

We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

4,800

Open access books available

122,000

International authors and editors

135M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.

For more information visit www.intechopen.com



Cognition and the Child Witness: Understanding the Impact of Cognitive Development in Forensic Contexts

Daisy A. Segovia and Angela M. Crossman

Additional information is available at the end of the chapter

<http://dx.doi.org/10.5772/53938>

1. Introduction

Children's normal cognitive development allows them to thrive and succeed in a wide variety of contexts, particularly those well suited to their emerging abilities. However, there are domains in which children are forced to participate that are not necessarily well adapted to their developing cognitive skills and abilities. One of these is the legal system. Designed to operate with adults in mind, children are often poorly equipped to cope with its demands and rigors (Malloy, Mitchell, Block, Quas, & Goodman, 2007), and their performance in these contexts is often evaluated in ways that might under- or overestimate their contributions (Bottoms, Golding, Stevenson, Wiley, & Yozwiak, 2007). Hence, examining children's cognitive abilities in forensic contexts can be an important means of helping calibrate the usefulness of their contributions.

While the nature of children's participation in the legal system varies, child witnesses must have certain basic cognitive abilities, such as the capacity to perceive, recall and communicate appropriate, relevant information clearly and accurately to provide evidence in legal contexts (Federal Rules of Evidence 601, 602). They must be able to understand and respond to questions effectively, without succumbing to suggestion or interviewer influence, and they must be able to do so credibly, or their evidence might be disregarded, dismissed or otherwise disbelieved (Leippe & Romanczyk, 1989; Ruva & Bryant, 2004). Thus, beyond the cognitive capacity to perceive, recall and report on past events, child witness credibility is an important factor in the extent and type of impact a child witness might have in a given case.

While there are numerous influences on perceptions of child witness credibility, it is likely that their cognitive development impacts both their actual accuracy and perceptions of their

accuracy and credibility. Yet, this impact likely varies as a function of case content. That is, cognitive maturity might be an important consideration in weighing a child's custody preferences, but be considered less relevant for an alleged sexual abuse victim, for whom perceived trustworthiness is more critical (Crossman, Powell, Principe, & Ceci, 2002; Duggan, Aubrey, Doherty, Isquith, Levine & Scheiner, 1989). To understand the role and impact of child witnesses in the legal system, it is thus important to consider what aspects of cognitive development, if any, are related to child witness accuracy and credibility.

In the current chapter, cognitive development is explored as it pertains to children in different forensic contexts. First, aspects of memory development are considered in terms of how they likely impact child witness perception and reporting of events, in addition to factors that might influence witness memory, such as trauma. Then, additional factors related to child witness strengths and vulnerabilities are considered, including intelligence, source monitoring abilities, and suggestibility. Finally, the interplay between case content and cognitive development is explored for its impact on child witness effectiveness. While the central focus of this chapter is on children as victims/witnesses, children also interact in the justice system as suspects and perpetrators. One of the central concerns in those cases is with lie-telling, which is addressed elsewhere in this volume, but here we consider issues such as juvenile confessions in relation to their cognitive development.

2. The developing cognitive abilities of the child witness

There is no one "child witness" and the variety of forensic contexts in which children participate makes it difficult to define uniform aspects of cognitive development that are relevant to all child witnesses. Nevertheless, various aspects of cognitive development have been heavily examined for their importance to child witness accuracy and credibility, as detailed below.

2.1. Memory development – Witnessing an event

Most critical for child witnesses is memory development. Although the ability to create memories seems to be present at least from birth, lasting autobiographical memories that a child can report of an experienced event are rare until approximately 3 years of age (Fivush, 1994, 1997; Jack, Simcock, & Hayne, 2012), likely facilitated and organized by language development (Simcock & Hayne, 2002). Nevertheless, once developed, children's memories can be highly accurate. In terms of eyewitness identifications, child witnesses can be as accurate in identifying a culprit as adult witnesses (Humphries, Holliday, & Flowe, 2012; Pozzulo & Lindsay, 1998).

Generally speaking, to be effective witnesses, children must be able to communicate facts of a forensic nature about which they are knowledgeable because they directly perceived and remember them. Thus, a child's ability to properly encode an event in memory is paramount. Effective encoding can be influenced by attention and prior knowledge, while memory retention might be affected by memory strength, script knowledge, and memory storage capacity.

Attention. One does not necessarily encode into one's memory information that did not receive attention. This is relevant to child witnesses, as children often do not attend to the same aspects of an event as adults (Johnson & Foley, 1984; Mandler, 1990; Yarmey, 1979). This could be protective for children, as recent findings using the Deese-Roediger-McDermott paradigm (DRM) suggest. The DRM paradigm asks participants to recall lists of semantically related words (e.g., slumber, dream, tired, snooze) from which a critical lure word is missing (e.g., sleep). The procedure tests for false memory of the lure words. Otgaar, Peters and Howe (2012) found that children presented with a divided attention task were *less* likely to have false memories in the DRM paradigm, while adults with divided attention were *more* likely to have false memories. In both groups, however, true memories were not impacted by the attention manipulation. Also, while adults and children might focus on different aspects of a perpetrator's appearance, they nevertheless both seem to be vulnerable to weapon focus effects (Davies, Smith, & Blincoe, 2008). That is, adults and children may focus on a weapon (or other object inconsistent with their expectations) to the detriment of their recall of other aspects of an event that captured less attention (Davies et al., 2008; Pickel, Narter, Jameson, & Lenhardt, 2008).

Prior knowledge. Children's knowledge, which grows with age, impacts the accuracy of their event memory as well. It influences what they attend to, how they understand and interpret events and what they encode into memory (Principe, Ornstein, Baker-Ward, & Gordon, 2000). For example, a child expert in a domain (e.g., chess) can outperform an adult in recalling locations of chess pieces on a chess board (Chi, 1978), and prior expert knowledge can overwhelm the effect of general intellectual aptitude on story recall (Schneider, Bjorklund, & Maier-Brückner, 1996).

On the other hand, children begin to develop awareness of culturally-based stereotypes during the preschool years (e.g., obesity, mental illness, sex, race; Corrigan & Watson, 2007), and these stereotypes can lead children to selectively encode or inaccurately reconstruct their memories to be in line with their stereotypes (Bigler & Liben, 1993; Klaczynski, 2008; Martin & Halverson, 1983). This suggests that child witness memory accuracy could be undermined by children's stereotypes (Leichtman & Ceci, 1995a, b). Overall, then, knowledge can enrich and deepen a child's event recall and understanding, but also undermine their accuracy.

Memory strength and scripts. Once encoded, strength of a memory likely influences a child's ability to recall that memory. That is, events that are highly salient or meaningful to a child, or events that are repeated, might be associated with a stronger memory trace. This can protect the memory over time from degradation or other influences, such as suggestion (Christianson, 1992; Hamann, 2001; Holliday, Douglas, & Hayes, 1999; Howe, 1997; Pezdek & Roe, 1995). With sufficient replication, children can develop scripts, or generalized event representations abstracted from repeated instances of an event. For example, a child might develop a script for 'going out to eat' that involves multiple actors (e.g., host/hostess; waiter/waitress) and a particular set of ordered events (e.g., order beverages; read menu; order; eat; pay bill). The same abstraction can occur for abuse events (Roberts & Powell, 2001).

Children become more efficient in their ability to abstract event scripts with age. Farrar and Goodman (1992) showed that 4-year-olds did not seem to develop an event script following three repetitions of an event, while 7-year-olds did. More generally, children increasingly connect meaning across different exemplars of a target with age (e.g., apple juice, lemonade, and orange juice are all sweet drinks; Brainerd, Reyna, & Ceci, 2008). Thus, in some cases, younger children might not yet have the elaborate scripts that older children have developed. This can insulate them from making erroneous assumptions or interpretations about events (Brainerd et al., 2008; Lindberg, 1991; Pickel et al., 2008).

However, despite their efficiency, event scripts can interfere with recall of specific, *individual* instances of an event, such as abuse (Powell & Thomson, 1996). This could be problematic for a testifying child witness asked to describe and differentiate between multiple abuse incidents – perhaps because the defense is seeking to present alibi evidence. If the incidents were so similar that they became script-like for the child, it could be extremely difficult for the child to differentiate the events or to identify a unique incident at a specific date and time (Roberts & Powell, 2001), potentially undermining their credibility.

Memory storage. Children's memory capacity grows with age (Gathercole, Pickering, Ambridge, & Wearing 2004), such that they become increasingly able to recall larger amounts of information over time. For child witnesses, this can become visible when they are asked to provide free recall reports in response to open-ended questions, such as "What happened?". Younger children tend to provide very little event detail when asked such questions. Nevertheless, even young children are capable of accurately recalling and reporting their experiences from memory (Goodman, 2006).

An important moderator of children's ability to store memories is the amount of time between encoding and retrieval. With longer delays, child witnesses have greater difficulty providing complete and accurate memory reports, particularly younger children, as their memory traces seem to decay more rapidly than older children or adults (Brainerd & Reyna, 1995). However, offering children an opportunity to recall an event after a short delay might help to inoculate their reports and maintain them over time (Peterson, Pardy, Tizzard-Drover, & Warren, 2005), particularly when the event context is reinstated during the interview (La Rooy, Pipe, & Murray, 2007). This suggests that the development of children's memory storage facilitates better witness reports with age. It also suggests that there are means of helping even young children to overcome some of their memory shortcomings.

2.2. Memory development – Reporting an event

Having witnessed an event (e.g., a crime), the child witness's next responsibility is to report the relevant facts, as observed. A child's memory report accuracy is therefore dependent on his or her memory retrieval ability and communication/linguistic skills.

Memory retrieval. When asked to retrieve a memory (i.e., reconstruct the event from memory storage), children become increasingly able to structure that information into narrative form with age (Lamb et al., 2003). Younger children must often rely on adult

assistance, in the form of questions, to provide a narrative account of an event. Older children, on the other hand, are increasingly able to provide a structured, coherent narrative description of their experiences in response to simpler prompts, such as "What happened?". Thus, interviewers (and parents) frequently ask questions that are more supportive, or "leading", with younger children, in part to provide the narrative structure children need to produce a coherent event account (e.g., Dent & Stephenson, 1979; Hudson, 2006; Poole & Lindsay, 1998).

However, researchers consistently find that the least directive questions (e.g., free recall) tend to elicit the most accurate information and have the lowest risk of eliciting false information from children. They also elicit less information overall from children (Bjorklund et al., 2000; Poole & Lindsay, 1995). Interview strategies have thus been designed that attempt to provide additional structure and cues to children to maximize the amount of accurate event recall, while minimizing false recall. Techniques include context-reinstatement (La Rooy et al., 2007) and full interviewing protocols such as the Cognitive Interview (Fisher & Schreiber, 2007) and the NICHD Protocol (Lamb, Orbach, Hershkowitz, Esplin, & Horowitz, 2007). These practices seem to facilitate child witnesses' attempts to reconstruct events from memory.

Communication and linguistic ability. A child who cannot communicate effectively in the justice system may lack credibility, leading perhaps to future victimization or to conviction, in the case of a juvenile defendant. Most child victims, for instance, must be able to disclose abuse in order for the abuser to be stopped or prosecuted. However, it seems clear from the number of adults who never reported childhood abuse that this remains a problem for many children (Bottoms, Rudnicki, & Epstein, 2007; London, Bruck, Wright, & Ceci, 2008). Yet, when abuse is suspected, the interview strategies noted above can help children to disclose (Pipe et al., 2007).

Some child witnesses must testify in court, subsequent to a disclosure. This can be traumatic, particularly if it must be repeated (Quas et al., 2005). In many cases, children must first undergo a competency evaluation. These typically attempt to assess their understanding of truths and lies, which emerges in the preschool years and becomes more nuanced with age (Talwar & Crossman, 2012). However, it is likely that competency evaluations underestimate children's understanding of truth/lie concepts and are not likely to be related to a child witness' actual truth-telling (Talwar & Crossman, 2012), raising questions about their usefulness.

When they testify, children are immersed in the linguistically foreign legal system, for which they are often not developmentally prepared (Walker, 1993). They may face the challenge of deciphering legal jargon, as well as linguistically complex questions that they are ill equipped to answer (as are many adults; Carter, Bottoms, & Levine, 1996; Perry et al., 1995). However, this might not undermine children's credibility, as one study of trial transcripts found that complex questions asked by defense attorneys predicted convictions, rather than acquittals in those cases (Evans, Lee, & Lyon, 2009). Nevertheless, children also may be required to offer testimony on concepts that are developmentally beyond their

reach. For instance, caution is warranted when asking young children to locate in time or enumerate past events (e.g., age, month, or season; which occurrence, 1st, 2nd, etc.; Friedman, Reese, & Dai, 2011), particularly maltreated children (Wandrey, Lyon, Quas, & Friedman, 2012), as they may struggle to do so accurately until adolescence.

Another challenge for all witnesses is cross-examination. Unfortunately, research examining children's performance under cross-examination suggests that they risk losing credibility, despite their cognitive ability to provide accurate information. This is because they often change answers in response to cross-examination – both their correct and their incorrect direct examination answers (Zajac & Hayne, 2003; Zajac, Jury, & O'Neill, 2009). In fact, preschoolers, older children *and* adults are vulnerable to the deleterious impact of cross-examination (Zajac & Hayne, 2006; Zajac & Cannan, 2009) – highlighting the fact that social pressures can undermine accurate memory reporting. Providing support persons for child witnesses and preparation for legal participation are procedures meant to alleviate some of the stresses of testifying for children and seem to offer some benefits (Malloy et al., 2007). Nevertheless, it is clear that the justice system demands a significant degree of communicative and linguistic competency from child witnesses, some of which is beyond their capacities.

2.3. Memory and trauma

Memory and stress. The nature of memory for traumatic events has been debated for decades. Early research supported the notion that memory for traumatic events was different than memory for neutral or positive events. The high emotionality and salience of traumatic events were thought to create “flashbulb memories” – memories that were embedded in one's mind like a “photographic imprint” (Conway, Anderson, Steer, & Donnelly, 1994; Winograd & Killinger, 1983). These memories were thought to be highly accurate and fixed due to the overstimulation of the event, which led to over consolidation of memory (McGaugh, 1990; Pitman, 1989). However, more recent research supports the view that memory for traumatic events, like other events, is subject to alteration, is malleable, and is not necessarily completely accurate (Engelhard, van der Hout, & McNally, 2008; Southwick, Morgan, Nicolau, & Charney, 1997). The effect of traumatic experiences on memory is of great importance in the legal system because it could alter the accuracy and effectiveness of a child's eyewitness testimony.

Many crimes are highly stressful in nature and witnessing or being involved in a crime can be psychologically traumatic, particularly for a child. Findings from studies investigating the impact of stressful events on memory have been largely mixed. On the one hand, research has shown that highly stressful situations can adversely affect one's memory. For example, Quesada and others (2012) examined the effect of stress on 8- to 11-year-olds' memory performance. Children were randomly assigned to a stressful or non-stressful condition and then asked to play a memory game. Children who were exposed to stress performed worse, making more errors in retrieval. These decrements in memory performance may result because cognitive resources otherwise used to encode and store

details of the events are focused on coping or self-regulation (Vandermass, Hess, & Baker-Ward, 1993) or because cortisol levels produced by stress can affect the hippocampus, which affects memory retrieval (Quesada et al., 2012).

On the other hand, stress from emotionally salient experiences could lead eyewitnesses to have a stronger memory for a target event (Goodman, Hirschman, Hepps, & Rudy, 1991; Pezdek & Taylor, 2002; Shrimpton, Oates, & Hayes, 1998). Some researchers argue that the stressful nature of traumatic events renders them more personally meaningful and distinctive, which may lead to higher levels of cognitive activation directed toward encoding significant details of the event (Christianson, 1992; Hamann, 2001; Howe, 1997). Indeed, Ochsner, Zaragoza, and Mitchell (1999) found that children who witnessed a staged theft were more accurate on recall and recognition measures compared to children who viewed a similar but neutral event.

Finally, it is possible that stress is related to memory in a curvilinear fashion, with low levels of stress not eliciting enough attention to encode details of an event, but too much stress causing decrements in memory performance. Bahrnick, Parker, Fivush and Levitt (1998) found that children exposed to moderate amounts of hurricane damage to their homes recalled more than those with minimal or extensive damage (i.e., low or high stress). However, follow-up interviews showed that the effect did not seem to persist over time (Fivush, Sales, Goldberg, Bahrnick, & Parker, 2004).

Overall, studies investigating children's memory for stressful events have shown that younger children tend to recall less information and make more mistakes (e.g., Goodman, Quas, Batterman-Faunce, & Riddlesberger, 1994; Goodman, Quas, Batterman-Faunce, Riddlesberger, & Kuhn, 1997), but individual cognitive factors that affect memory have rarely been examined. However, there may be some cognitive factors that can predict children's memory performance for stressful experiences. For example, Alexander and her colleagues (2002) interviewed 51 children between the ages of 3 and 7 years, two weeks after they received inoculation shots at the doctor's office—an experience that can be very stressful for children. They found that children with better cognitive inhibition ability were less likely to provide incorrect details in free-recall and were less likely to make omission errors when asked misleading questions (e.g., "The nurse didn't give you a shot, did she?") than children with lower cognitive inhibition, controlling for age. Cognitive inhibition, briefly, is the ability to process information while impeding other irrelevant or distracting information or stimuli (Harnishfeger & Bjorklund, 1994; Lorbach & Reimer, 1997). Alexander and her colleagues reasoned that children with better inhibitory skills were better able to prevent distractions from impeding encoding during the inoculation, thus allowing for better memory of the event. Further, they also argued that their superior inhibitory skills allowed them to suppress suggestive thoughts, allowing them to better resist suggestive questions. More research needs to be conducted to further probe these results and to explore what other cognitive processes affect memory for stressful events.

Memory and maltreatment. Examining the effect of stress on memory is important to the legal arena, but it is particularly important to investigate if these findings generalize to

children who face recurrent stressful experiences, such as children who are victims of abuse. Maltreated children may come into contact with the legal system frequently, especially if the abuse has been substantiated and if they are required to testify. Maltreated children may differ from children who only experience traumatic or stressful events once, in that the constant exposure to stress may affect how maltreated children encode and retrieve information. Some research has yielded evidence for developmental delays in maltreated children, especially those who have been physically abused or neglected (see Veltman & Browne, 2001 for a review). Maltreated children have been shown to perform at levels one or two years behind nonabused peers in areas such as intelligence, language, short-term memory, and executive function (Alessandri 1991; Carrick, Quas, & Lyon, 2010; Cicchetti, Rogosch, Maughan, Toth, & Bruce, 2003; Trickett & McBride-Chang, 1995). These delays can be problematic when obtaining a memory report from a maltreated child because they can affect a child's ability to adequately understand and respond to questions (e.g., Eigsti & Cicchetti, 2004; Zajac & Hayne; 2003).

On the other hand, a child's constant exposure to traumatic events might help his or her memory. The constant stress may lead a child to adopt processing strategies that make him or her hyper-vigilant to stressful stimuli, thereby encoding that information better than non-stressful stimuli (McNally, Metzger, Lasko, Clancy, & Pitman, 1998). A maltreated child may also have extensive knowledge of trauma-related information, which could support better memory (Goodman, Quas, & Ogle, 2010). However, there is evidence to suggest that this hyper-vigilance is generally associated with emotion-regulating strategies (McNally, Kaspi, Riemann, & Zeitlin, 1990; Williams & Broadbent, 1986), rather than cognitive factors.

Overall, despite the findings of developmental delays among maltreated children, research has shown that maltreated children can be as accurate in their memory reports as their nonabused counterparts (Goodman et al., 2010; Howe, 1997; Howe, Toth, & Cicchetti, 2011). For example, Eisen and others (2002) examined 189 3- to 17-year-olds who were allegedly maltreated. These children were questioned about an anogenital examination they received as part of their child maltreatment investigations. Results mimicked those found by studies examining nonabused children: younger children made more errors and reported fewer details than older children. Importantly, the children with prior histories of abuse performed on par with children with no prior history of abuse. Thus, child maltreatment does not necessarily deprive children of their ability to provide accurate event reports, nor does it seem to alter the predictors of memory accuracy (Eisen et al., 2002, 2007).

3. Vulnerability to error and influence

Beyond memory issues, additional factors can influence the accuracy of children's memory reports – and their vulnerability to influence. These include children's intelligence, mental health, source monitoring ability, suggestibility and the use of suggestive interview aids.

Intelligence and mental health. For child witnesses, intelligence is most relevant to memory accuracy and resistance to suggestion. That is, individuals with higher IQ scores tend to

have better memory skills and to provide more detailed recall when reporting an event (Gudjonsson & Henry, 2003; Zhu et al., 2010). Although a legal professional might not need to take into account the intelligence of typically developing (TD) children, it is important to be aware that children who suffer from learning and other intellectual disabilities (ID) may be more vulnerable in forensic contexts (Henry & Gudjonsson, 2007). Indeed, the rate at which children's memory performance improves across age may be slower for ID children than for TD children, with mental age a better predictor of eyewitness memory performance than IQ measures (Henry & Gudjonsson, 2007). Thus, children with ID are at risk of being less accurate and more suggestible in their event reporting than are TD children.

These effects may be exacerbated among children who are in the justice system as defendants. ID is overrepresented among juvenile delinquents (Najdowski, Bottoms, & Vargas, 2009), as is mental illness (Redlich, 2007), both of which increase adolescent vulnerability to interrogative pressure, which is already heightened among youths (Redlich, 2007; Richardson, Gudjonsson, & Kelly, 1995). Indeed, research demonstrates that children and adolescents (particularly ID and mentally ill juveniles) are at greater risk for falsely confessing transgressions that they did not commit (Najdowski et al., 2009; Redlich, 2007). Given these findings, it is vital that intellectual ability and mental health be taken into account when considering child and adolescent witness and defendant statements.

Source monitoring. Children's memory reports can also become inaccurate due to faulty source monitoring, which is the process of determining the origin (or source) of their knowledge, memories and/or beliefs (Johnson, Hashtroudi, & Lindsay, 1993). Child witnesses, like any other witnesses, might be asked to provide specific details about criminal events, such as when a crime happened, who committed it, where it happened, and distinguish whether it was a perpetrator's actions or someone else's that they are recalling. Unfortunately, pre- and post-event information from outside sources can influence one's memory, thus making it difficult to distinguish between real event details and suggested details (Poole & Lindsay, 2002; Roberts & Blades, 1999; Thierry, Spence, & Memon, 2001). The source of one's misinformation can vary from television, to word-of-mouth, to intentional suggestion, to name a few. But regardless of the source, the concern is the same – that a child exposed to incorrect information following an event will fail to identify the true source of the novel information and provide inaccurate testimony as a result. Indeed, there is clear developmental growth in the ability to recall source information, identified at the neural level (Sprondel, Kipp, & Mecklinger, 2011). Hence, researchers have begun to explore what factors might influence source monitoring.

There are several factors that can influence the likelihood of committing source monitoring errors for children. These include the similarity of events, delays in recall, suggestive interviewing, and agent identity (i.e., whether the event was about oneself, a friend, or an unfamiliar person; Roberts, 2002). When pre- or post-event information is similar to the target information, it is more likely that children will make source monitoring errors (Johnson et al., 1993; Lindsay, Johnson, & Kwon, 1991). Indeed, although children with stronger source monitoring abilities seem better able to resist post-event suggestions,

particularly when encouraged to identify the source of the suggestions, they are less able to do so when those suggestions are consistent with their event schema (Roberts & Powell, 2006). When information that is similar in nature is encoded, there are few cognitive cues to help to distinguish the sources (Day, Howie, & Markham, 1998; Roberts & Blades, 1999). This can be important in instances where children experience multiple similar incidents, such as in the case of prolonged child abuse. Unfortunately, in forensic contexts such as court, children may be asked to distinguish between these multiple incidents or identify multiple perpetrators.

On the other hand, children tend to make fewer source monitoring errors when the target information regards the self rather than others (Baker-Ward, Hess, & Flannagan, 1990; Roberts & Blades, 1998). In other words, they are better able to accurately report on events that happened to themselves than on events they witnessed other people experiencing. For example, Roberts and Blades (1998) found that 6- and 9-year-olds were more accurate and made fewer source monitoring errors answering questions about activities they had performed versus those they observed, while 4-year-olds showed the reverse relation. Further, children remember better actions performed by a familiar person compared to an unfamiliar person (Baker-Ward et al., 1990). Some have posited that this is due to the cognitive processes that are elicited when encoding familiar (self and peer) information (Baker-Ward et al., 1990; Foley et al., 1989). Specifically, children in these situations are using cognitive processing that requires them to use more cognitive effort—they are anticipating what must be done, anticipating the action's consequence, and reflecting on the cognitive processes that were required to perform that action (Ratner, Foley, & Gimpert, 2000). Children can then use records of these cognitive processes as cues to discriminate between sources (Roberts, 2002).

All of these factors are relevant when considering child witnesses and techniques for interviewing them. For example, misleading or suggestive interview questions that are script-consistent and plausible are more readily accepted by child witnesses and are more likely to elicit source monitoring errors (Pezdek, Fingers, & Hodge, 1997). Additionally, the nature of the inquiry can impact the accuracy of the report. For instance, Roberts and Blades (1995) found that younger children were more accurate in their source identifications when asked to report information nonverbally compared to verbally. Moreover, children committed fewer source monitoring errors during free recall than when answering specific questions (Roberts & Blades, 1998, 1999), reinforcing the importance of free recall when interviewing child witnesses. To date, however, explicit training in source monitoring appears to be beneficial for older (i.e., 7- to 8-year-old), but not for younger (3- to 6-year-old) child witnesses (Poole & Lindsay, 2002).

Suggestibility. Another potential source of children's errors in forensic contexts is via suggestibility. Suggestibility has been defined as the ease with which a person is persuaded and influenced, and the degree to which one accepts and changes one's own judgments, opinions, or patterns of behavior without critical response (Drukteinis, 2001). In a forensic context, this is usually exhibited by changes in memory reports due to suggestive

questioning by an interviewer. For example, a question such as, “Was the man’s jacket red or blue?” is suggestive because it implies that the man was wearing a jacket (he may or may not have been). Children may have difficulty accurately answering suggestive questions because they may not have the cognitive or social skills to identify that they do not know the answer and do not have to choose an answer.

Studies to date indicate that individual difference variables may be more likely to influence the degree to which people are suggestible than situational factors (Gudjonsson, 1994). Indeed there are several traits that might make an individual more susceptible to suggestive questioning (Bain, Baxter, & Ballantyne, 2007; Singh & Gudjonsson, 1992), such as age. Both adults and children are susceptible to suggestive questioning, but younger children tend to be especially vulnerable to suggestive interview techniques (Ceci & Bruck, 1993, 1995; Chae, Goodman, Eisen, & Qin, 2011; Eisen et al., 2002). These age differences can usually be explained by differences in cognitive development between older and younger children. In fact, when age is controlled, children with better cognitive functioning are overall less suggestible and produce fewer memory errors due to suggestive questioning (Chae et al., 2011; Karpinski & Scullin, 2009). Moreover, as noted above, children with intellectual disabilities are highly susceptible to suggestive questioning (Henry & Gudjonsson, 1999, 2003, 2004, 2007).

Findings for other potential cognitive predictors of suggestibility have been mixed (see Bruck & Melnyk, 2004 for a review). However, research has shown that children with advanced language skills, better memory test performance, (Clark-Stewart et al., 2004; Danielsdottir, Sigurgeirsdottir, Einarsdottir, & Haraldsson, 1993; Henry & Gudjonsson, 2003), better event accuracy (Marche, 1999; Marche & Howe, 1995; Pezdek & Roe, 1995), and/or more creativity (Brown, 1999; Clarke-Stewart et al., 2004) are often less suggestible than other children.

Concerns about children’s suggestibility are common in legal cases, especially in instances where the child’s memory report is key evidence. In fact, in child sexual abuse cases, the child’s accusation may be the only evidence available to the court. It is thus important to consider interviewing techniques and the potential for suggestion when evaluating child witnesses’ memory reports.

Interview aids. A special case of suggestibility might be said to arise through the use of some interview aids, such as anatomically detailed dolls. First used clinically as a means of communicating nonverbally about children’s emotional issues, forensic interviewers began to use anatomically detailed dolls to assist children in reporting difficult or embarrassing events (i.e., sexual abuse; Poole, Bruck, & Pipe, 2011). Unfortunately, the dolls seemed to be inherently suggestive, leading some children to demonstrate genital or anal cavity insertions on the dolls that did not occur (Bruck, Ceci, & Francoeur, 2000). Thus, researchers and policy groups have concluded that children’s interactions with such dolls are not diagnostic of abuse, they should not be used to elicit abuse reports, their use is particularly problematic for children under age 5, and they do not appear to facilitate or enhance children’s reporting even when used after verbal reports have been provided (Poole et al., 2011).

Part of the reason for the dolls' ineffectiveness with very young children could be children's immature representational abilities (DeLoache, 2000). That is, young children may have difficulty perceiving the doll as a representation or symbol of themselves and acting on it as such. They might also have difficulty ignoring the dolls' salient, play-like qualities and unique features to use it as a symbol instead (DeLoache, 2000; Poole et al., 2011).

More recent efforts have focused on the use of body diagrams – pictures – to assist children in reporting abuse allegations. Although pictures seem less challenging for children to use as symbols, concern remains about their suggestiveness (Poole et al., 2011). Specifically, as with dolls, use of the diagrams seems to increase false reports of bodily touch, even among school-aged children (Poole & Dickinson, 2011). Further, their use seems to lead interviewers away from recommended, open-ended questioning styles toward more leading, specific questions (Aldridge et al., 2004; Poole et al., 2011). Finally, their use does not seem to enhance children's disclosures or lead to greater elaboration of their reports (Bruck, 2009). Thus, these symbolic interview aids seem to be suggestive, particularly for young children who might not be capable of using them symbolically, and their forensic use is discouraged (Poole et al., 2011).

4. Conclusions

In this chapter, we reviewed aspects of cognitive development that are most relevant to child witnesses and, to some extent, child suspects in the criminal and juvenile justice systems. The findings above highlight the areas of concern with any witness – but particularly child witnesses. Yet, their implications are not uniform. In fact, the implications of children's cognitive development in forensic situations are likely to vary as a function of a variety of factors, including the type of witness and case involved, as a child's credibility may be dependent on assessments of their trustworthiness and competence. Children who are perceived as lacking competence for a variety of reasons are likely to be considered lacking in credibility. However, this effect is likely more pronounced in some types of cases than in others. Cases requiring strong memory for detailed information that was experienced only once might demand a higher expectation for cognitive ability than a case of child neglect by a well-known caregiver. Similarly, a child's trustworthiness is likely impacted by the type of case, with some arguing that in child sexual abuse cases, honesty is more salient than cognitive abilities – and that perceived suggestibility likely impacts perceptions of the child's honesty in such cases (Connolly et al., 2010). The type of child witness is important as well. Children with intellectual disabilities might be more vulnerable to suggestion as witnesses. Children who are defendants in the juvenile justice system are at higher risk of suffering from both cognitive deficits and mental illness, making them particularly susceptible to suggestion and false confession. At the same time, one's identity as a defendant likely raises more questions about trustworthiness than when one is a child witness.

Despite many of the risks for child witnesses, however, and the poor fit between children's cognitive development and the justice system, it is clear that children are capable of

participating accurately and effectively as witnesses. They often partake in family court decision-making, provide evidence in eyewitness identification cases, and testify against their assailants in child abuse cases. There is a great deal still to be learned about important cognitive factors, such as whether there are means of improving younger children's source monitoring skills, how to improve children's eyewitness identification accuracy when the perpetrator is not present in a lineup, and how to help children resist misleading questions and suggestions. More needs to be learned about the impact of emotion on children's eyewitness memory and recall as well. Perhaps the growing research on the neural correlates of children's memory will further our understanding and allow for greater forensic sensitivity to child witness strengths and vulnerabilities. These and other results, it is hoped, will contribute to more effective interviewing, testimony and treatment of child witnesses.

Author details

Daisy A. Segovia and Angela M. Crossman
John Jay College and the Graduate Center, Cuny, USA

5. References

- Aldridge, J., Lamb, M. E., Sternberg, K. J., Orbach, Y., Esplin, P. W., & Bowler, L. (2004). Using a human figure drawing to elicit information from alleged victims of child sexual abuse. *Consulting and Clinical Psychology, 72*, 304-316.
- Alessandri, S. M. (1991). Play and social behavior in maltreated preschoolers. *Development and Psychopathology, 3*, 191-205.
- Alexander, K., Goodman, G. S., Schaaf, J. M., Edelstein, R. S., Quas, J. A., & Shaver, P. R. (2002). The role of attachment and cognitive inhibition in children's memory and suggestibility for a stressful event. *Journal of Experimental Child Psychology, 83*(4), 262-290. doi:10.1016/S0022-0965(02)00149-2
- Bahrack, L. E., Parker, J., Fivush, R., & Levitt, M. (1998). The effects of stress on young children's memory for a natural disaster. *Journal of Experimental Psychology: Applied, 4*(4), 308-331.
- Bain, S. A., Baxter, J. S., & Ballantyne, K. (2007). Self-monitoring style and levels of interrogative suggestibility. *Personality and Individual Differences, 42*, 623-630.
- Baker-Ward, L., Hess, T. M., & Flannagan, D. A. (1990). The effects of involvement on children's memory for events. *Cognitive Development, 5*(1), 55-69. doi:10.1016/0885-2014(90)90012-I
- Bigler, R. S., & Liben, L. S. (1993). A cognitive-developmental approach to racial stereotyping and reconstructive memory in Euro-American children. *Child Development, 64*, 1507-1518. doi: 10.2307/1131549
- Bjorklund, D. F., Cassel, W. S., Bjorklund, B. R., Brown, R. D., Park, C. L., Ernst, K., et al. (2000). Social demand characteristics in children's and adults' eyewitness memory and suggestibility: The effect of different interviewers on free recall and recognition. *Applied*

- Cognitive Psychology*, 14, 421-433. doi: 10.1002/1099-0720(200009)14:5<421::AID-ACP659>3.0.CO;2-4
- Bottoms, B. L., Golding, J. M., Stevenson, M. C., Wiley, T. R. A., & Yozwiak, J. A. (2007). A review of factors affecting jurors' decisions in child sexual abuse cases. In J. D. Read, D. Ross, M. Togliani, & R. Lindsay (Eds.), *The psychology of eyewitness memory* (pp. 509–543). Mahwah, NJ: Erlbaum.
- Bottoms, B. L., Rudnicki, A. G., & Epstein, M. A. (2007). A retrospective study of factors affecting the disclosure of childhood sexual and physical abuse. In M.-E. Pipe, M. E. Lamb, Y. Orbach, & A.-C. Cederborg (Eds.), *Child sexual abuse: Disclosure, delay, and denial* (pp. 175-194). Mahwah, NJ: Erlbaum.
- Brainerd, C. J., & Reyna, V. F. (1995). Learning rate, learning opportunities, and the development of forgetting. *Developmental Psychology*, 31, 251-262. doi: 10.1037/0012-1649.31.2.251
- Brainerd, C. J., Reyna, V. F., & Ceci, S. J. (2008). Developmental reversals in false memory: A review of data and theory. *Psychological Bulletin*, 134, 343-382. doi: 10.1037/0033-2909.134.3.343
- Brown, R. D. (1999). *Event type and individual differences in children's false-memory creation*. Unpublished doctoral dissertation, Florida Atlantic University, Boca Raton, Florida.
- Bruck, M. (2009). Human figure drawings and children's recall of touching. *Journal of Experimental Psychology: Applied*, 15, 361-374.
- Bruck, M., Ceci, S. J., & Francoeur, E. (2000). Children's use of anatomically detailed dolls to report genital touching in a medical examination: Developmental and gender comparisons. *Journal of Experimental Psychology: Applied*, 6, 74-83.
- Bruck, M., & Melnyk, L. (2004). Individual differences in children's suggestibility: A review and synthesis. *Applied Cognitive Psychology*, 18(8), 947-996. doi:10.1002/acp.1070
- Carter, C. A., Bottoms, B. L., & Levine, M. (1996). Linguistic and socioemotional influences on the accuracy of children's reports. *Law and Human Behavior*, 20, 335-358.
- Carrick, N., Quas, J. A., & Lyon, T. (2010). Maltreated and nonmaltreated children's evaluations of emotional fantasy. *Child Abuse & Neglect*, 34(2), 129-134. doi:10.1016/j.chiabu.2009.02.009
- Ceci, S. J., & Bruck, M. (1993). Suggestibility of the child witness: A historical review and synthesis. *Psychological Bulletin*, 113, 403–439.)
- Ceci, S. J., & Bruck, M. (1995). *Jeopardy in the courtroom: A scientific analysis of children's testimony*. Washington, DC: American Psychological Association.
- Chae, Y., Goodman, G. S., Eisen, M. L., & Qin, J. (2011). Event memory and suggestibility in abused and neglected children: Trauma-related psychopathology and cognitive functioning. *Journal of Experimental Child Psychology*, 110(4), 520-538. doi:10.1016/j.jecp.2011.05.006
- Chi, M. T. H. (1978). Knowledge structures and memory development. In R. S. Siegler (Ed.), *Children's thinking: What develops?* Hillsdale, NJ: Erlbaum.
- Christianson, S. (1992). Emotional stress and eyewitness memory: A critical review. *Psychological Bulletin*, 112(2), 284-309. doi:10.1037/0033-2909.112.2.284

- Cicchetti, D., Rogosch, F. A., Maughan, A., Toth, S. L., & Bruce, J. (2003). False belief understanding in maltreated children. *Development and Psychopathology*, *15*(4), 1067-1091. doi:10.1017/S0954579403000440
- Conway, M. A., Anderson, S. J., Larsen, S. F., & Donnelly, C. M. (1994). The formation of flashbulb memories. *Memory & Cognition*, *22*(3), 326-343.
- Clarke-Stewart, K. A., Malloy, L. C., & Allhusen, V. D. (2004). Verbal ability, self-control, and close relationships with parents protect children against misleading suggestions. *Applied Cognitive Psychology*, *18*, 1037-1058.
- Connolly, D. A., Price, H. L., & Gordon, H. M. (2010). Judicial decision making in timely and delayed prosecutions of child sexual abuse in Canada: A study of honesty and cognitive ability in assessments of credibility. *Psychology, Public Policy, and Law*, *16*, 177-199.
- Corrigan, P. W., & Watson, A. C. (2007). How children stigmatize people with mental illness. *International Journal of Social Psychiatry*, *53*(6), 526-546.
- Crossman, A. M., Powell, M. B., Principe, G. F., & Ceci, S. J. (2002). Child testimony in custody cases: A review. *Journal of Forensic Psychology Practice*, *2*(1), 1-31.
- Danielsdottir, G., Sigurgeirsdottir, S., Einarsdottir, H. R., & Haraldsson, E. (1993). Interrogative suggestibility in children and its relationship with memory and vocabulary. *Personality and Individual Differences*, *14*, 499-502.
- Davies, G. M., Smith, S., & Blincoe, C. (2008). A 'weapon focus' effect in children. *Psychology, Crime & Law*, *14*(1), 19-28. doi:10.1080/10683160701340593
- Day, K., Howie, P., & Markham, R. (1998). The role of similarity in developmental differences in source monitoring. *British Journal of Developmental Psychology*, *16*(2), 219-232. doi:10.1111/j.2044-835X.1998.tb00920.x
- DeLoache, J. S. (2000). Dual representation and young children's use of scale models. *Child Development*, *71*, 329-338. doi: 10.1111/1467-8624.00148
- Dent, H. R., & Stephenson, G. M. (1979). An experimental study of the effectiveness of different techniques of questioning child witnesses. *British Journal of Social and Clinical Psychology*, *18*, 41-51.
- Drukteinis, A. M. (2001). The role of suggestibility in mental damage claims. *American Journal of Clinical Psychiatry & Law*, *26*, 15-35.
- Duggan, L. M., Aubrey, M., Doherty, E., Isquith, P., Levine, M., & Scheiner, J. (1989). The credibility of children as witnesses in a simulated sexual abuse trial. In S. J. Ceci, D. F. Ross, & M. P. Toglia (Eds.), *Perspectives on children's testimony* (pp. 71-99). New York: Springer-Verlag).
- Eigsti, I., & Cicchetti, D. (2004). The impact of child maltreatment on expressive syntax at 60 months. *Developmental Science*, *7*(1), 88-102. doi:10.1111/j.1467-7687.2004.00325.x
- Eisen, M. L., Goodman, G. S., Qin, J., Davis, S., & Crayton, J. (2007). Maltreated children's memory: accuracy, suggestibility, and psychopathology. *Developmental Psychology*, *43*, 1275-94.
- Eisen, M. L., Qin, J., Goodman, G. S., & Davis, S. L. (2002). Memory and suggestibility in maltreated children: Age, stress arousal, dissociation, and psychopathology. *Journal of Experimental Child Psychology*, *83*(3), 167-212. doi:10.1016/S0022-0965(02)00126-1

- Engelhard, I. M., van den Hout, M. A., & McNally, R. J. (2008). Memory consistency for traumatic events in Dutch soldiers deployed to Iraq. *Memory, 16*, 3-9.
- Evans, A. D., Lee, K., & Lyon, T. D. (2009). Complex questions asked by defense lawyers but not prosecutors predicts convictions in child abuse trials. *Law and Human Behavior, 33*, 258-264.
- Farrar, M. J., & Goodman, G. S. (1992). Developmental changes in event memory. *Child Development, 63*, 173-187. doi: 10.2307/1130911
- Fed. R. Evid. 601.
- Fed. R. Evid. 602.
- Fisher, R. P., & Schreiber, N. (2007). Interview protocols for improving eyewitness memory. In M. P. Toglia, J. D. Read, D. F. Ross, & R. C. L. Lindsay (Eds.), *The handbook of eyewitness psychology, Vol. 1: Memory for events* (pp. 53-80). Mahwah, NJ: Erlbaum.
- Fivush, R. (1994). Young children's event recall: Are memories constructed through discourse. *Consciousness and Cognition, 3*, 356-373.
- Fivush, R. (1997). Event memory in early childhood. In N. Cowan (Ed.), *The development of memory in childhood* (pp. 139-161). Hove, England: Psychology Press.
- Fivush, R., Sales, J. M., Goldberg, A., Bahrick, L., & Parker, J. (2004). Weathering the storm: Children's long-term recall of Hurricane Andrew. *Memory, 12*(1), 104-118.
- Foley, M. A., Santini, C., & Sopaşakis, M. (1989). Discriminating between memories: Evidence for children's spontaneous elaborations. *Journal of Experimental Child Psychology, 48*(1), 146-169. doi:10.1016/0022-0965(89)90045-3
- Friedman, W. J., Reese, E., & Dai, J. (2011). Children's memory for the times of events from the past years. *Applied Cognitive Psychology, 25*, 156-165. doi: 10.1002/acp.1656
- Gathercole, S. E., Pickering, S. J., Ambridge, B., & Wearing, H. (2004). The structure of working memory from 4 to 15 years of age. *Developmental Psychology, 40*(2), 177-190. doi:10.1037/0012-1649.40.2.177
- Goodman, G. S. (2006). Children's eyewitness memory: A modern history and contemporary commentary. *Journal of Social Issues, 62*, 811-832. doi:10.1111/j.1540-4560.2006.00488.x
- Goodman, G. S., Hirschman, J. E., Hepps, D., & Rudy, L. (1991). Children's memory for stressful events. *Merrill-Palmer Quarterly: Journal of Developmental Psychology, 37*(1), 109-157.
- Goodman, G. S., Quas, J. A., Batterman-Faunce, J. M., & Riddlesberger, M. M. (1994). Predictors of accurate and inaccurate memories of traumatic events experienced in childhood. *Consciousness and Cognition: An International Journal, 3*(3-4), 269-294. doi:10.1006/ccog.1994.1016
- Goodman, G. S., Quas, J. A., Batterman-Faunce, J. M., Riddlesberger, M. M., & Kuhn, J. (1997). Children's reactions to and memory for a stressful event: Influences of age, anatomical dolls, knowledge, and parental attachment. *Applied Developmental Science, 1*(2), 54-75. doi:10.1207/s1532480xads0102_1
- Goodman, G. S., Quas, J. A., & Ogle, C. M. (2010). Child maltreatment and memory. *Annual Review of Psychology, 61*, 325-351. doi:10.1146/annurev.psych.093008.100403

- Gudjonsson, G. H. (1994). Interrogative suggestibility: Does the setting where the subjects are tested make a difference to the scores on the GSS 1 and GSS 2? *Personality & Individual Differences, 18*, 789-790.
- Gudjonsson, G. H., & Henry L. (2003). Child and adult witnesses with intellectual disability: The importance of suggestibility. *Legal and Criminological Psychology, 8*(2), 241-252.
- Hamann, S. (2001). Cognitive and neural mechanisms of emotional memory. *Trends in Cognitive Sciences, 5*(9), 394-400. doi:10.1016/S1364-6613(00)01707-1
- Harnishfeger, K., & Bjorklund, D. F. (1994). A developmental perspective on individual differences in inhibition. *Learning and Individual Differences, 6*(3), 331-355. doi:10.1016/1041-6080(94)90021-3
- Henry, L. A., & Gudjonsson, G. H. (1999). Eyewitness memory and suggestibility in children with mental retardation. *American Journal on Mental Retardation, 104*(6), 491-508. doi:10.1352/0895-8017(1999)104<0491:EMASIC>2.0.CO;2
- Henry, L. A., & Gudjonsson, G. H. (2003). Eyewitness memory, suggestibility, and repeated recall sessions in children with mild and moderate intellectual disabilities. *Law and Human Behavior, 27*(5), 481-505. doi:10.1023/A:1025434022699
- Henry, L. A., & Gudjonsson, G. H. (2004). The effects of memory trace strength on eyewitness recall in children with and without intellectual disabilities. *Journal of Experimental Child Psychology, 89*(1), 53-71. doi:10.1016/j.jecp.2004.05.002
- Henry, L. A., & Gudjonsson, G. H. (2007). Individual and developmental differences in eyewitness recall and suggestibility in children with intellectual disabilities. *Applied Cognitive Psychology, 21*, 361-381.
- Holliday, R. E., Douglas, K., & Hayes, B. K. (1999). Children's eyewitness suggestibility: Memory trace strength revisited. *Cognitive Development, 14*(3), 443-462. doi:10.1016/S0885-2014(99)00014-3
- Howe, M. L. (1997). Children's memory for traumatic experiences. *Learning and Individual Differences, 9*(2), 153-174. doi:10.1016/S1041-6080(97)90004-2
- Howe, M. L., Toth, S. L., & Cicchetti, D. (2011). Can maltreated children inhibit true and false memories for emotional information? *Child Development, 82*(3), 967-981. doi:10.1111/j.1467-8624.2011.01585.x
- Hudson, J. A. (2006). The development of future time concepts through mother-child conversation. *Merrill-Palmer Quarterly: Journal of Developmental Psychology, 52*(1), 70-95. doi:10.1353/mpq.2006.0005
- Humphries, J. E., Holliday, R. E., & Flowe, H. D. (2012). Faces in motion: Age-related changes in eyewitness identification performance in simultaneous, sequential, and elimination video lineups. *Applied Cognitive Psychology, 26*(1), 149-158. doi:10.1002/acp.1808
- Jack, F., Simcock, G., & Hayne, H. (2012). Magic memories: Young children's verbal recall after a 6-year delay. *Child Development, 83*, 159-172. doi:10.1111/j.1467-8624.2011.01699.x
- Johnson, M. K., & Foley, M. A. (1984). Differentiating fact from fantasy: The reliability of children's memory. *Journal of Social Issues, 40*(2), 33-50.
- Johnson, M. K., Hashtroudi, S., & Lindsay, S. D. (1993). Source monitoring. *Psychological Bulletin, 114*, 3-28.

- Karpinski, A. C., & Scullin, M. H. (2009). Suggestibility under pressure: Theory of mind, executive function, and suggestibility in preschoolers. *Journal of Applied Developmental Psychology, 30*(6), 749-763. doi:10.1016/j.appdev.2009.05.004
- Klaczynski, P. A. (2008). There's something about obesity: Culture, contagion, rationality, and children's responses to drinks 'created' by obese children. *Journal of Experimental Child Psychology, 99*, 58-74. doi: 10.1016/j.jecp.2007.08.005
- Lamb, M. E., Orbach, Y., Hershkowitz, I., Esplin, P. W., & Horowitz, D. (2007). A structured forensic interview protocol improves the quality and informativeness of investigative interviews with children: A review of research using the NICHD Investigative Interview Protocol. *Child Abuse & Neglect, 31*(11-12), 1201-1231.
- Lamb, M. E., Sternberg, K. J., Orbach, Y., Esplin, P. W., Stewart, H., & Mitchell, S. (2003). Age differences in young children's responses to open-ended invitations in the course of forensic interviews. *Journal of Consulting and Clinical Psychology, 71*(5), 926-934. doi:10.1037/0022-006X.71.5.926
- La Rooy, D., Pipe, M.-E., & Murray, J. E. (2007). Enhancing children's event recall after long delays. *Applied Cognitive Psychology, 21*, 1-17. doi: 10.1002/acp.1272
- Leichtman, M. D., & Ceci, S. J. (1995a). The effects of stereotypes and suggestions on preschoolers' reports. *Developmental Psychology, 31*, 568-578. doi:10.1037/0012-1649.31.4.568
- Leichtman, M. D., & Ceci, S. J. (1995b). The effects of stereotypes and suggestions on preschoolers' reports: Correction. *Developmental Psychology, 31*, 758. doi:10.1037/0012-1649.31.5.758
- Leippe, M. R., & Romanczyk, A. (1989). Reactions to child (versus adult) eyewitnesses: The influence of jurors' preconceptions and witness behavior. *Law and Human Behavior, 13*, 103-132.
- Lindberg, M. (1991). An interactive approach to assessing the suggestibility and testimony of eyewitnesses. In J. Doris (Ed.), *The suggestibility of children's recollections* (pp. 47-55). Washington, DC US: American Psychological Association. doi:10.1037/10097-004
- Lindsay, D., Johnson, M. K., & Kwon, P. (1991). Developmental changes in memory source monitoring. *Journal of Experimental Child Psychology, 52*(3), 297-318. doi:10.1016/0022-0965(91)90065-Z
- London, K., Bruck, M., Wright, D., & Ceci, S. J. (2008). Review of the contemporary literature on how children report sexual abuse to others: Findings, methodological issues, and implications for forensic interviewers. *Memory, 16*, 29-47. doi:10.1080/09658210701725732.
- Lorsbach, T. C., & Reimer, J. F. (1997). Developmental changes in the inhibition of previously relevant information. *Journal of Experimental Child Psychology, 64*(3), 317-342. doi:10.1006/jecp.1996.2350
- Malloy, L. C., Mitchell, E., Block, S., Quas, J. A., & Goodman, G. S. (2007). Children's eyewitness memory: Balancing children's needs and defendants' rights when seeking the truth. In M. P. Toglia, J. D. Read, D. F. Ross, & R. C. L. Lindsay (Eds.), *The handbook of eyewitness psychology, Vol 1: Memory for events* (pp. 545-574). Mahwah, NJ: Erlbaum.

- Mandler, J. M. (1990). Recall and its verbal expression. In R. Fivush & J. A. Hudson (Eds.), *Knowing and remembering in young children* (pp. 317-330). New York: Cambridge University Press.
- Marche, T. A. (1999). Memory strength affects reporting of misinformation. *Journal of Experimental Child Psychology, 73*, 45-71.
- Marche, T. A., & Howe, M. L. (1995). Preschoolers report misinformation despite accurate memory. *Developmental Psychology, 31*, 554-567.
- Martin, C. L., & Halverson, C. F. (1983). The effects of sex-typing schemas on young children's memory. *Child Development, 54*, 563-574. doi: 10.2307/1130043
- McGaugh, J. L. (1990). Significance and remembrance: The role of neuromodulatory systems. *Psychological Science, 1*(1), 15-25. doi:10.1111/j.1467-9280.1990.tb00060.x
- McNally, R. J., Kaspi, S. P., Riemann, B. C., & Zeitlin, S. B. (1990). Selective processing of threat cues in posttraumatic stress disorder. *Journal of Abnormal Psychology, 99*(4), 398-402. doi:10.1037/0021-843X.99.4.398
- McNally, R. J., Metzger, L. J., Lasko, N. B., Clancy, S. A., & Pitman, R. K. (1998). Directed forgetting of trauma cues in adult survivors of childhood sexual abuse with and without posttraumatic stress disorder. *Journal of Abnormal Psychology, 107*(4), 596-601. doi:10.1037/0021-843X.107.4.596
- Najdowski, C. J., Bottoms, B. L., & Vargas, M. C. (2009). Jurors' perceptions of juvenile defendants: The influence of intellectual disability, abuse history, and confession evidence. *Behavioral Sciences & the Law, 27*, 401-430.
- Ochsner, J. E., Zaragoza, M. S., & Mitchell, K. J. (1999). The accuracy and suggestibility of children's memory for neutral and criminal eyewitness events. *Legal and Criminological Psychology, 4*(Part 1), 79-92. doi:10.1348/135532599167806
- Otgaar, H., Peters, M., & Howe, M. L. (2012). Dividing attention lowers children's but increases adults' false memories. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 38*, 204-210. doi: 10.1037/a0025160
- Perry, N. W., McAuliff, B. D., Tam, P., Claycomb, L., Dostal, C., & Flanagan, C. (1995). When lawyers question children: Is justice served? *Law and Human Behavior, 19*, 609-629.
- Peterson, C., Pardy, L., Tizzard-Drover, T., & Warren, K. L. (2005). When initial interviews are delayed a year: Effect on children's 2-year recall. *Law and Human Behavior, 29*, 527-541. doi: 10.1007/s10979-005-6833-6
- Pezdek, K., Finger, K., & Hodge, D. (1997). Planting false childhood memories: The role of event plausibility. *Psychological Science, 8*(6), 437-441. doi:10.1111/j.1467-9280.1997.tb00457.x
- Pezdek, K., & Roe, C. (1995). The effect of memory trace strength on suggestibility. *Journal of Experimental Child Psychology, 60*, 116-128.
- Pezdek, K., & Taylor, J. (2002). Memory for traumatic events in children and adults. In M. L. Eisen, J. A. Quas, & G. S. Goodman (Eds.), *Memory and suggestibility in the forensic interview* (pp. 165-183). Mahwah, NJ: Erlbaum.
- Pickel, K. L., Narter, D. B., Jameson, M. M., & Lenhardt, T. T. (2008). The weapon focus effect in child eyewitnesses. *Psychology, Crime & Law, 14*, 61-72. doi: 10.1080/10683160701391307

- Pipe, M.-E., Lamb, M. E., Orbach, Y., Sternberg, K. J., Stewart, H. L., & Esplin, P. W. (2007). Factors associated with nondisclosure of suspected abuse during forensic interviews. In M.-E. Pipe, M. E. Lamb, Y. Orbach, & A.-C. Cederborg (Eds.), *Child sexual abuse: Disclosure, delay, and denial* (pp. 77-96). Mahwah, NJ: Erlbaum.
- Pitman, R. K. (1989). Post-traumatic stress disorder, hormones, and memory. *Biological Psychiatry*, *26*(3), 221-223. doi:10.1016/0006-3223(89)90033-4
- Poole, D. A., Bruck, M., & Pipe, M.-E. (2011). Forensic interviewing aids: Do props help children answer questions about touching? *Current Directions in Psychological Science*, *20*, 11-15. doi: 10.1177/0963721410388804
- Poole, D. A., & Dickinson, J. J. (2011). Evidence supporting restrictions on uses of body diagrams in forensic interviews. *Child Abuse & Neglect*, *35*, 659-669. doi: 10.1016/j.chiabu.2011.05.004
- Poole, D. A., & Lindsay, D. S. (1995). Interviewing preschoolers: Effects of nonsuggestive techniques, parental coaching, and leading questions on reports of nonexperienced events. *Journal of Experimental Child Psychology*, *60*, 129-154. doi: 10.1006/jecp.1995.1035
- Poole, D. A., & Lindsay, D. S. (1998). Assessing the accuracy of young children's reports: Lessons from the investigation of child sexual abuse. *Applied and Preventive Psychology*, *7*, 1-26.
- Poole, D. A., & Lindsay, D. S. (2002). Reducing child witnesses' false reports of misinformation from parents. *Journal of Experimental Child Psychology*, *81*, 117-140.
- Powell, M. B., & Thomson, D. M. (1996). Children's memory of an occurrence of a repeated event: Effects of age, repetition, and retention interval across three question types. *Child Development*, *67*, 1988-2004. doi: 10.2307/1131605
- Pozzulo, J. D., & Lindsay, R. L. (1998). Identification accuracy of children versus adults: A meta-analysis. *Law and Human Behavior*, *22*(5), 549-570. doi:10.1023/A:1025739514042
- Principe, G. F., Ornstein, P. A., Baker-Ward, L., & Gordon, B. N. (2000). The effects of intervening experiences on children's memory for a physical examination. *Applied Cognitive Psychology*, *14*, 59-80.
- Quas, J. A., Goodman, G. S., Ghetti, S., Alexander, K. W., Edelstein, R., Redlich, A. D., Cordon, I. M., & Jones, D. P. H. (2005). Childhood sexual assault victims: Long-term outcomes after testifying in criminal court. *Monographs of the Society for Research in Child Development*, *70*(2), 1-128.
- Quesada, A. A., Wiemers, U. S., Schoofs, D. D., & Wolf, O. T. (2012). Psychosocial stress exposure impairs memory retrieval in children. *Psychoneuroendocrinology*, *37*(1), 125-136.
- Ratner, H., Foley, M., & Gimpert, N. (2000). Person perspectives on children's memory and learning: What do source-monitoring failures reveal? In K. P. Roberts, & M. Blades (Eds.), *Children's source monitoring* (pp. 85-114). Mahwah, NJ: Erlbaum.
- Redlich, A. D. (2007). Double jeopardy in the interrogation room for youths with mental illness. *American Psychologist*, *62*, 609-611.
- Richardson, G., Gudjonsson, G. H., & Kelly, T. P. (1995). Interrogative suggestibility in an adolescent forensic population. *Journal of Adolescence*, *18*, 211-216.

- Roberts, K. P. (2002). Children's ability to distinguish between memories from multiple sources: Implications for the quality and accuracy of eyewitness statements. *Developmental Review*, 22(3), 403-435. doi:10.1016/S0273-2297(02)00005-9
- Roberts, K. P., & Blades, M. (1995). Children's discrimination of memories for actual and pretend actions in a hiding task. *British Journal of Developmental Psychology*, 13(4), 321-333. doi:10.1111/j.2044-835X.1995.tb00683.x
- Roberts, K. P., & Blades, M. (1998). The effects of interacting in repeated events on children's eyewitness memory and source monitoring. *Applied Cognitive Psychology*, 12(5), 489-503. doi:10.1002/(SICI)1099-0720(199810)12:5<489::AID-ACP535>3.0.CO;2-#
- Roberts, K. P., & Blades, M. (1999). Children's memory and source monitoring of real-life and televised events. *Journal of Applied Developmental Psychology*, 20(4), 575-596. doi:10.1016/S0193-3973(99)00030-1
- Roberts, K. P., & Powell, M. B. (2001). Describing individual incidents of sexual abuse: A review of research on the effects of multiple sources of information on children's reports. *Child Abuse & Neglect*, 25, 1643-1659. doi: 10.1016/S0145-2134(01)00290-3
- Roberts, K. P., & Powell, M. B. (2006). The consistency of false suggestions moderates children's reports of a single instance of a repeated event: Predicting increases and decreases in suggestibility. *Journal of Experimental Child Psychology*, 94, 68-89. doi: 10.1016/j.jecp.2005.12.003
- Ruva, C. L., & Bryant, J. B. (2004). The impact of age, speech style, and question form on perceptions of witness credibility and trial outcome. *Journal of Applied Social Psychology*, 34, 1919-1944.
- Schneider, W., Bjorklund, D. F., & Maier-Brückner, W. (1996). The effects of expertise and IQ on children's memory: When knowledge is, and when it is not enough. *International Journal of Behavioral Development*, 19, 773-796. doi: 10.1080/016502596385578
- Shrimpton, S., Oates, K., & Hayes, S. (1998). Children's memory of events: Effects of stress, age, time delay and location of interview. *Applied Cognitive Psychology*, 12(2), 133-143.
- Simcock, G., & Hayne, H. (2002). Breaking the barrier? Children fail to translate their preverbal memories into language. *Psychological Science*, 13, 225-231. doi: 10.1111/1467-9280.00442
- Singh, K. K., & Gudjonsson, G. J. (1992). Interrogative suggestibility among adolescent boys and its relationship with intelligence, memory and cognitive set. *Journal of Adolescence*, 15, 155-161.
- Sprondel, V., Kipp, K. H., & Mecklinger, A. (2011). Developmental changes in item and source memory: Evidence from an ERP recognition memory study with children, adolescents, and adults. *Child Development*, 82, 1938-1953.
- Southwick, S. M., Morgan, C. A., III, Nicolaou, A. L., & Charney, D. S. (1997). Consistency in memory for combat-related traumatic events in veterans of Operation Desert Storm. *American Journal of Psychiatry*, 154, 173-177.
- Talwar, V., & Crossman, A. M. (2012). Children's lies and their detection: Implications for child witness testimony. *Developmental Review*. <http://dx.doi.org/10.1016/j.dr.2012.06.004>

- Thierry, K. L., Spence, M. J., & Memon, A. (2001). Before misinformation is encountered: Source monitoring decreases child witness suggestibility. *Journal of Cognition & Development, 2*(1), 1-26. doi:10.1207/S15327647JCD0201_1
- Trickett, P. K., & McBride-Chang, C. (1995). The developmental impact of different forms of child abuse and neglect. *Developmental Review, 15*(3), 311-337. doi:10.1006/drev.1995.1012
- Vandermass, M. O., Hess, T. M. & Baker-Ward, L. (1993). Does anxiety affect children's reports of memory for a stressful event? *Applied Cognitive Psychology, 7*, 109-128.
- Veltman, M.W. M., & Browne, K. D. (2001). Three decades of child maltreatment research: implications for the school years, *Trauma Violence Abuse, 2*, 215-39.
- Walker, A. G. (1993). Questioning young children in court: A linguistic case study. *Law and Human Behavior, 17*, 59-81.
- Wandrey, L., Lyon, T. D., Quas, J. A., & Friedman, W. J. (2012). Maltreated children's ability to estimate temporal location and numerosity of placement changes and court visits. *Psychology, Public Policy, and Law, 18*, 79-104.
- Williams, J., & Broadbent, K. (1986). Autobiographical memory in suicide attempters. *Journal of Abnormal Psychology, 95*(2), 144-149. doi:10.1037/0021-843X.95.2.144
- Winograd, E., & Killinger, W. A. (1983). Relating age at encoding in early childhood to adult recall: Development of flashbulb memories. *Journal of Experimental Psychology: General, 112*(3), 413-422. doi:10.1037/0096-3445.112.3.413
- Yarmey, A. (1979). Through the looking glass: Sex differences in memory for self-facial poses. *Journal of Research in Personality, 13*(4), 450-459. doi:10.1016/0092-6566(79)90007-2
- Zajac, R., & Cannan, P. (2009). Cross-examination of sexual assault complainants: A developmental comparison. *Psychiatry, Psychology and Law, 16*(Suppl 1), S36-S54.
- Zajac, R., & Hayne, H. (2003). I don't think that's what really happened: The effect of cross-examination on the accuracy of children's reports. *Journal of Experimental Psychology, 9*, 187-195.
- Zajac, R., & Hayne, H. (2006). The negative effect of cross-examination style questioning on children's accuracy: Older children are not immune. *Applied Cognitive Psychology, 20*, 3-16.
- Zajac, R., Jury, E., & O'Neill, S. (2009). The role of psychosocial factors in young children's responses to cross-examination style questioning. *Applied Cognitive Psychology, 23*, 918-935.
- Zhu, B., Chen, C., Loftus, E. F., Lin, C., He, Q., Chen, C., et al. (2010). Individual differences in false memory for misinformation: Cognitive factors. *Memory, 18*, 543-555.