

Memory Development in the Forensic Context¹

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In February 2010, a male pediatrician was charged with 471 counts of child sexual abuse, including child rape, against 103 children. The charges resulted when, in December 2009, the mother of a 2-year-old called the police. The 2-year-old said that Dr. Bradley hurt her genitals when he had taken her to his toy room. The child had also made this claim a month earlier after an appointment with the same doctor. Her parents doubted the little girl's allegations, but the 2-year-old kept insisting that the doctor had hurt her. The mother reluctantly called the police.

Was the child confusing the medical exam with another time she had been hurt, a source-monitoring error (Poole & Lindsay, 2001)? Did the child suffer from a sexual fantasy, as Freud (1896) might claim? Or perhaps the mother had falsely suggested the incidents to the child, as many psychologists might fear (e.g., Ceci & Bruck, 1993; Dale, Loftus, & Rathburn, 1978)? Yet, when the police searched Dr. Bradley's office and home, they found 13 hours worth of videotapes of the doctor sexually abusing and raping scores of his young patients, often repeatedly, with some of the assaults dating back 11 years. Many of the child victims were preverbal—one was just 3 months old—prompting Delaware Attorney General Beau Biden (son of Vice President Joe Biden) to say (with tears in his eyes), “These were crimes committed against the most vulnerable among us—those without voices.”²

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² Dr. Bradley was convicted and is currently serving a sentence of 14 consecutive life terms without parole plus 165 years.

For many centuries, even older, fully verbal children were in effect “without voices” when it came to crimes such as child sexual abuse, because often children were not believed when they reported their experiences—not only about child sexual abuse, but also about other crimes they may have witnessed or experienced, such as domestic violence, attempted murder, and homicide. This lack of belief in children’s eyewitness memory reports very likely resulted in justice not being served.

However, there is another important side of justice that must be considered as well, because children (and adults) do sometimes “get it wrong,” and this can also lead to miscarriages of justice. Take this next case as an example:

On the night of June 7, 1998, 6-year-old Brooke Elkins awoke to the screams of her 58-year-old grandmother, Judith Johnson. Brooke went to investigate the noise, and found her grandmother being attacked in the living room of her home. Brooke tried to escape to the bedroom, but the attacker followed her, sexually assaulted her, and strangled her into unconsciousness. The 6-year-old awoke the next morning to find her grandmother dead. Brooke ran to the neighbors to get help, and upon arriving there claimed the attacker who killed her grandmother looked like Brooke’s Uncle Clarence. After telling family members and doctors that her uncle, Clarence Elkins, was the perpetrator, Mr. Elkins was arrested at his home. Brooke took the stand at her uncle’s trial in May 1999, and insisted he had murdered her grandmother and attacked her on that warm June night a year earlier. Clarence Elkins was convicted of murder, rape, and aggravated assault and sentenced to life with no possibility of parole. However, the story was not over. As time went on, Brooke began to remember more details of the crime and later recanted her original assertion that her uncle had attacked her and her grandmother. After 7 years in prison, Clarence Elkins’s conviction was overturned due to DNA exoneration. In a surprising twist, the true perpetrator was a male neighbor, Earl Mann, who lived at the house Brooke initially ran to for help in June of 1998. Earl Mann eventually pleaded guilty and was sentenced to 55 years to life in prison.

The modern study of children’s eyewitness memory was founded in dramatic cases such as these, as well as in the sensational preschool child sexual abuse cases of the 1980s and 1990s (e.g., the McMartin Preschool case in Manhattan Beach, CA). Fortunately, through the science of memory development, researchers have made great strides in helping the legal system tackle many of the complex issues involved. In this chapter, we have room to discuss only a subset of the many fascinating topics that link memory development and law. We start with a review of core basic memory development principles that are important in the legal context. We then turn to research on trauma and memory, a topic of vital concern given the types of cases that come to the attention of police officers, child protection workers, child forensic interviewers, and the courts. We also include a review of some of the prominent research on children’s non-disclosure of crime, particularly of child sexual abuse. This chapter would not be complete without a discussion of research on children’s suggestibility and false memory. We consider memory development not only as influenced by cognitive factors but by social factors as well, since the latter can profoundly affect children’s memory reports within the legal context. We end by addressing, in some detail, child forensic interview protocols that have been developed based in large part on scientific research on children’s eyewitness memory. These protocols are a growing topic of research and debate. Although we focus on research conducted in our laboratory, we discuss findings by many other researchers as well.

Basics of Memory Development

One of the most robust predictors of eyewitness memory performance is age. Across childhood, increased age is associated with more accurate and complete recounting of events, including the number of details retrieved (Goodman & Reed, 1986; Howe, 2011). For both mundane and traumatic events, when young preschoolers' performance is compared to that of older children and adults, young preschoolers recall less information on their own (e.g., when asked free recall questions such as "What happened?"), answer specific questions less accurately (e.g., when asked yes/no questions such as "Was he wearing a blue shirt?" or option-posing questions such as "Was it a blue shirt or a green shirt?"), and exhibit greater suggestibility to misleading questions (e.g., when asked tag questions such as "She kissed you, didn't she?" when she had not, or questions that presuppose inaccurate information such as "What did the odor in the room smell like?" when there was no odor). Young children typically need more cuing of their memories to retrieve information stored. Although cuing can result in increases in accurate reporting, it can also contribute to memory errors. As a result, in forensic contexts, such cuing is often seen as "leading the witness."

Age-related increases in memory capability do not, on their own, tell us much about the mechanisms that promote memory development over time, nor do they permit us to predict with certainty the accuracy of a specific child witness. Numerous factors studied by cognitive developmental psychologists contribute to more successful memory abilities with age, including but not limited to advances in biological maturation, language development, knowledge base, recollective processes, and memory strategies, including metamemory (e.g., Fivush & Nelson, 2004; Holliday & Albon, 2004; Howe, 2011). This diverse range of cognitive factors contribute to the complex and multi-faceted nature of memory. However, when social influences on children's memory and individual difference factors are added to the mix, even greater complexity results. This complexity makes it difficult to predict children's eyewitness memory accuracy with precision. Moreover, research on memory development focuses almost exclusively on group trends. In contrast, the legal system is primarily concerned with gauging the accuracy of a specific witness. Our science is not currently at the point that we can tell the courts whether a specific witness is wrong or right; that is, we cannot determine what is termed in the legal system as the "ultimate issue."

Explicit memory involves memories that can be consciously brought to mind and verbalized, whereas implicit memories aid in the performance of a task without reaching conscious awareness. Explicit memory is of particular interest in the forensic context. Most adults and older children do not retain explicit memories from before about 2 years of age due to a phenomenon known as childhood amnesia (Howe, 2011). Some forms of implicit memory as opposed to explicit memory begin much earlier (Bauer, 1997), suggesting that memory processes are working from an extremely young age. For an in-depth review of childhood amnesia, see Chapter 22 by Bauer (this volume).

The form of explicit memory that is most relevant to the legal context is called *episodic memory*, and within episodic memory, of particular importance is *autobiographical memory*. It is widely believed that influences on early autobiographical memory formation include advances in hippocampal development, as well as the emergence of language and the self-concept. Newcombe, Lloyd, and Ratliff (2007) noted that autobiographical memory should be first available around 2 years of age due to important changes in hippocampal functioning at about this time period in human development. Regarding language, according to Nelson and

Fivush (2004), language provides an important symbol system that can aid retention and permit memories to be shared with others. Courage and Howe (2010) focused not on language but on self-concept development. They proposed that a self-concept is necessary for autobiographical memory because, without a self-concept, events cannot be understood as personally relevant. According to Courage and Howe, the development of a sense of self generally begins to stabilize at about age 2 years, and it helps to organize events into meaningful units that can then be stored as explicit, autobiographical memories (Courage & Howe, 2010). Because development of the hippocampus, language ability, and a concept of self occurs at around the same age, it is difficult to determine the exact contributions of each. However, the crucial role of language in the development of autobiographical memory is underscored by research showing that few pre-verbal memories are retained after infancy (Bauer, 1997), children with parents who encourage and use high levels of elaboration when discussing events tend to recall events more accurately and in more detail (Fivush & Fromhoff, 1988; Peterson, Sales, Rees, & Fivush, 2007; Reese, 2009; Reese, Haden, & Fivush, 1993), and children rarely describe past events using language that they did not know at the time that the event took place, although a few children can do so (Jack, Simcock, & Hayne, 2012; Morris & Baker Ward, 2007). Given that the legal system relies heavily on verbal reports of events, the role of language in creating—or at least expressing—memories is particularly important in the legal context.

With development also comes changes in children's knowledge base that can support accurate and complete memory, as well as lead to distortions. As children gain more experience, their knowledge base expands, and their memories can be expected to improve as well. However, knowledge can also lead to memory errors, as when someone infers that an action must have happened because it typically would occur. As Myles-Worsley, Cromer, and Dodd (1986) and Farrar and Goodman (1992) found, one way that these countervailing forces of knowledge can be seen is the study of children's development of "scripts," that is, organized event representations about real-life experiences (Nelson & Hudson, 1988). We all have "scripts" for such common events as eating at a restaurant, attending a child's birthday party, and attending class lectures. We know the basic structure of what to expect in such situations. Although this knowledge, which increases with development, can lead to improved memory, it can also lead to errors in recall because scripts allow people to fill in gaps in episodic memory with semantic memory of how the event normally occurs. As a result, memory for a given instance of the event is better as long as the event unfolds as expected (Myles-Worsley *et al.*, 1986). When it does not, having scripted knowledge fill in for holes in memory can lead to memory errors. That said, once a script is formed, deviations from the script may stand out in memory (Farrar & Goodman, 1992). Thus, a child who has a certain routine ("script") for getting ready for bed at night might remember well the time that a sexual act occurred that violated the routine. If the sexual acts become repeated and routinized by the perpetrator, a child's script for such assaults would likely be generally accurate, with some possible error in memory for certain specific instances across time, whereas a single distinctive event might be less prone to such confusions. In recounting single or repeated events, children must be able to monitor their memories to distinguish fantasy, inference, and false suggestions from what actually occurred, apply sufficient memory retrieval strategies to recall what happened, and have the words and understanding to describe what was witnessed or experienced. This can be a tall order for a small child.

Research on basic memory development makes it clear that many contributing influences are in play, causing memory performance to have some predictable features, but also a significant

amount of variation. However, most research on basic memory development is about neutral or mundane information and has not concerned memory for forensically relevant events, which are often highly emotional, shocking, and distressing in nature. When children experience an event that has particular personal significance or is traumatic (e.g., being kidnapped and raped, or witnessing a murder), they may be more likely to remember it than if the event has little or no life importance (Goodman, Rudy, Bottoms, & Aman, 1990). In fact, the problem may rest primarily in controlling intrusive memories of the trauma. Furthermore, individual differences in understanding of the event, in its perceived importance, and in willingness to think about and discuss traumatic material can affect the degree to which the event is encoded, stored, and/or retrieved. In child sexual abuse cases, for example, children may differ in their understanding of the significance of the abuse, and they may differ in their willingness to think about or talk about the sexual incidents. Because children's memory reports are often the main evidence in sexual abuse cases, much of the research on children's eyewitness memory focuses on child sexual abuse—an experience that can be distressing and traumatic at the time, as well as later.

Distress, Trauma, and Memory

There is considerable debate about the accuracy of children's memory for stressful and traumatic events. As described by Paz-Alonso, Ogle, and Goodman (2013), in laboratory research, the study of children's emotional memories has primarily relied on negative word lists and stories (e.g., Davidson, Luo, & Burden, 2001; Goodman et al., 2011; Howe, 2007; Moradi, Taghavi, Neshat-Doost, Yule, & Dalgleish, 2000), or videotaped or staged events where children watch but do not directly experience a somewhat stressful incident (e.g., Bugental, Blue, Cortez, Fleck, & Rodriguez, 1992; Poole & White, 1991). Overall, these studies have shown that emotional and distinct material is better remembered than neutral material, and that children's memory is often quite accurate but also susceptible to forgetting, inaccuracies, and distortion. However, the stimuli do not evoke the level of distress and trauma involved in many actual criminal cases, for example, in cases of child sexual assault.

Field research has taken advantage of naturally occurring, real-life stressful and traumatic occurrences. These events include natural disasters (e.g., Ackil, Van Abbema, & Bauer, 2003), shocking public events (e.g., Pillemer, 1992), and criminal events (e.g., Alexander et al., 2005; Pynoos & Nader, 1989). These events may give rise to "flashbulb memories" (Brown & Kulick, 1977), which are believed to form as a result of single, distinctive events that are unexpected and charged with emotional content, consequentiality, and personal relevance (Pillemer, 1992; Terr, Bloch, Michel, & Shi, 1996; Warren & Swartwood, 1992; Winograd & Killinger, 1983). One notable study of children's flashbulb memory is Terr et al.'s (1996) investigation of children's memories of the Challenger explosion. In this study, children who watched the tragic event (i.e., high involvement group) produced more clear, consistent, and detailed accounts about the explosion itself and their surrounding personal circumstances (e.g., personal placement, incidents, other people present) than those who just heard about the event (i.e., low-involvement group), at both 5–7-week and 14-month retention intervals. In another investigation of children's flashbulb memories, Bahrck, Parker, Fivush, and Levitt (1998) examined the memories of 3- and 4-year-old children who experienced Hurricane Andrew, a strong storm that devastated the Florida coast in 1992. Although all children provided detailed accounts of the disaster when interviewed a few weeks after the event, children who

experienced moderate to high levels of stress recalled more than those in the low-stress group, as determined by a scale designed to objectify the degree of storm exposure. Similarly, Terr (1981) examined 5–14-year-old victims' memories of the Chowchilla school-bus kidnapping, and found that children exhibited vivid memories of the experience immediately after their rescue, and retained largely accurate memory for the gist of the incident 1 and 5 years later (Terr, 1983; see also Pynoos & Eth, 1984; Pynoos & Nader, 1989).

Overall, studies of these forms of stressful events indicate that detailed memories of highly salient and personally consequential experiences in childhood are relatively well retained over long periods of time (e.g., 6 years, Fivush, Sales, Goldberg, Bahrick, & Parker, 2004), and can remain vivid into adulthood (e.g., Berntsen & Rubin, 2006; Reviere & Bakeman, 2001; Winograd & Killinger, 1983), as long as the children are not too young (e.g., 1- or 2-year-olds) when the events occurred. However, because public events are often involved in these studies, children and adults may have discussed their experiences with others, which could help explain the endurance of these memories (e.g., Fivush et al., 2004). Of importance, too, is that, despite considerable accuracy, and even with high personal involvement and strong emotion involved, traumatic memories are not immune to inaccuracies in children (e.g., Terr et al., 1996), as well as in adults (e.g., Neisser & Harsch, 1992; Nourkova, Bernstein, & Loftus, 2004; Pezdek, 2003; Yuille & Cutshall, 1986). The children sometimes misremembered details of the stressful events, such as certain acts, dates, times, and durations of the events, and incorporated these inaccuracies into their memory reports (e.g., Cederborg, Lamb, & Laurell, 2007; Sjöberg & Lindblad, 2002; Terr, 1983).

Another approach to investigating children's memory for stressful experiences is to use medical procedures as the to-be-remembered events in analog studies. The medical procedures have ranged from mildly stressful (e.g., well-child checkups) to highly stressful experiences (e.g., emergency room visits, surgery, cancer treatments; Baker-Ward, Gordon, Ornstein, Larus, & Clubb, 1993; Burgwyn-Bailes, Baker-Ward, Gordon, & Ornstein, 2001; Chen, Zeltzer, Craske, & Katz, 2000; Goodman, Hirschman, Hepps, & Rudy, 1991; Goodman, Quas, Batterman-Faunce, Riddlesberger, & Kuhn, 1997; Melinder et al., 2010; Peterson & Bell, 1996). The findings from basic memory research regarding age differences were often replicated in such studies, although memory for stressful experiences is typically more robust and long lasting than is memory for less stressful events (e.g., Brown et al., 1999; Ornstein, Baker-Ward, Gordon, & Merritt, 1997).

Goodman and colleagues (1997) examined 3–10-year-olds' memory about a traumatic medical procedure known as a Voiding Cystourethrogram Fluoroscopy (VCUG). This procedure involves urethral catheterization. When children's memory was tested shortly after the procedure (1–4 weeks later), typical age differences in memory were apparent, with younger children providing significantly less correct information about the event. In further examining children's long-term memory for VCUG procedures, typical infantile amnesia effects were evident. Children who were 3 years of age and younger at the time of the procedure had significantly less, if any, definitive memories regarding the procedure (Quas, Goodman, Bidrose, Pipe, Craw, & Ablin, 1999). Lenore Terr (1988) also found that children who were 2–3 years of age or younger at the time of a traumatic event did not possess explicit memories for the experience. Of interest, Terr indicated that younger children seemed to have implicit memories for the event, as displayed, for example, through acting out the trauma during play. This seems to suggest that even very young children have some representation of the traumatic experience, whether they can explicitly express the memory or not.

In addition to age findings, socioemotional factors play a role in children's memory for stressful experiences. One particularly well-studied socioemotional influence on children's memory for stressful events is parental attachment orientation. Bowlby's (1980) attachment theory posits that the attachment system is activated in times of discomfort, need, or distress, and during these times individuals seek out comfort from their caregivers. Theoretically, attachment theory is of great interest when examining memory for stressful events, as it may be related to behaviors and processes associated with encoding, storage, and retrieval of distressing information. Parental avoidant attachment has emerged as a reliable predictor of children's inaccuracies in memory for stressful medical procedures. This relation was initially uncovered in research on children's memory for VCUGs (Goodman et al., 1997). Parents with more avoidant attachment orientations had children who were more distressed during the procedure and were more inaccurate in subsequent memory interviews. In contrast, children of more secure parents showed lower levels of distress during the procedure and were less likely to err on the later memory test. On some memory measures, parental attachment was a stronger predictor of memory performance than age, even though a broad age range (3–10 years) was tested.

The original VCUG research along with subsequent studies on parental attachment and children's memory for stressful events has revealed that parents who scored higher rather than lower in avoidant attachment do little to prepare their children for stressful events, are less responsive to their children during highly stressful experiences, comfort their children less afterwards, and fail to discuss negative events with their children. There is a risk therefore that children of avoidant parents are not helped in processing or understanding the event, which leads to subsequent deficits in memory for the event. Taken together, these results paint a picture in which children of more avoidant parents become highly aroused during a stressful event, then later receive little or no comfort from their caregivers in the absence of a forum to discuss the experience with their attachment figure, which is related to poor memory for the event. It is possible that the high levels of stress experienced by the child, and low levels of caregiver support, result in too few resources allotted to encoding and processing of the details of the event, as well as to what Bowlby called "defensive exclusion," that is, avoidance of attending to, thinking about, or discussing negative experiences (Chae, Goodman, & Edelstein, 2011). More research is needed to explore these possibilities.

Thus, although it is well established that young children recall less information than older children and adults due to cognitive factors, in the forensic context, socioemotional factors also play a crucial role. We turn now to a topic that highlights socioemotional factors and their strong influence on children's eyewitness memory reports.

Non-disclosure of Child Sexual Abuse

The types of events that child victims and witnesses are asked to discuss can be distressing, embarrassing, and even self-implicating. This is certainly often the case when children are asked to recount experiences of child sexual abuse. Children *on their own* frequently do not disclose sexual abuse, likely due to embarrassment or fears of getting themselves or others in trouble. Recent research on actual cases of child sexual abuse, as well as laboratory studies, reveal children's reluctance to discuss sexual events, even when they likely remember what occurred (Leander, Christianson, & Granhag, 2007; see Paz-Alonso et al., 2013, for a review).

The recent studies on children's memory for actual sexual abuse are possible because perpetrators sometimes record (e.g., photograph, videotape, and/or audiotape) the abuse they inflict on children. Sjöberg and Lindblad (2002) investigated factors influencing children's disclosure of sexual abuse in a case in which a man abused 10 children who were either his stepchildren or known by him from his work at day care centers. The children were on average 5.6-years-old ($SD = 2.4$) at the time of the last abuse incident, and 6.9-years-old ($SD = 2.4$) at the time of the police questioning. Abusive acts included anal, oral, and/or vaginal penetration and forced urination/defecation. The frequency of abuse per child ranged from 1 to 60 incidents. The police interviews of the children were compared to videotapes of the sexual abuse incidents confiscated from the perpetrator's home. The police interviews included leading questions and accusatory statements.

Of note, the children made no spontaneous disclosures prior to the police interviews. Comparison of the children's interviews with the videotapes revealed that there were no sexual acts falsely reported. The abuse disclosed by children during interviews was rated as significantly less severe than was the abuse captured on videotape, suggesting that the children tended to minimize or under-report their abuse experiences. Indeed, five children, including the child who suffered the greatest number of abuse incidents, failed to disclose abuse during the police interviews. Four children said they did not want to tell. This study, along with several others in which documented abuse was compared with children's disclosures to the police (e.g., Bidrose & Goodman, 2000; Leander et al., 2007), suggests that children generally show a relatively high number of omission errors about sexual acts, even in the face of leading questions and accusatory statements made by interviewers.

A similar trend was found in a laboratory-type study conducted by Saywitz and colleagues (Saywitz, Goodman, Nicholas, & Moan, 1991) that involved questioning 5- and 7-year-olds about genital and anal touch during a medical examination. Half of the children experienced a genital and anal examination by a medical doctor as part of the doctor's normal well-child physical check-up. For the other half of the children, the genital and anal examination was replaced with a scoliosis examination. As expected, Saywitz et al. found that the older children's overall memory performance was better than that of the younger children. However, regarding children who experienced genital and anal touch, the older children were less likely to reveal such touch than were the younger children. The results implied that the older children's more advanced cognitive abilities led to better memory performance overall, but also made the children more aware of the social taboo of mentioning genital and anal touch such that they were less likely to describe these details of the event. The children generally tended to omit mention of the genital and anal touch in free recall and in re-enactment of the medical examination using dolls, but were highly likely to acknowledge such touch when asked leading questions. However, for children who had the scoliosis examination, 8% of the children falsely affirmed genital or anal touch that they had not experienced. Only one of these children provided any detail (i.e., when the interviewer probed more about what happened, this child said the doctor had used a stick). These results show the delicate balance that must be reached in the forensic context between gathering enough evidence from children to determine if and how abuse has occurred to ensure the children's protection versus obtaining false information from children that could send an innocent person to prison.

In summary, the potentially chilling effect of child victims' feelings of fear, shame, embarrassment, and/or guilt may explain children's omission of a considerably greater amount of sexual compared to neutral information when recounting sexually abusive experiences (e.g., Leander, 2010; Leander et al., 2007; Sjöberg & Lindblad, 2002). It is even possible to reverse

typical age differences in memory performance when reports of genital and anal touch are considered. Given the types of crimes about which children may be called upon to bear witness, such socioemotional factors must be taken into consideration to understand children's eyewitness memory.

Children's Suggestibility and False Memory

Some children are able to recall events with great accuracy and amazing detail. Other children, however, are not as accurate; they are highly suggestible and vulnerable to misinformation. Some children can even be led to report entire criminal acts that did not occur, with the children exhibiting false memory (Bottoms, Shaver, & Goodman, 1996). Psychological research has begun to uncover the mechanisms and variables associated with children's suggestibility and false memory reports. Again, both cognitive and social factors are prominent in this area of study. In this section, we discuss some of the recent theoretical approaches and research findings from our laboratory, as well as other influential studies regarding children's suggestibility.

A number of theories have been proposed to account for children's suggestibility and false memory susceptibility. For example, the source-monitoring framework concerns the ability to differentiate the source of information one has acquired (Johnson, Hastroude, & Lindsay, 1993). To the extent that children have greater difficulty than adults in monitoring the sources of their memories, they may mistake information suggested to them with information obtained from actual experience. Children's weaker memory traces may also contribute to their increased suggestibility, since weak memory traces may be easier to overwrite (Ceci & Bruck, 1995). Debate ensues about whether misinformation actually alters children's memory or only their reports of events through social factors. If autobiographical memory itself has changed, and there is no possibility of the child recovering an accurate memory, the courts would be very concerned. Although actual memory change may occur in some children, for other children, misinformation and suggestibility effects appear to largely dissolve over time (Huffman, Crossman, & Ceci, 1997). Relevant to theories of suggestibility, there are tremendous individual differences at any age in terms of their susceptibility to suggestions that also need to be explained (Bruck & Melnyk, 2004).

It is important to appreciate that there are both cognitive and socioemotional factors that affect not only children's memory but also their suggestibility. Of the cognitive factors, age is particularly important. As previously mentioned, one of the most robust findings in memory research is the effect of age on memory performance. Children's suggestibility is no different; many studies have shown that younger children are significantly more vulnerable to leading and misleading questions, and misinformation effects generally, than are older children (but see Ceci, Papierno, & Kulkofsky, 2007).

Schaaf, Alexander, and Goodman (2008) examined 3–5-year-olds' false memory using a procedure similar to the famous Loftus and Pickrell (1995) "lost in the mall" paradigm. Within a single interview session, Schaaf et al. questioned children repeatedly about four experienced and four unexperienced events, using both leading and non-leading interview styles. In this study, the interviewers were nice to the children, but the interviewers would not take "No" for an answer. For example, if the child was asked if she ever got into trouble for throwing a rock through a window and the child said "No", the interviewer then asked "Was your mother with you when you got into trouble for throwing a rock through a window?" On average, it took approximately three such questions before the younger children affirmed the

false event as if it were true. In contrast, the 5-year-olds did not cave in on average until six questions had been asked. Such age differences are fairly common in the children's eyewitness suggestibility literature. However, of special interest, the results indicated that children were more susceptible to suggestion about positive than negative events (see also Ceci, Loftus, Leichtman, & Bruck, 1994). Most forensic interviews concern negative events, and it is thus of note that the children were less suggestible about such events. This is consistent with earlier findings that children, at least by the age of 4 years, if not before, were particularly resistant to negative-abuse-related suggestions, such as being hit or having their clothes removed when that had not occurred (e.g., Rudy & Goodman, 1991). However, these findings do not indicate that children are immune to suggestion about such acts, as there is evidence of age differences in such suggestibility in the literature.

One socioemotional factor that influences children's suggestibility and false memory is trauma-related psychopathology. Research conducted with adults has found that trauma-related psychopathology is related to true and false memory for trauma (Goodman et al., 2003; Qin, Ogle, & Goodman, 2008). It has been shown that adults with high compared to low levels of dissociation are more susceptible to creation of false memories (Qin et al., 2008), although their attachment orientations are even stronger predictors. Recent research conducted with children with histories of maltreatment has revealed similar results concerning the important role of psychopathology in the accuracy of children's memory reports (Chae, Goodman, Eisen, & Qin, 2011; Eisen, Goodman, Qin, Davis, & Crayton, 2007). For example, Chae and colleagues examined event memory and suggestibility of 3–16-year-olds with histories of child maltreatment. Among children who self-reported a greater number of trauma symptoms, higher dissociative tendencies were associated with inaccurate memory reports and greater suggestibility. Of interest, more trauma symptoms were not associated with inaccuracy in maltreated children with low levels of dissociation, suggesting a unique contribution of dissociation. Similarly, McWilliams, Harris, and Goodman (2011) reported that, in a sample of 9–15-year-olds, a history of child maltreatment and high level of traumatic psychopathology (including higher levels of dissociation) were significantly related to greater commission errors regarding a previously viewed video clip. These results suggest that child maltreatment alone may not lead to greater memory problems or suggestibility (Goodman, Bottoms, Rudy, Davis, & Schwartz-Kenney, 2001), but when trauma-related psychopathology exists, children may be at heightened risk of erring in their memory reports (see also Goodman, Quas, & Ogle, 2009).

In addition to cognitive and socioemotional factors, the type of questioning and overall context of an interview is an important factor that can affect children's memory and suggestibility. The children's relationship to the interviewer, the warmth of an interviewer, preconceived false beliefs of an interviewer, and repeated misleading interviewing when the child's memory is weak are all interview characteristics associated with children's suggestibility (Bottoms, Quas, & Davis, 2007; Goodman, Sharma, Thomas, & Considine, 1995; Quas et al., 2007). Although interview characteristics are important, children's performance in a memory interview also has a profound influence on how children are interviewed (Gilstrap & Ceci, 2005; Melinder et al., 2010). When 3–7-year-old children were interviewed in a free question format, rather than using a scripted interview, the best predictor of children's future response was the information they provided earlier in the interview (e.g., Gilstrap & Ceci, 2005). In other words, researchers were able to predict whether a child would acquiesce or deny in response to an interviewer's question by examining the child's previous response, and ignoring all interviewer input.

Overall, due to the research findings on suggestibility, efforts have been made by psychologists and the legal system to develop procedures for interviewing children that obtain the most complete and accurate reports, while providing a safe and emotionally stable environment during the process. In the next section, we discuss the development of forensic interviewing protocols, which have been established with this goal in mind.

Interview Protocols

We have all heard the term “leading the witness.” In the legal system, a question is considered leading if it introduces new information not already offered by the witness. Considerable debate revolves around the degree to which interview questions need to be leading in interviews with children. To the extent children are suggestible, leading questions could lead to errors with very serious consequences such as the incarceration of an innocent person. However, to the extent that children have difficulty accessing their memories, revealing sensitive information, or understanding what is required in a forensic interview, leading questions may be crucial for obtaining information vital to solving crimes.

Many influential researchers have examined the effects of using open-ended (e.g., free recall) versus specific (e.g., forced-choice, such as yes/no or option-posing) or misleading questions with children. The research has shown that, overall, open-ended questions produce the most accurate information; however, when dealing with young children, open-ended questions do not always evoke the amount or type of information desired in a forensic interview (Sternberg et al., 1996). Moreover, some children are inaccurate even in free recall, for example, when they discuss a different event than the one asked about (often without the interviewer or the child realizing it). Based on a growing body of research concerning how to best help children recall and communicate accurate and detailed accounts of witnessed or experienced events, several standardized child forensic interview protocols have been developed. In general, the overarching goals of these protocols are to maintain accuracy in children’s statements, reduce legal-system re-victimization of children, protect innocent defendants from false accusations, maintain the credibility of the child and interviewer, and promote justice overall. Although a number of important differences exist, child forensic interview protocols share several core components, including rapport building, assessment of the child’s developmental level, discussion of the distinction between truth and lies, review of interview rules (e.g., explaining that it is acceptable and expected that children say “I don’t know”), and a substantive questioning phase, with concentration on free recall and open-ended questions concerning the target event using a “funnel” approach (e.g., starting with free recall and open-ended questions and progressing to more specific questions only as needed). Most protocols also end with a closure phase during which the child is thanked for participation and cooperation. Although use of body diagrams and anatomical dolls, and allowing the child to draw during the interview, are sometimes included, not all protocols permit the introduction of these techniques, as they can be considered controversial. In the following section, several of the primary child forensic interview protocols are briefly described.

The Revised Cognitive Interview. The Cognitive Interview (CI; Fisher & Geiselman, 1992) was originally designed for laboratory use with adults based on two principles of memory, namely *encoding specificity* and *varied retrieval*. The CI extends standard police interviews by providing the witness with two sets of instructions prior to and during the interview that

encourage the witness to (1) revisit the context of the witnessed event, and (2) engage in several different retrieval strategies in an attempt to access a greater amount of stored information (Fisher, Geiselman, & Amador, 1989). The protocol was later revised for use in field settings and expanded to incorporate several additional principles of cognitive psychology, including *focused retrieval*, *extensive retrieval*, *limited mental resources*, *imagery*, and *witness-compatible* questioning (see Memon, Meissner, & Fraser, 2010, for a meta analysis). The CI was also adapted for use with child eyewitnesses to help children overcome their communication and cognitive limitations. Laboratory studies concerning the effectiveness of the revised CI with children have shown that the protocol elicits as much as 50% more correct information compared to the standard interview (e.g., McCauley & Fisher, 1995a). Given that child eyewitnesses are often interviewed repeatedly throughout the course of an investigation, the effectiveness of the revised CI has also been examined in the context of repeated interviews. McCauley and Fisher (1995b) found that the revised CI facilitated children's recall of new forensically relevant and accurate information under such conditions. Specifically, the CI elicited approximately twice as much correct information compared to standard interview procedures, an advantage similar to the increase in correct information reported in studies that tested the efficacy of the revised CI in the context of a single interview. The CI also increased the amount of accurate new information recalled during a second interview, especially when it followed a standard interview at Interview 1. This finding is important, given that most criminal investigations involve more than one interview; and when multiple interviews of child eyewitnesses are needed, there is a high probability that the first interview will not be conducted by a trained professional interviewer. Subsequent research has revealed that variants of the CI for children can also guard against misinformation effects, an important consideration with children in the legal context (Holliday & Albon, 2004; Milne & Bull, 2010).

Despite some benefits of the revised CI, there are also some disadvantages. Specifically, an increase in error can accompany such interviews, especially the first time they are administered (Memon, Wark, Bull, & Koehnken, 1997). Moreover, the techniques may not be sufficiently effective with very young children or with child sexual abuse victims who are fearful of disclosure.

The Step-wise Interview. The Step-wise Interview Protocol (Yuille, Hunter, Joffe, & Zaparniuk, 1993) is used primarily in investigations of child sexual abuse. It is designed to minimize the extent to which the interview process re-victimizes children, maximize the quantity as well as quality of the information obtained from children while simultaneously minimizing contamination of their reports and maintaining the integrity of the investigation for the various agencies. The protocol specifies a series of steps that interviewers follow to obtain child-generated information that is permissible in court. Interviewers are instructed to begin each line of questioning with general, open-ended invitations and progress to more direct and specific questions only when necessary. The protocol also requires that interviewers are educated about developmental differences in children's language and memory skills. In addition, the protocol specifies that interviews are conducted in a child-friendly setting. Inter-agency co-operation and presence at the interview are encouraged to minimize the need for repeated interviews, and parents and guardians are not permitted to be visible during the interview to reduce interference. The step-wise interview protocol has been widely adopted throughout Canada.

The step-wise interview begins with an *Introduction* phase, during which the interviewer introduces himself or herself to the child as a supportive and helpful adult. The interviewer

then continues to *build rapport* with the child, which is achieved primarily by prompting the child for information about herself or himself. This step includes a developmental assessment to determine the child's understanding of forensically relevant concepts (e.g., temporally relevant terms such as *before* and *after*).

The second step of the protocol includes a *child preparation phase*, during which the interviewer asks the child to describe two memorable events that are unrelated to the criminal investigation. Several studies have shown that interviews that incorporate into the rapport-building-phase prompts to recall information unrelated to the target event result in significantly more information in response to free recall questions asked during the substantive phase of the interview (e.g., Sternberg, Lamb, Esplin, & Baradaran, 1999).

The third step is an optional review of *interview rules* and is used primarily for younger children. For example, children are encouraged not to guess and to say "I don't know" when appropriate, a practice supported by research (Cordon, Saetermoe, & Goodman, 2005). During step four, the *need to tell the truth* is established: The child is asked to define the meaning of truth and the consequences of telling lies.

The aim of step five is to *introduce the topic of concern*. The topic is first introduced in a general fashion (e.g., "Do you know why we're talking here today?"), and the interviewer gradually increases the directedness of the questions, as needed. To help orient the child to the target event, the child may be asked to discuss the names and functions of body parts with the aid of human figure drawings, which can help elicit a disclosure. As a last resort, anatomically detailed dolls may be required to assist the child in describing a sexual act. However, dolls are never used to obtain a disclosure of abuse. Likewise, direct questions are recommended only when less leading techniques have been unsuccessful in eliciting a disclosure and there is reason to believe that the child has been abused. In general, great caution is recommended during this phase regarding the child's susceptibility to suggestive questioning.

Step six involves *free narrative* questioning, during which the child is asked for a narrative account of the target event using open-ended non-leading invitations (e.g., "I'd like you to tell me everything you remember about what happened starting from the beginning"). Only non-leading prompts such as "What happened next?" are used. For repeated events, such as chronic abuse, the interviewer first inquires about what usually happens to obtain information regarding the typical pattern of abuse. The child is then questioned about specific incidents, following the step-wise procedure for single-incident events. Free narrative questions are followed by *open questions* in the seventh step of the interview to elicit more details about the event. If *free narrative* and *open questioning* phases do not provide sufficient information, an optional eighth step consisting of *specific questions* is undertaken. Specific questions give the interviewer an opportunity to clarify and expand upon the child's previous answers. In the last step of the protocol (step 9), the interviewer *concludes the session*.

Narrative Elaboration. The Narrative Elaboration interview protocol was developed by Saywitz and Synder in 1996, based on several lines of laboratory research that illustrated the extent to which limitations in children's memory, knowledge, and communication may interfere with their ability to provide accurate and complete accounts of witnessed and experienced events. The narrative elaboration protocol was designed to help children overcome these developmental limitations in the forensic context. The protocol is comprised of six components, each of which has been shown to enhance the memory performance of school-aged children in laboratory research.

The first component involves providing children with instructions on how to use memory strategies. Specifically, children are introduced to a strategy for retrieving event details by organizing their recall into five categories of information, including participants, setting, actions, conversation and affective states, and consequences. The second component involves providing children with guidance on how to use the categories as memory cues. Children are instructed to be complete and accurate, and to not guess. In the third component, each category is represented by a line drawing on a card (e.g., a schematic picture of a building to prompt the “setting” category). These external cues remind children to report as much detail as possible from each category. The fourth component includes explaining to children the importance of using the pictorial cues to aid retrieval when needed. The fifth component involves providing children with practice using the pictorial cues on mock recall tasks, and feedback is provided concerning the accuracy and completeness of their responses. The last component involves reminders to use the new strategies during the subsequent interview. When questioned about the target event, children are first asked to describe their experience in response to unbiased open-ended questions (e.g., “What happened?”). Each pictorial cue is then presented, and the children are asked “Does this card remind you to tell something else?”, which encourages children to elaborate their memory reports using strategies practiced during the previous phases of training.

Support for the narrative elaboration technique is drawn from a study (Saywitz & Synder, 1996) in which the memory reports of school-aged children who received narrative elaboration training were compared to the memory reports of children who were instructed only to be complete and accurate. All children witnessed a staged classroom event that involved adults arguing. The children who received narrative elaboration training reported more correct information in response to free recall prompts than children in the control group. Compared to the control group, the narrative elaboration group also provided more correct information in response to visual cues. Of importance, narrative elaboration training did not produce an increase in incorrect information. Thus, the benefits of elaboration training were not achieved at the cost of a reduction in accuracy (see also Brown & Pipe, 2003).

The National Institute of Child Health and Human Development (NICHD) Protocol. The interview protocol that has received the most attention in the scientific literature was developed by Lamb and his colleagues at the National Institute of Child Health and Human Development (NICHD; Lamb, Orbach, Hershkowitz, Esplin, & Horowitz, 2007). Research concerning the efficacy of the NICHD interview protocol has shown that the *quality* of child forensic interviews improves when the protocol is employed compared to a standard forensic interview approach. Specifically, field studies in the United States, Canada, the United Kingdom, and Israel indicate that interviewers who employ the protocol use more open-ended questions and significantly fewer multiple choice and suggestive prompts compared to interviewers who do not use the protocol. Interviewers who use the protocol also introduce option-posing and suggestive questions later in the interview process than do interviewers who use a standard interview format. Delay in the use of option-posing and suggestive questions is forensically important because these types of questions involve the introduction of information by the interviewer and have the potential to contaminate children’s subsequent reports. These types of questions are also more likely to elicit erroneous information than open-ended questions.

Similar to many other investigative interview protocols, during the Introductory phase of the NICHD protocol, the interviewer explains the purpose of the interview and clarifies that the child’s task is to describe the events in as much detail as possible. In addition, the

interviewer explains the ground rules (e.g., truth telling) and encourages children to say “I don’t remember,” “I don’t know,” and “I don’t understand,” or to correct the interviewer when appropriate. The extent to which the child understands the difference between true and false statements may also be assessed. Similar to the step-wise interview protocol, children are prompted to describe in detail a recently experienced neutral event that is unrelated to the allegations during the rapport-building phase. Children are also given practice using open-ended questions, which are designed to familiarize children with the questioning style used in the substantive phase of the interview and demonstrate the specific level of detail expected.

Before transitioning to the substantive phase of the interview, the target events under investigation are identified using a series of non-suggestive open-ended prompts. Interviewers introduce increasingly more focused prompts only if a child fails to identify the target event. In cases when the child has made an allegation, the free recall phase begins with a prompt such as, “Tell me everything.” After the child describes the event, interviewers progress to follow-up questions and cued prompts that contain references to details mentioned by the child previously in an effort to elicit uncontaminated free-recall accounts of the alleged incident.

One key feature of the NICHD protocol is that interviewers continue to use free-recall prompts until they no longer elicit new and forensically relevant information before progressing to more focused prompts. Focused recall or directive questions that contain details previously mentioned by the child are then used to request information about specific categories of information (e.g., the perpetrator’s appearance). Non-suggestive yes/no and forced-choice questions, in which interviewers by definition introduce information, are used only if essential information is still missing after free-recall and directive prompts have been exhausted. The NICHD protocol has been recommended for use with children as young as 4 years of age.

Although considerable research exists on the NICHD protocol, it should be noted that the *accuracy* of the information obtained with this protocol has not been evaluated. Almost all of the studies on the NICHD protocol concern actual child abuse victims in real cases, in which the truth of what happened is not necessarily known. That said, the protocol is based on established principles derived from studies concerning memory development in which accuracy was assessed. A shortened form of the NICHD protocol was recently developed and is now also being used in some jurisdictions, for example, in parts of California (Lyon, 2007).

The Rapport, Anatomy Identification, Touch Inquiry, Abuse, and Closure (RATAC) Protocol. The RATAC protocol (Walters, Holmes, Bauer, & Vieth, 2003), otherwise known as the Finding Words technique, was developed by the National Center for Prosecution of Child Abuse in collaboration with CornerHouse, a private, non-profit interagency child abuse evaluation and training center. The RATAC protocol has been officially adopted by many jurisdictions in the United States. Although there is a lack of research concerning the effectiveness of the RATAC, it is also largely based on principles verified in memory development research.

One of the primary features of the RATAC protocol is the stated importance of the interview setting to meet the needs of each child’s cognitive, social, and emotional level in a developmentally sensitive manner. The five stages of the RATAC interview include rapport-building, anatomy identification, touch inquiry, abuse scenario, and closure. The rapport-building stage of the RATAC interview entails three primary objectives: (1) to establish the child’s comfort by being responsive to the child’s individual needs and acknowledging and respecting the child’s diversity; (2) to assess the child’s unique mode of communication, including language

skills, emotions, facial expressions, and non-verbal behaviors (e.g., gesturing, posture); and (3) to assess the child's competence. During the rapport-building stage, the child is also offered child-friendly explanations of the interviewer's role as well as the child's role as the expert on the topic of concern. In contrast to other protocols, the RATAC protocol does not recommend a standardized truth-lie discussion during the rapport stage of the interview. Instead, the interviewer is encouraged to provide interview instructions, including truth-lie discussion, as needed and as natural situations arise throughout the course of the interview. Another unique feature of RATAC is that drawing activities are introduced during the rapport-building stage to help the child relax. General information about the child's family and home environment can also be obtained during drawing activities. Multiple question types, particularly open-ended questions and narrative invitations, are used to assess the child's abilities and to prepare the child for question types used later in the interview.

The anatomy identification phase involves the use of detailed male and female anatomical diagrams to establish a child's ability to differentiate between genders and to establish a common language between the child and the interviewer regarding the child's names for body parts. The diagrams remain in the child's sight throughout the interview process in case they can help the child communicate throughout the interview.

Support for the facilitative role of anatomical diagrams in the interview process is derived from basic research on dual representation (DeLoache, 2000). Although anatomical drawings can potentially serve as memory retrieval cues, there is growing concern that such drawings may also lead to greater error in young children, for example, if the children are suggestively interviewed when presented with anatomical drawings (e.g., Brown, Pipe, Lewis, Lamb, & Orbach, 2007; Bruck, 2010).

The RATAC outlines a specific technique and method for asking questions about touch that is followed in the third stage of the interview. The child is first asked about the types of touching that are okay and about the types of touching that the child likes, followed by a discussion of the types of touching that are unwanted or confusing to the child. The interviewer invites the child to define or name a type of touch (e.g., tickling), to identify who gives the touch, and to indicate the part of the child's body that is touched. The touching of another person's body is also explored.

The fourth stage of the interview is undertaken if the child discloses events that appear to be abusive in nature. Immediately following the disclosure, the child is encouraged to provide as much detail about the event as possible in response to open invitations, such as "Tell me everything you remember." This is continued until the child's free-recall memory is exhausted, after which questions seeking detail or clarification are posed. Emphasis is also placed on gathering information from the child that can be corroborated. Throughout this stage, interviewers are encouraged to explore all alternative hypotheses or explanations of the child's allegations, which challenge interviewers to remain open-minded and in general reduce the risk of false allegations due to suggestive questioning. This practice may involve asking the child questions about others who may have touched the child in similar ways as the alleged perpetrator (e.g., "Has anyone else touched you in that way?").

Similar to other forensic interview protocols, the closure stage of the RATAC interview is aimed at helping the child to prepare for the next steps of the legal process and to thank the child. Relatively unique to the RATAC closure phase is that interviewers also educate children about personal safety by identifying which parts of the body are private and clarifying that no one should touch those parts. Interviewers assist children in identifying trustworthy adults whom they can tell if abuse occurs and review the importance of calling 911.

Conclusion

The legal system looks to developmental scientists for guidance about children's eyewitness memory abilities. Protection of children from trauma, on the one hand, and protection of innocent adults from false report, on the other, can rest on our understanding of children's abilities to accurately bear witness to criminal events. Because of the importance of the issues involved, the scientific study of children's eyewitness memory has become an international effort. It strives to give voice to those who were previously voiceless while attempting to ensure accuracy and completeness of children's reports so that justice can be served. It strives to protect children, such as those sexually abused by their own pediatrician, as well as to protect innocent adults such as Clarence Elkins, who spent years in prison for a crime he did not commit. That an insistent 2-year-old broke a case of child sexual abuse involving actions by her own doctor—abuse that had been ongoing in the community for 11 years—reminds us not to underestimate child witnesses. However, we cannot afford to overestimate their abilities either.

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