse ride?
19. Yes / No Did Paco break a toy while he was here?
20. Yes / No Did Paco say goodbye to everyone before leaving?
21. Yes / No Did Paco ride a bull?
22. Yes / No Did Paco kiss you on the nose?
23. Yes / No Did Paco take you on a boat ride?
24. Yes / No Did Paco catch a huge shark on the boat ride?
Appendix D

Paco Perez Other People High Status Source, No Endorsement Suggestive Questions – Interview One (VERSION 1)

I want to ask you some questions about the other day when Paco Perez came and read you the “Toy Story 3” story. He had on a silly hat didn’t he? Well, I already talked to your teacher (Insert Name of Teacher) and (He/She) said that Paco did some bad things.

1. Yes / No (Teacher) said that Paco told you a secret and said not to tell anyone. Did he tell you a secret?
2. Yes / No (Teacher) said that Paco dropped the book and said how clumsy he was. Did he drop the book and call himself clumsy?
3. Yes / No (Teacher) said that Paco took off his funny hat. Did Paco take off his funny hat?
4. Yes / No (Teacher) said that Paco tickled your tummy. Did he tickle your tummy?
5. Yes / No (Teacher) said that Paco said abracadabra and disappeared! Did he disappear?
6. Yes / No (Teacher) said that Paco tore the book while he was here. Did he tear the book?
7. Yes / No (Teacher) said that Paco put on goofy glasses. Did he put on goofy glasses?
8. Yes / No (Teacher) said that Paco told the children to sit quietly and listen. Did he tell the children to sit quietly and listen?
9. Yes / No (Teacher) said that Paco threw a crayon at a kid who was talking. Did he throw a crayon?
10. Yes / No (Teacher) said that Paco asked you if you saw the movie TOY STORY 3. Did he ask you if you saw the movie?
11. Yes / No (Teacher) said that Paco took you on a helicopter ride. Did he take you on a helicopter ride?
12. Yes / No (Teacher) said that Paco put a sticker on your hand. Did he put a sticker on your hand?
13. Yes / No (Teacher) said that Paco said a bad word. Did he say a bad word?
14. Yes / No  (Teacher) said that Paco took you to a farm. Did he take you to a farm?

15. Yes / No  (Teacher) said there were animals on the farm. Did you see animals on the farm?

16. Yes / No  (Teacher) said that Paco gave you a high five. Did he give you a high five?

17. Yes / No  (Teacher) said that Paco stole a pen from the their desk. Did he steal a pen from the their desk?

18. Yes / No  (Teacher) said that Paco took you on a horse ride. Did he take you on a horse ride?

19. Yes / No  (Teacher) said that they saw Paco break a toy while he was here. Did Paco break a toy?

20. Yes / No  (Teacher) said that Paco said goodbye to everyone before leaving. Did he say goodbye?

21. Yes / No  (Teacher) said that Paco rode a bull. Did he ride a bull?

22. Yes / No  (Teacher) said that Paco kissed you on the nose. Did he kiss you on the nose?

23. Yes / No  (Teacher) said that Paco took you on a boat ride. Did he take you on a boat ride?

24. Yes / No  (Teacher) said that Paco caught a huge shark on the boat ride. Did he catch a shark?
Appendix E

Paco Perez Other People High Status Source, Endorsement Suggestive Questions – Interview One (VERSION 2)

I want to ask you some questions about the other day when Paco Perez came and read you the “Toy Story 3” story. He had on a silly hat didn’t he? Well, I already talked to your teacher (Insert Name of Teacher) and (He/She) said that Paco did some bad things. And do you know what? I really believe that (Insert Name of Teacher) is telling me the truth.

1. Yes / No (Teacher) said that Paco told you a secret and said not to tell anyone, and I really believe (Teacher). Did he tell you a secret?

2. Yes / No (Teacher) said that Paco dropped the book and said how clumsy he was. Did he drop the book and call himself clumsy?

3. Yes / No (Teacher) said that Paco took off his funny hat, and I really believe (Teacher) is telling the truth. Did Paco take off his funny hat?

4. Yes / No (Teacher) said that Paco tickled your tummy. Did he tickle your tummy?

5. Yes / No (Teacher) said that Paco said abracadabra and disappeared, and I really believe (Teacher)! Did he disappear?

6. Yes / No (Teacher) said that Paco tore the book while he was here. Did he tear the book?

7. Yes / No (Teacher) said that Paco put on goofy glasses. Did he put on goofy glasses?

8. Yes / No (Teacher) said that Paco told the children to sit quietly and listen, and I really believe (Teacher) is telling the truth. Did he tell the children to sit quietly and listen?

9. Yes / No (Teacher) said that Paco threw a crayon at a kid who was talking, and I really believe (Teacher) told me the truth. Did he throw a crayon?

10. Yes / No (Teacher) said that Paco asked you if you saw the movie TOY STORY 3, and I still really believe (Teacher). Did he ask you if you saw the movie?

11. Yes / No (Teacher) said that Paco took you on a helicopter ride, and I really believe (Teacher). Did he take you on a helicopter ride?

12. Yes / No (Teacher) said that Paco put a sticker on your hand. Did he put a sticker on your hand?

13. Yes / No (Teacher) said that Paco said a bad word. Did he say a bad word?
14. Yes / No (Teacher) said that Paco took you to a farm, and I really believe (Teacher) is telling me the truth. Did he take you to a farm?

15. Yes / No (Teacher) said there were animals on the farm. Did you see animals on the farm?

16. Yes / No (Teacher) said that Paco gave you a high five. Did he give you a high five?

17. Yes / No (Teacher) said that Paco stole a pen from the their desk. Did he steal a pen from the their desk?

18. Yes / No (Teacher) said that Paco took you on a horse ride, and I really believe (Teacher). Did he take you on a horse ride?

19. Yes / No (Teacher) said that they saw Paco break a toy while he was here. Did Paco break a toy?

20. Yes / No (Teacher) said that Paco said goodbye to everyone before leaving. Did he say goodbye?

21. Yes / No (Teacher) said that Paco rode a bull, and I really believe (Teacher). Did he ride a bull?

22. Yes / No (Teacher) said that Paco kissed you on the nose, and I really believe (Teacher) is telling the truth. Did he kiss you on the nose?

23. Yes / No (Teacher) said that Paco took you on a boat ride, and I really believe (Teacher) told the truth. Did he take you on a boat ride?

24. Yes / No (Teacher) said that Paco caught a huge shark on the boat ride. Did he catch a shark?
Appendix F

Paco Perez Other People Low Status Source, No Endorsement Suggestive Questions – Interview One (VERSION 3)

I want to ask you some questions about the other day when Paco Perez came and read you the “Toy Story 3” story. He had on a silly hat didn’t he? Well, I can’t tell you who I talked to, or say who they were, but some of the other children in your class have already told me what happened. And the other kids in your class that I talked to said that Paco did some silly and bad things.

1. Yes / No The other kids said that Paco told you a secret and said not to tell anyone. Did he tell you a secret?
2. Yes / No The other kids said that Paco dropped the book and said how clumsy he was. Did he drop the book and call himself clumsy?
3. Yes / No The other kids said that Paco took off his funny hat. Did he take off his funny hat?
4. Yes / No The other kids said that Paco tickled your tummy. Did he tickle your tummy?
5. Yes / No The other kids said that Paco said abracadabra and disappeared! Did he disappear?
6. Yes / No The other kids said that Paco tore the book while he was here. Did he tear the book?
7. Yes / No The other kids said that Paco put on goofy glasses. Did he put on goofy glasses?
8. Yes / No The other kids said that Paco told the children to sit quietly and listen. Did he tell the children to sit quietly and listen?
9. Yes / No The other kids said that Paco threw a crayon at a kid who was talking. Did he throw a crayon?
10. Yes / No The other kids said that Paco asked you if you saw the movie TOY STORY 3. Did he ask you if you saw the movie?
11. Yes / No The other kids said that Paco took you on a helicopter ride. Did he take you on a helicopter ride?
12. Yes / No The other kids said that Paco put a sticker on your hand.
Did he put a sticker on your hand?

13. Yes / No  The other kids said that Paco said a bad word. Did he say a bad word?

14. Yes / No  The other kids said that Paco took you to a farm. Did he take you to a farm?

15. Yes / No  The other kids said there were animals on the farm. Did you see animals on the farm?

16. Yes / No  The other kids said that Paco gave you a high five. Did he give you a high five?

17. Yes / No  The other kids said that Paco stole a pen from their desk. Did he steal a pen from their desk?

18. Yes / No  The other kids said that Paco took you on a horse ride. Did he take you on a horse ride?

19. Yes / No  The other kids said that they saw Paco break a toy while he was here. Did Paco break a toy?

20. Yes / No  The other kids said that Paco said goodbye to everyone before leaving. Did he say goodbye?

21. Yes / No  The other kids said that Paco rode a bull. Did he ride a bull?

22. Yes / No  The other kids said that Paco kissed you on the nose. Did he kiss you on the nose?

23. Yes / No  The other kids said that Paco took you on a boat ride. Did he take you on a boat ride?

24. Yes / No  The other kids said that Paco caught a huge shark on the boat ride. Did he catch a shark?
Appendix G

Paco Perez Other People Low Status Source, Endorsement Suggestive Questions – Interview One (VERSION 4)

I want to ask you some questions about the other day when Paco Perez came and read you the “Toy Story 3” story. He had on a silly hat didn’t he? Well, I can’t tell you who I talked to, or say who they were, but some of the other children in your class have already told me what happened, and I really believe them. The other kids in your class that I talked to said that Paco did some silly and bad things, and I really believe that they are telling me the truth!

1. Yes / No The other kids said that Paco told you a secret and said not to tell anyone, and I really believe them. Did he tell you a secret?

2. Yes / No The other kids said that Paco dropped the book and said how clumsy he was. Did he drop the book and call himself clumsy?

3. Yes / No The other kids said that Paco took off his funny hat, and I really believe they are telling the truth. Did Paco take off his funny hat?

4. Yes / No The other kids said that Paco tickled your tummy. Did he tickle your tummy?

5. Yes / No The other kids said that Paco said abracadabra and disappeared, and I really believe them! Did he disappear?

6. Yes / No The other kids said that Paco tore the book while he was here. Did he tear the book?

7. Yes / No The other kids said that Paco put on goofy glasses. Did he put on goofy glasses?

8. Yes / No The other kids said that Paco told the children to sit quietly and listen, and I really believe they are telling the truth. Did he tell the children to sit quietly and listen?

9. Yes / No The other kids said that Paco threw a crayon at a kid who was talking, and I really believe they told me the truth. Did he throw a crayon?

10. Yes / No The other kids said that Paco asked you if you saw the movie TOY STORY 3, and I still really believe them. Did he ask you if you saw the movie?

11. Yes / No The other kids said that Paco took you on a helicopter ride, and I really believe them. Did he take you on a helicopter ride?
12. Yes / No  The other kids said that Paco put a sticker on your hand. Did he put a sticker on your hand?

13. Yes / No  The other kids said that Paco said a bad word. Did he say a bad word?

14. Yes / No  The other kids said that Paco took you to a farm, and I *really believe* they are telling the truth. Did he take you to a farm?

15. Yes / No  The other kids said there were animals on the farm. Did you see animals on the farm?

16. Yes / No  The other kids said that Paco gave you a high five. Did he give you a high five?

17. Yes / No  The other kids said that Paco stole a pen from the teacher’s desk. Did he steal a pen from the teacher’s desk?

18. Yes / No  The other kids said that Paco took you on a horse ride, and I *really believe* them. Did he take you on a horse ride?

19. Yes / No  The other kids said that they saw Paco break a toy while he was here. Did Paco break a toy?

20. Yes / No  The other kids said that Paco said goodbye to everyone before leaving. Did he say goodbye?

21. Yes / No  The other kids said that Paco rode a bull, and I *really believe* them. Did he ride a bull?

22. Yes / No  The other kids said that Paco kissed you on the nose, and I *really believe* they are telling the truth. Did he kiss you on the nose?

23. Yes / No  The other kids said that Paco took you on a boat ride, and I *really believe* they told the truth. Did he take you on a boat ride?

24. Yes / No  The other kids said that Paco caught a huge shark on the boat ride. Did he catch a shark?
### Appendix H

**Health and Personal History**

**University of Texas El Paso**

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<thead>
<tr>
<th>Child's RACE/ETHNICITY: Please circle all that apply:</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American, Asian, Hispanic,</td>
</tr>
<tr>
<td>Latino, Mexican, Mexican American,</td>
</tr>
<tr>
<td>Non-Hispanic White</td>
</tr>
<tr>
<td>Other: ___________________________</td>
</tr>
</tbody>
</table>

Have you ever been told your child has any of the following? *Please circle all that apply*:

- Learning disability
- Attention Problems
- Slow or delayed development
- Stuttering, Mental retardation
- Eye problems
- Behavior Disorder
- Hearing Loss
- Other: ___________________________

The approximate yearly income of your family is *please circle one*:

- Less than $10,000 a year
- $10,000 - $15,000 a year
- $15,000 - $20,000 a year
- $20,000 - $25,000 a year
- $25,000 - $30,000 a year
- $30,000 - $35,000 a year
- $35,000 - $40,000 a year
- $40,000 - $45,000 a year
- $45,000 - $50,000 a year
- $50,000 - $55,000 a year
- $55,000 - $60,000 a year
- $60,000 - $65,000 a year
- $65,000 - $70,000 a year
- $70,000 or more a year
- Other: ___________________________

What type of Snack would be acceptable to give your child? *Please circle all that apply*:

- M&M’s
- Marshmallow’s
- Goldfish
- Sugar Free Hard Candy

Other alternative options: ___________________________
Appendix I

Language Background Questionnaire

For the following questions, please use the scale below. Please circle the number that corresponds to the appropriate skill or use level in English and Spanish.

English 1------2------3------4------5------6------7------8------9  Spanish

1 = English only used
2 = Strong advantage for English
3 = Moderate advantage for English
4 = Slight advantage for English
5 = Equal skill/use for BOTH languages
6 = Slight advantage for Spanish
7 = Moderate advantage for Spanish
8 = Strong advantage for Spanish
9 = Spanish only used

Please answer which skill/use level applies to YOUR CHILD by circling the appropriate number:

1. Language child speaks in the home:  
2. Language child speaks with friends: 
3. Language child watches television/movies in: 
4. Language child reads in: 
5. Language child speaks to siblings in: 
6. Language you consider your child’s strongest:

Please answer which skill/use level applies to PARENTS/GUARDIANS by circling the appropriate number:

7. Mother’s/guardian’s strongest language overall: 
8. Father’s/guardian’s strongest language overall: 
9. Language Mother/guardian speaks in home: 
10. Language Father/guardian speaks in home: 
11. Language parent’s/guardians read to child in: 

Please answer the following questions by circling the appropriate answer.
1. What age did your child begin to learn English? ______

2. What age did your child begin to learn Spanish? ______

3. Does your child mix English and Spanish? ______
   a. If yes, what age did she/he begin to mix them? ______

4. What kind of preschool program is your child in? Monolingual Bilingual
   a. Language(s) of program: English Spanish Both

5. How many hours per week would you say you/guardian read to your child?
   None 20 minutes 40 minutes 1 hour or more
Appendix J

Paco Script

Hi kids! My name is Paco Perez and I’m here today to read you a story. The name of the story is “TOY STORY 3” and I want you all to sit quietly and listen. How many of you saw the movie? Did you like it? After the story, I brought some stickers to share with you. But first I have to take off my hat. Isn’t it a silly hat?

Are you all ready for me to get started? (Wait for response. If no response, ask again)

Okay, let me just put on my glasses so I can start! (Clear throat noisily/loudly 3 times and make a production out of it before getting started. Read story after putting on funny glasses and clearing throat)

(Once done reading the story, make a production out of closing it and fumble and drop the book.) Oops, how CLUMSY of me to drop the book!!!

Thank you all for listening to me today! To thank you all for listening so well, I have some stickers to pass out. Can everybody raise their hand up into the sky, as high as you can?

Okay, now take your hand and put it on top of your head (demonstrate)! I’ll come around and put a sticker on everybody’s hand! (Ask each kid for a high five after putting a sticker on his or her hand).

(Once all children have received a sticker) Good-bye everybody! It was nice visiting you today.
Appendix K

Paco Perez Free Recall Questions – Interview TWO

Each child will be asked the following questions:

1) Tell me about things you like to do.

2) Tell me more about [activity the child has mentioned. AVOID TV, VIDEOS, & FANTASY]

3) I really want to know more about things that happen to you. Tell me everything that happened yesterday, from the time you got to school to the time you left school.

4) Do you remember when Paco Perez visited your school?

5) Tell me everything you remember about Paco’s visit.

6) What else happened?

7) Tell me about what Paco did with his hat.

8) Tell me about what Paco did with his glasses.

9) What good things did Paco do?

10) What bad things did Paco do?

11) What happened when Paco took you out of the classroom?
Appendix L

Video Suggestibility Scale for Children

Name: ______________________________

Ask questions at least one day after the child has seen the video:
For videotaping purposes, say child’s name while building rapport.

Open-ended questions
A. Do you remember that video about the birthday party? Tell me everything you remember about the birthday party.
   Repeatedly probe: What else do you remember?

When the child finishes responding, ask:

C. What happened when the children opened the presents?

D. Did anything kind of scary happen during the birthday party? (If yes) What was it?

YIELD

1. Did the two girls arrive at the party in a bright red car?
   Round 1: YES ___ NO ___ DON’T KNOW ___ NO RESPONSE ___ OTHER ___
Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

2. Did the lady driving the kids tell them to behave and say please and thank you?
   Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
   Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

3. Did the girls knock on the door before being shown in?
   Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
   Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

4. Was there a girl named Suzie at the party?
   Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
   Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

5. Did the kids play pin the tail on the donkey?
   Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
   Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

6. Was there a little white doggie at the party?
   Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
   Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

7. Did the girls look inside one of the bags of presents?
   Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
   Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

8. Did the kids play with balloons during the party?
   Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
   Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

9. Did that clumsy girl Robin knock over the lamp?
   Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
   Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

10. Did the kids break a balloon while they were hitting them around?
    Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
    Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

11. Did Robin trip and fall on the way to the table?
    Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
    Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

12. When the clown juggled, did he drop a ball?
    Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
    Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

Feedback: You have made a few mistakes. Let’s go over the questions again and see if you can do better.
15. Was one of Billy’s birthday presents broken when he opened it?
   Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
   Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

16. Did Billy cry when he found his toy was broken?
   Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
   Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

17. Did Billy break the toy?
   Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
   Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

18. Did Billy and his friends play with the broken toy after Billy’s dad fixed it?
   Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
   Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

19. Did Billy’s dad cut the birthday cake?
   Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
   Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

20. When Robin dropped the cake on her lap, did she just go ahead and eat it?
    Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
    Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

21. When Billy spilled his juice, did he cry?
    Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
    Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

22. Did Billy get the last piece of cake?
    Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
    Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

23. Did one of the girls tell Billy to quit kicking her??
    Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
    Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

24. Did Billy’s friends stay overnight?
    Round 1: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___
    Round 2: YES ___ NO ___ DON'T KNOW ___ NO RESPONSE ___ OTHER ___

Feedback: You have made a few mistakes again. Let’s go over the questions again and see if you can do better.
Appendix M

Diverse Desire

Props: Small figurine of man. Plus 8.5x11 piece paper (laminated) with colored realistic drawing of carrot on one half and cookie on the other.

Story: Here’s Mr. Jones (place figure next to picture, midway between two items). It is his snack time. So, Mr. Jones wants a snack to eat. Here are two different snacks: a carrot (point) and a cookie (point).

Own Desire: Which snack would YOU like best?
Would you like a carrot (point) or... a cookie (point) best?

___ If carrot: Well, that’s a good choice, BUT...
Mr. Jones REALLY LIKES cookies (don’t point).
He doesn’t like carrots. What he likes BEST are cookies.

___ If cookie: Well, that’s a good choice, BUT...
Mr. Jones REALLY LIKES carrots (don’t point).
He doesn’t like cookies. What he likes BEST are carrots.

Question: So, now it’s time to eat. Mr. Jones can only choose one snack, just one. Which snack will Mr. Jones (point to Mr. Jones) choose?… A carrot…or a cookie?

___ carrot ___ cookie

SCORING: To be scored as correct, or to “pass” this task, the child must answer the target question opposite from his/her answer to the own-desire question.
Appendix N

Knowledge Access

Props: Small nondescript rectangular container with a drawer or a box with a lid. Toy dog to fit in drawer or box. Small figurine of girl.

Experimenter: Here’s a box (keep finger over box).

Question to child: What do you think is inside the box (point to box)?
(If child gives an answer): _______________

Experimenter: (With drama) Let’s see…it’s really a DOG inside!
(Open box to show dog)

(Close the box to restrict view again after a pause)

Post-view Question: Okay…what is in the box? _______________
(If child makes an error here, show contents inside again until child gets this question correct)

Experimenter: Polly has never ever seen inside this box. (Take Polly out).
Now here comes Polly.

Question: So…does Polly KNOW what is in the box?

___ yes ___ no

Did Polly see inside this box?

___ yes ___ no

SCORING: To be scored correct the child must answer the target question “no” and answer the memory control question (the last question about seeing) “no.”
Appendix O

Contents False-Belief

Props: standard Band-aid box with picture of band-aid prominently on front. Toy pig to fit in box. Small figure of a boy.

Experimenter: Here is a Band-Aid box.

Question to child: What do you think is inside the Band-Aid box? ___________ (Prompt child to say Band-Aids if necessary. For Example: 1st prompt, “Does it look like there would be Band-Aids inside?” 2nd prompt, “What kind of box is this? What should be in here?” 3rd prompt, “Should there be Band-Aids in here or books in here?”)

Experimenter: (With drama) Let’s see…it’s really a PIG inside! (Pour pig out) (Close the lid to restrict view again after a pause)

Post-view Question: Okay…what is in the box? ___________ (If child makes an error here, show contents inside again until child gets this question correct)

Experimenter: Peter has never ever seen inside this Band-Aid box. (Take Peter out) Now here comes Peter.

Question: So…what does Peter THINK is in the box? Band-Aids or a Pig? (Reiterate choice again if child still does not answer) ___ Band-Aids ___ Pig

Did Peter see inside this box? ___ yes ___ no

SCORING: To be scored correct the child must answer the target question “Band-Aids” and answer the memory question (the last question about seeing) “no.”
Appendix P

**Diverse Belief**

Props: Small figurine of girl. Plus 8.5x11 piece paper (laminated) with colored realistic drawing of bushes on one half and garage on the other.

**Story:** Here’s Linda (place figure on table next to picture midway between two items).

Linda wants to find her cat.

Her cat might be hiding in the **bushes** (point) or…it might be hiding in the **garage** (point).

**Own Belief:** Where do **YOU think** the cat is? In the **bushes** (point)…or in the **garage** (point)?

___ If bushes: Well, that’s a good idea, **BUT**…

Linda **THinks** her cat is in the **garage** (don’t point).

She **thinks** her cat is in the garage.

___ If garage: Well, that’s a good idea, **BUT**…

Linda **THinks** her cat is in the **bushes** (don’t point).

She **thinks** her cat is in the bushes.

**Question:** So…where will Linda (point to Linda) **look** for her cat?…

In the **bushes**…or in the **garage**?

___ bushes ___ garage

**SCORING:** To be scored correct the child must answer the **target** question opposite from his/her answer to the **own-belief** question.
Appendix Q

Real-Apparent Emotion

Pre-training
Props: Picture (about 3x3) showing drawing of back of a boy’s head (not face or expression). Emotion scale: a strip (about 3x10) of three simple “faces” (bare-bones “smiley”-type black-and-white faces of just circular outline plus simple eyes and line-like mouths): one happy, one sad, and (in middle of strip) one neutral.

Experimenter: Now, I’m going to tell you a story about a boy. (Take out emotion scale)
In this story, the boy might feel happy (point).
He might feel sad (point).
Or, he might not feel happy or sad, just OK (point).

Can you point to the face that is:
____ Sad?
____ OK?
____ Happy?

(Train child again if child makes a mistake)
RECORD WHAT THE MISTAKES WERE: _________________________________________

Experimenter: Okay, now about the story: After I’ve finished the story, I’m going to ask you about how the boy really feels, inside (pat own chest), AND how he looks on his face (pat own cheek). How he really feels inside (pat own chest) may be the same as how he looks on his face (pat own cheek), or they may be different.

(At this point the emotion scale is pushed to one side. The child does not have to answer the target questions by pointing at the scale. The scale remains in sight but out of the way just to provide a visual reminder of the warm up, unless child is unusually nonverbal.)
Testing

Experimenter: This story is about Matt (show picture). Matt’s aunt just got back from a trip. She promised that she would buy Matt a toy car. But, she got Matt a book instead. Matt doesn’t like books (slow pace). What Matt really wants is a toy car. But…Matt has to hide how he feels, because if his aunt knows his real feelings, she’ll never buy him anything again.

Memory Check: What did Matt’s aunt buy for him?

(Correct answer: a book…if the child gets the answer wrong, tell the story again)

What will Matt’s aunt do, if she knows how Matt really feels?

(Correct answer: she will never buy anything for Matt anymore…if the child gets the answer wrong, tell the story again; TELL IT 3 TIMES before Discontinuing)

Question: So…how did Matt really feel (pat own chest), when his aunt gave him the book—Happy, Sad, or Okay? (Note: Do not show any feelings)
(Reiterate choice again if child still does not answer)

___ Happy     ___ Sad     ___ Okay

How did Matt try to look on his face (pat own face), when his aunt gave him the book—Happy, Sad, or Okay? (Note: Do not show any feelings)
(Reiterate choice again if child still does not answer)

___ Happy     ___ Sad     ___ Okay

SCORING: Scoring rests on answers to the last two questions. To be scored correct the child’s answer to the really-feel question must be more negative than his/her answer to the look question (i.e., sad for really-feel and happy or OK for look, or OK for really-feel and happy for look).
Appendix R

Contents

Props: box, toy pig, toy horse

*Experimenter:* Look at this box, let’s open it and see what’s inside!
What’s in the box?
(*child should say pig*) _______________

*Experimenter:* I think we should put this horse inside the box instead.
(*Remove pig and place horse inside the box and close it*)
**Now** what is inside the box?
(*child should say horse*) _______________

*Question:* When I **first** showed you the box, before we opened it, what was inside it then? Was there a horse inside or was there a pig inside?
(*child should say pig*) _______________

SCORING: To be scored correct the child must answer the last question with PIG.
Appendix S

Location

Props: Two small boxes of different colors, and a small figure (ball, block, etc.) to fit inside the colored boxes

*Experimenter:* See this *(figure)*? I’d like you to place it inside this **BLUE** box. Good job!
Alright, now I’d like you to take it **OUT** of the **BLUE** box and put it inside the **GREEN** box.

*Question:* **Now** where is the *(figure)*? ____________
*(child should say GREEN box; if not, correct them)*

*Question:* When we **first** put the *(figure)* in a box, **before** we moved it, where was it then?
Was it in this box (green) or this box (blue)? ____________
*(child should say BLUE box)*

*SCORING:* To be scored correct the child must answer the NOW question with GREEN, and the BEFORE question with BLUE.
Appendix T

**Delay of Gratification**

*(Mischel, Shoda, & Rodriguez, 1989)*

**Materials:** 2 bowls, bell, variety of treats (e.g. goldfish crackers, M&M’s, marshmallows)

**Instructions for administration:**
After administering the Digit Span task, tell the child “I have to leave the room for a bit, I forgot some of my materials for the rest of the games we are going to play.”

*(Place bell on the table). While I’m gone, if you want me to come back at any time, all you have to do is ring this bell.* *(Demonstrate ringing the bell).*

“Since I have to leave, I brought some goodies for you. Which one would you prefer?” *(Present the child with the various treat options and let them choose favorite and/or use treat parent approved of).*

*(Once the child has chosen, place 2 of their favorite treats in one bowl, and 10 of them in another bowl.)*
“Okay, I’m going to leave two bowls here, one has 2 treats, the other has 10. Which amount would you prefer?” *(Record Response = ______).*

“When I leave, if you can wait in your seat without eating any of the treats, you can have the large pile of treats when I get back.”

“However, if you don’t want to wait, you can ring this bell at any time and I’ll return shortly, but then you only get the small pile of treats. Do you understand?” *(Response. If they don’t understand, explain again). (If they do understand, place the bell directly in front of them, between the two bowls of treats.)*

“Alright, I’m going to go and find my materials, but will listen in case you ring the bell.”
*(Leave the room for maximum of 2 minutes or until the child rings the bell.)*

*(Praise the child regardless of performance.)* “Great job, thanks for waiting for me while I found my things, I really appreciate it!”

**Scoring:** Coding will include three measures of latency, measured in minutes/seconds, including the time it took for the child to touch the bell, the bowl, and the time it took to touch or eat the treats. In addition, whether the child ate the treats or not will be recorded.

1. **Latency Measures:**
   - Time it took to touch the bell
   - Time it took to touch the bowls
   - Time it took to touch or eat the treats

2. **Did the child eat the treats before the time was up?** Yes or No
Appendix U

Dimensional Change Card Sorting Task (DCCS) – By COLOR first
Zelazo et al. (2003)

**Materials:**
- 2 Original Target cards (1 Brown Elephant and 1 Purple Monkey)
- 16 Test cards (8 Purple Elephants and 8 Brown Monkeys)

“We’re going to play a fun game. I want to see if you can follow directions and do exactly as I say. Would you like to play this game with me?” (Response). “I’m glad you want to play because this is really going to be fun!”

**Demonstration and Preswitch Phase:**

“We are going to play the COLOR game!
We’re going to put these cards (show cards) in piles. (Cards will always go face down).
If it is BROWN, put it here (show pile spot with brown elephant target card).
If it is PURPLE, put it here (show pile spot with purple monkey target card).

I’m going to show you how to do this.

(Hold up BROWN MONKEY). Here is a BROWN monkey.
Since it is BROWN, I am going to put it here (put card in correct pile face down).

(Hold up PURPLE ELEPHANT) Here is a PURPLE elephant.
Since it is PURPLE, I am going to put it here (put card in correct pile face down).
Now, it’s your turn! (Place an X next to each successful preswitch trial).”

**Reminder:** Label each card by BOTH color and shape for each trial. Also, prompt the child that another trial will begin. (No feedback should be given).

For each trial, say: “Here is a PURPLE Elephant. Where does it go?” “Let’s do another one.”

1. Brown Monkey ______
2. Purple Elephant ______
3. Brown Monkey ______
4. Purple Elephant ______
5. Brown Monkey ______
6. Brown Monkey ______
7. Purple Elephant ______
8. Purple Elephant ______

TOTAL PRE-SWITCH TRIALS CORRECTLY SORTED: ______

**Postswitch Phase:** (Do not remove cards from piles).
“Now, we are going to play a **NEW** game!

We’re **NOT** going to play the **COLOR** game anymore. This game is different. We are going to play the **SHAPE** game!

If it is a **MONKEY**, put it here (show pile spot).
If it is an **ELEPHANT**, put it here (show pile spot).

Now, let’s play!”

*(No demonstration for the postswitch phase. Place an X next to each successful postswitch trial).*

**Reminder:**  
Label each card by **BOTH** color and shape for each trial.  
Also, prompt the child that another trial will begin.  
Continually remind the child of the postswitch rules.

* (No feedback should be given).*  

**For each trial, say:**  
“Here is a **PURPLE ELEPHANT**. Where does it go?”
“Let’s do another one.”
“Remember, if it’s a **MONKEY**, put it here. If it’s an **ELEPHANT**, put it here.”

1.  Purple Elephant ______
2.  Brown Monkey ______
3.  Brown Monkey ______
4.  Purple Elephant ______
5.  Brown Monkey ______
6.  Purple Elephant ______
7.  Purple Elephant ______
8.  Brown Monkey ______

**Feedback:** “You did a great job! Thanks for playing with me!”

**TOTAL POST-SWITCH TRIALS CORRECTLY SORTED:**  

*Dimensional Change Card Sorting Task (DCCS) – By SHAPE first*
  *Zelazo et al. (2003)*

**Materials:**  
2 Original Target cards (*1 Brown Elephant and 1 Purple Monkey*)
16 Test cards (*8 Purple Elephants and 8 Brown Monkeys*)
“We’re going to play a fun game. I want to see if you can follow directions and do exactly as I say. Would you like to play this game with me?” (Response). “I’m glad you want to play because this is really going to be fun!”

Demonstration and Preswitch Phase:

“We are going to play the SHAPE game! We’re going to put these cards (show cards) in piles. (Cards will always go face down). If it is an ELEPHANT, put it here (show pile spot with brown elephant target card). If it is a MONKEY, put it here (show pile spot with purple monkey target card).

I’m going to show you how to do this.

(Hold up BROWN MONKEY). Here is a brown MONKEY. Since it is a MONKEY, I am going to put it here (put card in correct pile face down).

(Hold up PURPLE ELEPHANT) Here is a purple ELEPHANT. Since it is an ELEPHANT, I am going to put it here (put card in correct pile face down). Now, it’s your turn! (Place an X next to each successful preswitch trial).

Reminder: Label each card by BOTH color and shape for each trial. Also, prompt the child that another trial will begin. (No feedback should be given).

For each trial, say: “Here is a Purple ELEPHANT. Where does it go?” “Let’s do another one.”

4. Purple Elephant_______ 8. Purple Elephant _______

TOTAL PRE-SWITCH TRIALS CORRECTLY SORTED: _______
Postswitch Phase: *(Do not remove cards from piles).*

“Now, we are going to play a **NEW** game! We’re **NOT** going to play the **SHAPE** game anymore. This game is different. We are going to play the **COLOR** game! If it is **BROWN**, put it here *(show pile spot)*. If it is **PURPLE**, put it here *(show pile spot)*. Now, let’s play!” *(No demonstration for the postswitch phase. Place an X next to each successful postswitch trial).*

**Reminder:** Label each card by **BOTH color and shape** for each trial. Also, prompt the child that another trial will begin. Continually remind the child of the postswitch rules. *(No feedback should be given).*

For each trial, say:  
“Here is a **PURPLE ELEPHANT**. Where does it go?”  
“Let’s do another one.”  
“Remember, if it is **BROWN**, put it here. If it is **PURPLE**, put it here.”

1. Purple Elephant ______
2. Brown Monkey ______
3. Brown Monkey ______
4. Purple Elephant ______
5. Brown Monkey ______
6. Purple Elephant ______
7. Purple Elephant ______
8. Brown Monkey ______

Feedback: “You did a great job! Thanks for playing with me!”

**TOTAL POST-SWITCH TRIALS CORRECTLY SORTED:** ______
Appendix V

Digit Span Task

“We’re going to play a fun game that involves memory. Do you have a good memory?” (Response). Would you like to play this game with me?” (Response). “I’m glad you want to play because this is really going to be fun!”

“First I want you to listen to me as I say some numbers. Try to remember each number that I am saying because I’m going to ask you to say the numbers back to me. Are you ready to listen to the numbers?” (Response).

Instructions for administration:
- Numbers are read at a rate of one item per second.
- The span length begins at two. Every time a child repeats the numbers correctly in the exact order, the span length is increased by one.
- If the child recalls the span incorrectly, a different digit span of the same span length is repeated.
- If the child fails the second span, the testing session is finished.

Practice Trials: “Let’s practice first. Listen to me say these numbers and then when I tell you, say the numbers back to me.”

5 - 7 - 4

“O.K. Now, say the numbers back to me.”
(Response. If incorrect, repeat rules and do practice trial again). (When correct) “Very good!”

Test Trials: “O.K., let’s play the game!”

<table>
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<th>TRIAL</th>
<th>FIRST SPAN</th>
<th>SECOND SPAN</th>
<th>Level</th>
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<td>6 8 9 1</td>
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<td>0 1 7 4 3 8 2 3 1 9 5</td>
<td>5 9 1 3 7 6 9 2 4 8 9</td>
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</tr>
</tbody>
</table>

Feedback: “Thanks for playing the game! I hope you had fun! You did really well!”

HIGHEST LEVEL COMPLETED: _____
Appendix W

Day/Night Stroop Task

“We are going to play a game with some sun and moon picture cards. This is a special game where I will tell you what I want you to say to the cards. This is a picture of **DAY** *(show picture)*. There is a **SUN** on the picture, so it is **DAYTIME**. This is a picture of **NIGHT** *(show picture)*. There is a **MOON** on the picture, so it is **NIGHTTIME**.”

“What I want you to do is to say “**NIGHT**” when I show you the picture of **DAY**. *(Hold up SUN card)*. What do you say when I hold up this card?” *(Response. If incorrect response, go over the rule again).* *(When correct)* “Very good!”

“Now I want you to say “**DAY**” when I show you the picture of **NIGHT**. *(Hold up MOON card)*. What do you say when I hold up this card?” *(Response. If incorrect response, go over the rule again).* *(When correct)* “Very good!”

**Practice Trials:** “Let’s practice!
When I show you a card, I want you to say the word you are supposed to say as **fast** as possible. *(Show MOON card)*. What do you say when you see this one? *(Response)*.
*(Show SUN card)*. What do you say when you see this one?” *(Response)*.
*(If correct, continue to test trials. If not, practice the rules again)*.

**Test Trials:** “O.K., let’s play the game!”

**Scoring:** The child is given **one** point when they answer correctly

1. Night (Show SUN card) ______ 5. Day (Show MOON card) ______
2. Day (Show MOON card) ______ 6. Day (Show MOON card) ______
3. Night (Show SUN card) ______ 7. Night (Show SUN card) ______
4. Night (Show SUN card) ______ 8. Day (Show MOON card) ______

**Feedback:** “Thanks for playing the game! I hope you had fun! You did really well!”

**TOTAL “Day” (Moon Card) SCORE:** ______
**TOTAL “Night” (Sun Card) SCORE:** ______
**TOTAL SCORE (Out of 8):** ______
Appendix X

Tower of London
Bull, Espy, & Senn (2004) – Shortened

“We’re going to play a fun game. This game uses three colored balls: red, blue, and yellow (show balls).
(Hold up red ball) What color ball is this? (Response. Feedback).
(Hold up blue ball) What color ball is this? (Response. Feedback).
(Hold up yellow ball) What color ball is this? (Response. Feedback).

I want to see if you can follow directions and do exactly as I say. Would you like to play this game with me? (Response). I’m glad you want to play because this is really going to be fun!”

Rules:
“Great! First, I am going to show you how to play. These three colored balls can only be moved in special ways. There are three wooden pegs that you can put the balls on (show pegs).
The FIRST RULE is that the balls can only move one at a time.
The SECOND RULE is that if you are NOT moving a ball, it MUST be kept on one of the wooden pegs.
And the THIRD RULE is that your move is finished when you take your hand OFF of the ball.
Do you understand?” (Response).

“O.K. I’m going to show you how to move the balls. (Demonstrate as you go).
The three wooden pegs are different sizes.
The SMALLEST peg can only fit ONE ball on it.
The MEDIUM sized peg can fit TWO balls on it.
And the LARGEST peg can fit THREE balls on it.
So, when I move the balls, I can only move ONE ball at a time (show moving one ball at a time).
If I am moving a ball, it has to be kept on a peg.
I can’t put the ball on the table or floor. That’s not allowed (show moving the ball from peg to peg and NOT allowing it to be on the table or floor).
Also, when I take my hand OFF the ball, my move is over (show taking hand off the ball).

Rule Check:
“So, what size peg is this?” (Show the small peg. Child must say “small peg” to proceed).
“And how many balls can fit on this peg?” (Child must say “one” to proceed).

“So, what size peg is this?” (Show the medium peg. Child must say “medium peg” to proceed).
“And how many balls can fit on this peg?” (Child must say “two” to proceed).

“So, what size peg is this?” (Show the large peg. Child must say “large peg” to proceed).
“And how many balls can fit on this peg?” (Child must say “three” to proceed).

“What is this?” (Point to table or floor. Child must say “table/floor” to proceed).
“And are the balls allowed to touch the floor/table?” (Child must say “no” to proceed).

“Can I move two balls at the same time?” (Child must say “no” to proceed).
“So, I can only move one ball at a time, right?” (Child must say “yes” or nod to proceed).
“What happens when I take my hand off the ball?” (Child must say “your turn is over” to proceed).
“Now, here is my book of pictures with the SAME set of wooden pegs and balls. (Show book).
They look just like your pegs and balls. See? They look the same (show pictures).
I want you to make your set of balls and wooden pegs look like these pictures.
Do you think you can do that?” (Response).

**Practice Trial:** “O.K. Let’s practice!”

(*Practice trial requires moving only one ball. See diagram on next page for information. The practice trial target position is shown in the picture book) Remember to time the child.

**Test Trials:** “You did a great job! Now, let’s play!”

**Instructions for administration:**
- Repeat necessary rules if the child fails a trial.
- After each trial, hide the balls with the booklet while repositioning them back to their original configuration.
- The diagram for each trial shown is how the balls should look at the end of a successful trial (target position).
- If the child exceeds the # of moves required or exceeds the time limit, stop that trial and move on to the next.
- If a child breaks the rules, reposition balls to original configuration and move on to the next trial.
- If the child refuses to continue, he/she is considered to not pass that specific trial. You can try the next trials.
- If the child fails 4 trials in a row, testing is stopped.
- Mark the appropriate number of points for each successful trial.

**Before each trial:** “Okay, can you make your balls look like the picture?”

1. 0 counter-intuitive moves, 30 seconds, 2 moves ______
2. 1 counter-intuitive move, 30 seconds, 3 moves ______
3. 1 counter-intuitive move, 30 seconds, 4 moves ______
4. 2 counter-intuitive moves, 45 seconds, 5 moves ______
5. 3 counter-intuitive moves, 45 seconds, 6 moves ______
6. 4 counter-intuitive moves, 45 seconds, 7 moves ______

**TOTAL POINTS:** ______

**Feedback:** “Thank you for playing! I hope you had fun! You did a great job!”

**Scoring:**
The trials are assigned a point value based on how many minimal moves were required for a solution. For example, the 2 move problem is assigned 2 points. The 7 move problem is assigned 7 points. The total score is the sum of all correctly solved trials up to a maximum of 7 moves. For example, if a child successfully solved the 2-, 4-, and 5-move trials, the score would be 11. The child receives points if the specified amount of moves is used and is completed in the time limit. The maximum possible score is 27.
Appendix Y

Hand Game

Hughes (1998); Carlson, Mandell, & Williams (2004)

“We’re going to play a fun game. I want to see if you can follow directions and do exactly as I say. Would you like to play this game with me?” (Response). “I’m glad you want to play because this is really going to be fun!”

“First, I want you to do whatever I am doing.”
“Can you make a fist?” (Make fist. Wait for response). (When correct) “Very good!”
“Can you point your finger?” (Point finger. Wait for response). (When correct) “Very good!”

Practice Imitation Trials:

“First I want you to practice. I am going to have you do whatever I am doing. Do you think you can copy me?” (Response). (After each trial, say “Okay, let’s try another…”)

1. Fist
2. Point
3. Fist
4. Point
5. Fist
6. Point

Practice Anti-Imitation Trials:

“Now that you practiced how to play, we are going to play with some different rules. Now, you are supposed to do the opposite of what I am doing. So, when I make a fist, I want you to point your finger. (Demonstrate) And when I point my finger, I want you to make a fist.” (Demonstrate)

(Make fist). “When I make a fist, what are you supposed to do?” (Response. If incorrect, go over rules again). (When correct) “Very good!”

(Point finger). “When I point my finger, what are you supposed to do?” (Response. If incorrect, go over rules again). (When correct) “Very good!”

“Let’s practice again” (After each trial, say “Okay, let’s try another…”)

1. Fist (Child should point)
2. Point (Child should make a fist)
3. Fist (Child should point)
4. Point (Child should make a fist)

Test Trials: “O.K., let’s play the game!”
Scoring:

*The participant is given one point when they execute the correct hand movement. The scores are the proportion of trials correct. (After each trial, say “Okay, next…”)*

1. Fist (Child points) ______ 9. Point (Child fists) ______
2. Point (Child fists) ______ 10. Fist (Child points) ______
3. Fist (Child points) ______ 11. Point (Child fists) ______
4. Point (Child fists) ______ 12. Fist (Child points) ______
5. Point (Child fists) ______ 13. Point (Child fists) ______
6. Point (Child fists) ______ 14. Fist (Child points) ______
7. Fist (Child points) ______ 15. Fist (Child points) ______
8. Fist (Child points) ______ 16. Point (Child fists) ______

Feedback: “Thanks for playing the game! I hope you had fun! You did really well!”

TOTAL “Fist” (Child points) SCORE: ______

TOTAL “Point” (Child fists) SCORE: ______

TOTAL OVERALL CORRECT: ______

TOTAL PROPORTION OF TRIALS CORRECT: ______ (“Fist”/”Point”)

Scoring:
The maximum span length is the score on this measure. Check the box if the level was completed successfully
Appendix Z

Gift Delay  
*Carlson and Moses (2001)*

**Materials:** Small toy, noisy wrapping paper, stopwatch, video recorder.

Begin the Gift Delay AFTER completing the Tower of London (and all other tasks).

**Instructions for administration:**
“Well, I know you played a lot of games with me today, and to thank you, I have a present for you. But I want it to be a BIG surprise! So will you face the other way and try not to look while I wrap your gift?”

*Noisily wrap the gift over a period of 60 seconds.*

*Once finished and time is up,* “Okay, you can open your present now!”

“Thank you so much for all of your help today!”

**Scoring:** Coding will include (1) a peeking score (0 = turning fully around to peek, 1 = peeking over the shoulder, 2 = no attempt to peek), (2) the total number of times peeked, and (3) latency to peek over shoulder or fully turn around (60 s for full compliance).

1. **Peeking:**
   - Fully turned around to peak ______
   - Peeked over shoulder ______
   - No attempt to peak ______

2. **Total number of times child peeked** ______

3. **Time before peaking (seconds)** ______
Appendix AA

Debriefing

Thank you for participating in this study. We were trying to see how well children do on the games that we played with you. We also asked you some questions about things that did not really happen in the birthday party video and when Paco read you a story. This was to see how well you remembered those things. Sometimes we told you that you had made a mistake. But you really had a good memory for the birthday party video and Paco’s visit! How do you feel about the things that we did together? Do you have any questions about what we did? (Answer questions.) Thank you for participating in this study.
Vita

Rachell Jones graduated *summa cum laude* with a Bachelor of Science degree in Psychology with a minor in Criminal Justice from Lamar University in August 2004. She received her Master of Science degree in Community/Clinical Psychology from Lamar University in May 2008. In September 2007 she joined the doctoral program in Legal Psychology at The University of Texas at El Paso. Dr. Jones has been the recipient of several research grants including two Doctoral Research Grants from the University of Texas at El Paso, and the National Science Foundation EAPSI Summer Internship to Australia.

While pursuing her degree, Dr. Jones worked as a research assistant and assistant instructor for the department of Psychology. She also taught preparation for adult living classes to children in foster care. She also interned at the Juvenile Probation Department and with Randall Rattan, Ph.D., ABPP Board Certified in Forensic Psychology. She also actively volunteers with Hospice of El Paso.

Dr. Jones has presented her research at conference meetings, and has published her research in the journal, *Personality and Individual Differences*. Dr. Jones’ dissertation, *The Effect of Co-witness Information and Individual Differences in Cognitive Abilities on the Suggestibility of Pre-school Children*, was supervised by Dr. James Wood and Dr. Matthew Scullin. After graduation, Dr. Jones intends to pursue a career in teaching and research.

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This dissertation was typed by Rachell Leanne Jones.