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Children's autobiographical memories across the years: Forensic implications of childhood amnesia and eyewitness memory for stressful events

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ABSTRACT

This is a review of two bodies of research conducted by myself and my colleagues that is relevant to child witness issues, namely childhood amnesia and children's eyewitness memory for stressful events. Although considerable research over the years has investigated the phenomenon of childhood amnesia in adults, only recently has it begun to be investigated in children. For them, the age of earliest memory is a moving target over their early years. However, there is nonetheless both variation between children in how early their first memories are as well as variation between memories in terms of likelihood of being retained, and some factors influencing both are explored. In terms of eyewitness memory for stressful events, 2–13-year-old children who had been injured seriously enough to require emergency room medical treatment were interviewed. Long-term memory for these stressful events was traced, and factors influencing that retention were investigated. The findings from both areas of research have implications for developmental forensic psychology.

Introduction

This review summarizes recent work done by my collaborators and myself on child witness issues. It focuses on two areas of research, both of which explore children's ability to remember salient real-world, naturally-occurring autobiographical events. One investigated children's earliest memories, i.e., it focused on childhood amnesia. The other investigated children's memories for injuries serious

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enough to require hospital emergency room treatment. Both bodies of work have implications for developmental forensic psychology and can address questions such as: How does age affect remembering? How old must a child be to retain a verbal memory? How long can memories be maintained, and how do they change over time? What influences forgetting and retention? How can memory and/or memory reports be enhanced?

Childhood amnesia

Childhood amnesia (also termed infantile amnesia) is the absence or scarcity of memories about very early life events (Hayne, 2004; Nelson & Fivush, 2004). Bauer (2007) differentiates two phases: a period of total amnesia (prior to an individual's first memory), and a period of partial amnesia (between that first memory and when the number of memories becomes similar to that for later ages). In this time of partial amnesia, individuals retrieve fewer memories than expected – very few from the preschool years with increasing numbers from early elementary years. The accelerated slope for the number of memories retrieved levels off somewhere around age 7–8 (Rubin, 2000). According to Bauer, Burch, Scholin, and Güler (2007), at this age the exponential function that best fits the distribution of memories in younger children changes to the power function that most successfully accounts for forgetting of memories in adults.

The phenomenon of childhood amnesia has often played a role in the forensic arena. The average age of earliest memory for adults from Western European cultures is age 3½, and a large body of research conducted with adults shows little or no recall for events from before the age of 3–4 years (Rubin, 2000). Although there is wide variation between individuals in their age of earliest memory, those memories that are identified as occurring from infancy or young toddlerhood are typically treated with suspicion because they date from an age so much earlier than most people can remember. But memories from the period labeled as partial amnesia are also often challenged. For example, in a case before the England and Wales Court of Appeal (England & Wales Re H 2005) involving an adolescent's memories of sexual abuse from childhood (age 4–6), an expert witness for the appellant asserted that the phenomenon of childhood partial amnesia (up to age 7 or 8) necessarily throws doubt on individuals reporting detailed memories dating from this period, and the Court of Appeal affirmed that it is incumbent on a judge to warn a jury that detailed narrative accounts of memories from this age of partial amnesia are inherently unreliable even though they might sound particularly convincing. Thus, the phenomenon of childhood amnesia has at times been a pivotal issue in courtroom decisions.

In recent years there has been a resurgence of interest in childhood amnesia, and what has differentiated recent research from earlier studies is that the phenomenon is currently being studied in *children* rather than just adults. Earlier explanations for childhood amnesia rested on young children's poor memory or language skills in early childhood, and the beginning of adults' memory for life events was attributed to a dramatic change in children's memory system as they made the transition from toddlerhood to childhood (e.g., Wetzler & Sweeney, 1986; White & Pillemer, 1979). However, these explanations have been shown to be untenable. Not only is there little sign of discontinuity in children's memory system (Bauer, 2007; Hayne, 2004), but 2-year-olds are able to describe memories of personal events that happened to them several months earlier, and 3- to 5-year-olds can readily talk about events that occurred more than a year previously (see reviews in Bauer, 2007; Peterson, 2002). Nonetheless, most of these memories eventually become veiled by time. Thus, the focus of recent research has shifted to understanding how the phenomenon of childhood amnesia changes across childhood.

Changes in childhood amnesia in children across age

The studies carried out in my lab in collaboration with a number of colleagues illustrate some of the new directions in research on childhood amnesia. In the first large-scale investigation of childhood amnesia in children rather than adults, a cross-sectional sample of Canadian children of Western European descent were given the following prompt: "I want you to think way back and tell me the first thing you ever remember, something that happened when you were really little." If necessary,

subsequent prompting repeated parts of the same prompt, e.g., "Think way, way back, back to when you were very very little." In that study we showed that the phenomenon of childhood amnesia was not only demonstrated by children, but that children's age at the time of their earliest memory changed depending upon their current age (Peterson, Grant, & Boland, 2005). Specifically, 6–9 year-olds had earlier first memories than did older children: younger children's average age at the time of their first memories was 3 years according to memory-dating by their parents, whereas for older children (10–19 years of age) it was approximately 3½ years – i.e., similar to findings with adults. Later research replicated these results when children and adults were directly compared: children in grades 2 and 5 had earlier memories than did children in grades 8 and 9 as well as adults (Peterson, Noel, Kippenhuck, Harmundal, & Vincent, 2009).

This initial finding was amplified in subsequent research that included additional children, especially at younger ages (Peterson, Warren, & Short, 2011). In that study, children ranged in age from 4 to 13 years of age. In their initial interview, the mean age of earliest memory for the children in the age groups of 4–5 years, 6–7 years, 8–9 years, 10–11 years, and 12–13 years was 27.6, 24.2, 34.3, 34.4, and 37.6 months, respectively. (The inversion between the two youngest groups is probably attributable to the youngest children having more difficulty with the task). This shift upward in the age of earliest memory was also found in recent cross-sectional research conducted in New Zealand (Jack, MacDonald, Reese, & Hayne, 2009; Tustin & Hayne, 2010).

It is important to emphasize the variation between children in their age at the time of their earliest memory. Almost all of the memories provided by children in both studies (Peterson et al., 2005, 2011) were confirmed by parents, who also provided the children's ages at the time of the events. In Fig. 1, the data for the age of earliest memory for the initial interviews of children included in Peterson et al. (2011) are plotted individually. As is apparent, children differed substantially in how early their first memory was, and this was true at all ages. For a number of children, their reported first memory dated from well before their second birthday, whereas other children could not recall events prior to age 4 or later.

The most salient finding of both studies is that the children's age at the time of their earliest memory derives from a later age as children get older, at least up through their primary school years. This

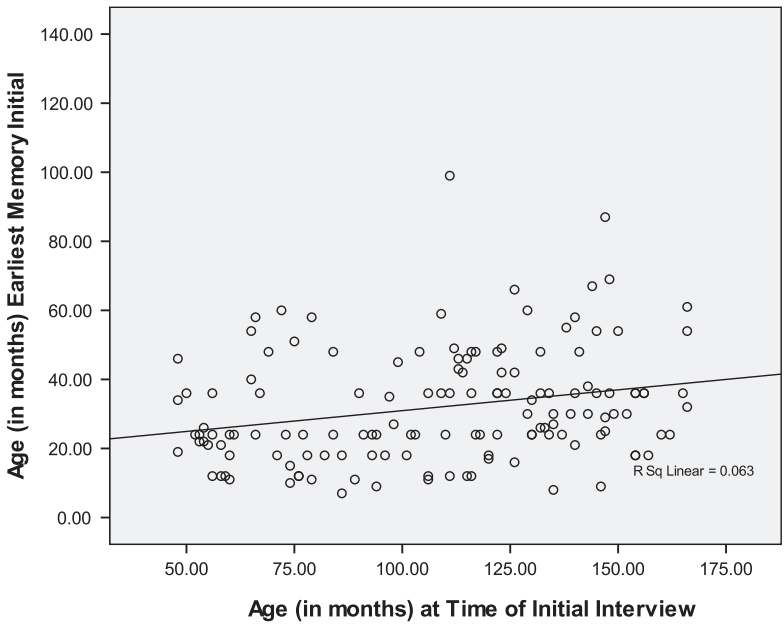

Fig. 1. Age of earliest memory in initial interview. *Note*: From Peterson et al., 2011.

was found not only cross-sectionally but also in the first study to investigate childhood amnesia longitudinally in children (Peterson et al., 2011). When the same children were re-interviewed 2 years later, the overall mean age of earliest memory for all children shifted from 32.0 to 39.6 months, a shift of more than 7 months. The investigators also asked children to describe their second and third earliest memories, and the overall mean age of their three earliest memories shifted even more: from 44.4 to 56.5 months, a shift of a year.

In order to explore this change in children's earliest memories, it is crucial to conduct longitudinal research in which the same memories identified by children as their earliest are tracked over time, and the study by Peterson et al. (2011) is the first to have done so. We found that whether or not children provided the same early memories at both time points depended upon their age. Of the 50 children who had been 4–7 years old at their initial interview, only five provided the same earliest memory 2 years later, and only nine children provided any overlap at all when all three of their earliest memories are considered. Thus, most of their memories during their second interview were new ones. In comparison, 22 of the 61 10–13 year olds provided the same earliest memory 2 years later, and only 25 of the children provided no overlap in memories.

However, just because children do not describe the same memory in a later interview does not necessarily mean that they do not remember the event. To assess this, we provided children with memory synopses at the end of their second interview. Three of these synopses were of events that had not happened to the children (confirmed by parents), whereas the remaining synopses were summaries of the children's own descriptions of memories they had reported in their first interview but not in the second. By providing false foils, we could ascertain that the children were not simply claiming to remember all of the prompted events. Since they correctly rejected virtually all of the false foils, this suggests that their claims about their true prompted memories were likely to be reliable, especially as some were accepted and some rejected. Children were also asked to provide additional details if they claimed to recall a prompted memory, and all of the children could do so. The children's responses to the prompted memories that were true are as follows: Of the 4–5 year olds, almost 40% of the prompted memories were not recalled and children often denied that the event had ever happened. Of the 6–7 year olds, almost a quarter of the prompted memories were also rejected. In comparison, very few of the prompted memories were rejected by the older children (15% by 8–9 year olds, 9% by the 10–11 year olds, and only 1 memory by the 12–13 year olds). These findings demonstrate that not only are younger children not spontaneously retrieving the same memories when asked to recall their earliest three, but that some of these memories are simply forgotten. In comparison, few of the memories provided by older children in their initial interview were forgotten 2 years later.

Additional analyses looked at changes in the content of the memories that were repeated at each interview. Although the sheer amount of information provided about each memory was similar in both interviews, older children tended to repeat the same information provided earlier whereas younger children were more likely to provide different information about the same events. Specifically, more than half of the information provided by former 4–7 year olds was different 2 years later whereas only a third of the information was different for the oldest children. Thus, older children were not only more consistent in which memories they identified as their earliest, they were also more consistent in the specific content of those memories.

What predicts whether or not a particular memory will be retained? Undoubtedly there is a multiplicity of factors and these probably differ between children. However, we can offer some tentative suggestions. First, one of the largest predictors of a memory being forgotten was the age of the child at the time of remembered events. Those that had occurred at younger ages were more likely to be forgotten, which accounts for the shift upwards in children's age of earliest memory as they get older. But the variable of age provides limited explanatory power since some very early memories are retained and others not. To explore memory maintenance in more detail, colleagues Gwynn Morris, Lynne Baker-Ward and I applied a recently developed coherence coding method, the Narrative Coherence Coding Scheme (NaCCs; Morris, Baker-Ward, & Bauer, 2010; Reese et al., 2011) to the data, to see if the coherence of the children's original memory description predicted memory maintenance over 2 years. Coherence was rated on the dimensions of context, chronology and theme. We used multilevel modeling to examine whether within-person variations in narrative coherence could predict the likelihood of an earliest memory's survival over 2 years above and beyond the influence of between-person

differences in age, and we found that all three of the coherence dimensions predicted memory maintenance (Peterson, Morris, Baker-Ward, & Flynn, 2012). That is, inclusion of information that orients the memory in both time and place (*context*), whether the narrative events could be placed on a timeline by a listener (*chronology*), and whether there was a clearly developed focus to the narrative (*theme*) all predicted memory survival, with thematic coherence the most important of the three.

Other characteristics of memories that were retained versus forgotten have also been examined. The length of the memories in terms of number of words used to describe them was not predictive, nor was the uniqueness of the event (versus a repeated event) nor the presence of reminders like photos, videos or family discussion (Peterson et al., 2012). As well, the specific content of the memories did not seem to predict memory maintenance. However the majority of memories provided by children were for rather mundane events, and it seems that memory content *does* make a difference when memories involve highly emotional or salient events. Memories that included emotion words were two and a half times more likely to be remembered over a 2-year delay than were emotionally neutral memories. In addition, other research that was not specifically directed toward the investigation of childhood amnesia also shows the importance of emotional content in memory maintenance. When former 2- and 3-year-olds were re-interviewed 5 years later about an injury they had sustained which had been serious enough to require emergency room medical treatment, the children showed remarkable long-term recall of the event (Peterson & Parsons, 2005; Peterson & Whalen, 2001). Not only did almost all the children remember the event but they recalled a host of accurate details about it, even though they had been so young at the time of injury and so much time had passed.

Other issues related to childhood amnesia in children

Task

In the above studies children were asked to remember their earliest memory (or their earliest three). However, some researchers argue that it is also fruitful to assess the accessibility of a range of memories from the early years (Nelson & Fivush, 2004). A task that does this is a memory fluency task in which individuals are asked to recall as many memories from their earliest years (e.g., before school) as they can in a timed task, e.g., 4 min (Wang, Conway, & Hou, 2004). This procedure shows whether individuals are able to readily access only very few memories or instead have ready access to a number of them. Using a memory fluency task, direct comparisons between children and adults were made by Peterson et al. (2009) for the accessibility of memories prior to school entry. They found that children in grades 2 and 5 were able to access more memories from earlier ages than could adults. Interestingly, although no gender differences were found for children, adult women recalled more memories than did men, replicating Wang et al. (2004). However, these gender differences in adults disappeared when task methodology was altered (individual versus group administration of memory fluency tasks – Peterson et al., 2009; Peterson, Warren, Nguyen, & Noel, 2010).

Culture

Cross-cultural research on childhood amnesia in *adults* has demonstrated convincingly that the population from which participants are drawn makes a difference (see Wang, 2003). But it is necessary to explore childhood amnesia in *children* cross-culturally too. In the studies from my lab, children came from Newfoundland, Canada. According to Statistics Canada (2001), 97% of Newfoundland's population is of Western European origin, mostly English and Irish. My colleagues Qi Wang and Yubo Hou and I compared childhood amnesia in this population with children from China (Peterson, Wang, & Hou, 2009). We used the memory fluency task and asked children to recall as many memories as possible from before starting school in a timed task, as well as asked them for their earliest memory and to date each memory. Participants were 8-, 11-, and 14-year-olds. Parents also confirmed and dated the memories. Fig. 2 shows the age of the children's earliest memories, and Fig. 3 shows how many memories they were able to retrieve in their timed memory fluency task. It is apparent that cultural differences were found in both measures from the earliest age at which we collected data, and that these cultural differences became larger with increasing child age. Considered as a whole, Canadian children's earliest memory was more than a year earlier than that of Chinese children, with mean ages of 28.2 versus 41.4 months, respectively. Canadian children also recalled more memories (mean = 8.1)

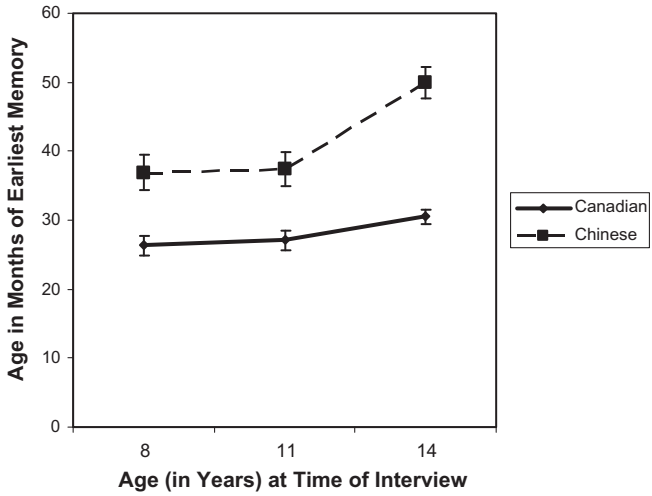

Fig. 2. Age of earliest memory as a function of age and culture. *Note*: From Peterson et al., 2009.

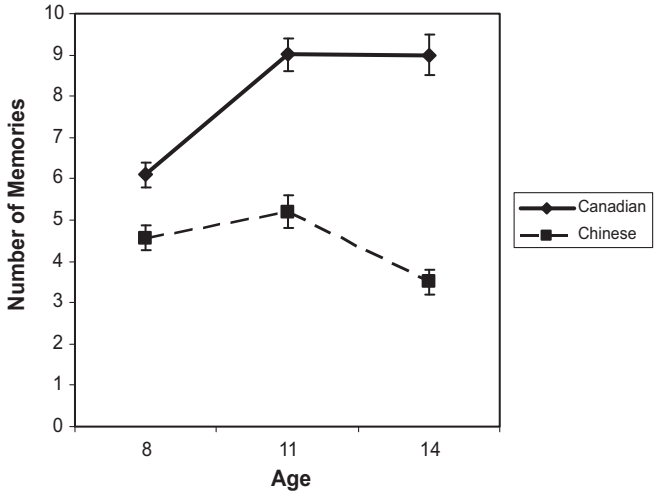

Fig. 3. Number of early memories as a function of age and culture. *Note*: From Peterson et al., 2009.

than did Chinese children (mean = 4.4). This is in spite of the fact that Canadian children typically begin school at age 5 whereas Chinese children do not typically begin school until age 6; that is, Chinese children had an additional year from which to draw memories, a year that was closer to their current age. Nevertheless, events from their preschool years were more readily accessible to the Canadian children. The content of memories also differed depending upon the children's culture. Canadian children's memories were most likely to center around themselves, often with no mention other people. In contrast, Chinese children's memories were more likely to involve other people, i.e., social rather than individual in focus.

Memory dating

There is another issue to be raised: the accuracy of memory-dating. Most research on childhood amnesia asks adults to date their memories by asking how old they were at the time of the recalled

event, although a few target known past events such as a sibling's birth. Because we independently asked both children and their parents to date the children's memories, we were able to compare the dates provided and to do so with participants from different cultures (Wang, Peterson, & Hou, 2010). We assumed that parents can date children's memories more accurately than the children themselves, although parents too can make dating errors. However, parents are likely to be more accurate than their children for several reasons. Children are recalling events from their very earliest years whereas for parents, these events date from the relatively recent past. Children were also recalling memories from a time when memories are scarce and often fragmentary whereas parents are recalling a period of their lives that is likely to have high personal significance and from which they are likely to recall a multitude of memories. In addition, parents have more advanced knowledge of time and dating strategies, and they can also use developmental differences in children's behavior to help them.

We found systematic differences between children's and parents' memory dating, and this was true across all ages in both cultures. The memories that children identified as their earliest actually occurred earlier than the children thought, according to parental dating. In contrast, the memories that derived from later in the preschool period actually occurred later than children thought. When we compared the memory dates supplied by parents versus children, we found a shift at 48 months. Those events that parents identified as having occurred earlier than when the children were 48 months were shifted to a later date in children's estimations. In contrast, those events that had occurred later than 48 months were shifted to an earlier date. In other words, there were systematic errors found by children in both cultures, and children tended to shift their memories toward the age of 48 months. Fig. 4 illustrates the systematic dating errors found in both cultures. This of course has implications for adults' memory dating. If adults too make the same sort of systematic errors, it may well be that their earliest memories are in fact earlier than they believe. Thus, rather than the age of their earliest memory being from when they had been 3½ years of age, it could well be from several months earlier. In other words, our understanding of how well adults can retrieve memories from their early years may be distorted. However, this is a question that awaits further empirical investigation.

Summary

Children experience childhood amnesia too, just like adults. But the earliest memories of younger children date from an earlier age than do those of older children, and thus some memories are

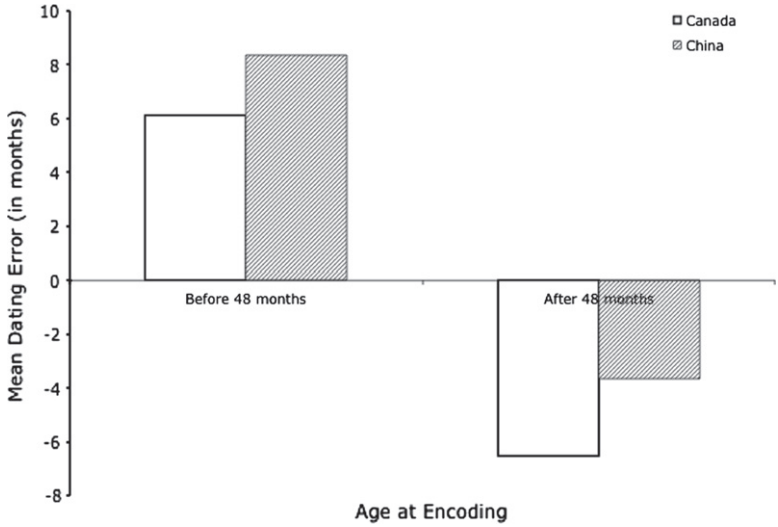

Fig. 4. Dating error as a function of age at encoding (before and after 48 months) and culture. *Note*: From Wang et al., 2010.

forgotten as children get older. However, there is still considerable variability between individuals, influenced by factors such as culture. There is also considerable variability between different memories of the same individual, and these are influenced by factors such as event salience, emotionality, and memory coherence. Thus, childhood amnesia in children is dynamic and reflects both change and stability over time.

Eyewitness memory for stressful events

In the early 1990s, increasing attention was being focused on children by the forensic system. For more than a century their accounts of events had been treated with suspicion; widespread views of children having poor memory skills along with concerns about their inability to discriminate fantasy and reality dominated public perception of child credibility (see Brainerd & Reyna, this volume; Goodman, 2006, for historical overviews). However, such attitudes had resulted in egregious miscarriages of justice for children. Consequently, a number of researchers turned their attention to explorations of children's memory that had implications for eyewitness testimony credibility. An important property of autobiographical events that influences whether there is robust long-term recall is emotionality, and highly negative events seem particularly well-remembered (see review in Peterson, 2002). As contrasting examples, preschoolers recall 20–30% of the features of a living-room camping trip when interviewed merely 1 day or a week later (Boland, Haden, & Ornstein, 2003), but fully 75% of the features of a facial surgery event (caused by injury) when interviewed a full year later (Burgwyn-Bailes, Baker-Ward, Gordon, & Ornstein, 2001).

In my lab, we contrasted children's relatively poor performance on typical laboratory-based tasks with the lengthy personal narratives often provided when asked to tell us about salient events in their lives (e.g., Peterson & McCabe, 1983). It seemed crucial to investigate children's memory for events that had ecological validity as well as were stressful – in other words, that bore some similarity to forensic events. A major stumbling block was that one cannot deliberately expose children to high levels of distress, and different investigators have navigated around this issue in various ways. One way is to study children's memory for medical procedures, such as in Goodman, Hirschman, Hepps and Rudy's (1991) groundbreaking research where they asked preschoolers to recall well-child check-ups that included inoculation. However, few children were highly distressed; furthermore, the distress was caused by medical personnel whom children are taught have only their best interests at heart. (Since that report there have been a number of excellent studies of children's memory for stressful medical events, most notably urinary catheterization – e.g., Goodman, Quas, Batterman-Faunce, Riddlesberger, & Kuhn, 1994, 1997; Merritt, Ornstein, & Spicker, 1994; Salmon, Price, & Pereira, 2002.) At the time of Goodman et al.'s report, prior narrative research conducted in my lab showed that children provide minimal accounts of visits to the doctor's office like those which the investigators studied, whereas they frequently provide extensive accounts of events in which they had suffered an injury. Thus, injury events could be an excellent venue for investigating eyewitness memory for naturally-occurring, ecologically valid events. So began more than a decade and a half of research in which my student collaborators and I have recruited children from a hospital emergency room, children with broken bones, lacerations requiring suturing, burns, crushed fingers, and so on. Because the hospital was the only one that treated children in the entire geographical region and health care is free in Canada, the children represent a cross-section of the population.

We have conducted a series of studies on children's memory for their injuries as well as their subsequent emergency room treatment. With one exception (discussed below), all children were interviewed in their homes within a few days of injury, along with adult eyewitnesses (mostly parents). Re-interviews were conducted after one or more of the following delays: 6 months (Peterson, 1996; Peterson & Bell, 1996), 1 year (Tizzard-Drover & Peterson, 2004), 2 years (Peterson, 1999, 2010, 2011; Peterson, Moores, & White, 2001; Peterson, Pardy, Tizzard-Drover, & Warren, 2005; Peterson, Parsons, & Dean, 2004; Peterson & Rideout, 1998; Peterson, Sales, Rees, & Fivush, 2007), and 5 years (Peterson & Parsons, 2005; Peterson & Whalen, 2001). This review discusses the findings of studies with the longest delays: 2 and 5 years.

Changes in memory reports over time

An important forensic issue is how children's memory reports about highly salient and personally relevant events change over time. In the forensic arena children are interviewed multiple times, such as initially for investigative purposes and later in court. Delays between interviews are inevitable, and some variation between child reports at different times is common. What do we make of such variation? Widespread public perception is that children's memory reports get progressively worse and therefore less reliable over time, and that any changes represent errors of memory. However, research findings have been more mixed, with some studies agreeing that children's memory reports get worse (e.g., Goodman et al., 1991; Quas et al., 1999; Shrimpton, Oates, & Hayes, 1998), while other studies found that they get better (Fivush, Sales, Goldberg, Bahrick, & Parker, 2004; Sales, Fivush, Parker, & Bahrick, 2005). Still others suggested that there is little change across time (Baker-Ward, Gordon, Ornstein, Larus, & Clubb, 1993; Burgwyn-Bailes et al., 2001; Merritt et al., 1994; Salmon et al., 2002). This lack of agreement about what happens to children's memory reports across time has been puzzling; what is universally agreed upon is that it is crucial to understand the effects of time delays on children's memory accounts.

A possible explanation for these divergent findings was proposed recently (Peterson, 2011): methodological differences in the aspects of the children's reports that were coded are responsible for the disagreement in findings. In other words, different aspects of children's reports could be changing in different ways. Typically, children's memory reports have been coded in one or more of the following ways: (a) assessments of overall completeness. In this coding scheme, the entire event is broken down into a series of components, either a checklist of procedures or items (such as what a doctor did/used in a check-up) or a list of components that comprise the prototypical event being studied (such as the components inherent in an injury: where and when it happened and the child's immediate reaction). (b) Counting the number of unique units of information, i.e., amount of narrative detail such as the unique mentions of location, persons, objects, and so on. (c) Accuracy of recall, with the specifics of what was coded for accuracy differing depending upon whether completeness or narrative details were being assessed. Thus, the fundamental units that are scored are usually either completeness components or unique narrative details. As described in Peterson (2011, p. 277), these two scoring procedures have a different focus even though they are complementary ways of measuring children's recall.

When scoring recall completeness, each prototype component is scored as present or not, regardless of how much narrative detail is provided. However, when scoring for narrative detail, each new detail is separately counted. Compare "we were at my Nan's" with "we were at my Nan's, behind the green shed that's next to her house." These are equivalent under the prototype completeness scoring since both state the location of described events and location is one of the component features of the prototype, but the latter contains considerably more narrative detail. Both ways of assessing children's recall are important forensically even though they provide a different perspective. When children provide a relatively complete account of a target experience, they include information about who, what, when, where, and the sequence of events that occurred. In other words, they provide information about the overall structure of the event, which is considerably more helpful in forensic situations than someone who only relates a few components of the event, even if those components are recalled accurately. However, children's accounts are even more useful if they are rich in descriptive detail rather than being a sparse, skeletal account.

In prior research, studies in which narrative details were scored typically found recall to improve over time while studies of accuracy indicated deterioration over time. Studies in which completeness was assessed tended to find either no change or modest decrement over time.

In Peterson (2011), data from 145 2–13-year-olds were compared when scored using both coding schemes: (a) completeness and (b) amount of narrative detail, and accuracy was assessed by means of both coding schemes. Children's initial recall was compared to recall after both 1 and 2 years. Although earlier articles reported recall data from both injury and hospital events, in Peterson (2011) only data from the injury event were included because that event is unique. In contrast, their visit to the emergency room was typically one of several for various reasons (see Peterson & Bell, 1996, for a breakdown of other visits), with many components similar across visits. Thus, the injury event provides a clearer picture of how memory reports change.

In terms of *completeness*, it had been assessed by using an idealized prototype of typical components of an injury event to guide questioning. An individual list of relevant components of that idealized prototype could be derived separately for each child by using adult witness reports (see Peterson, 1999, 2011; Peterson & Bell, 1996; Peterson & Whalen, 2001, for a complete list of event components). Completeness scoring consisted of calculating the proportion of prototype components that children did recall out of the possible number of prototype components that they potentially could have recalled, according to adult witness report.

Of course children had more complete recall with age, with a mean percentage correct recall of components of 51.0%, 67.6%, 78.8%, 81.2%, and 82.0% for the 2-year-olds, 3–4-year-olds, 5–6-year-olds, 8–9-year-olds, and 12–13-year-olds, respectively. (The oldest three age groups did not differ, although 2-year-olds had less complete recall than 3–4-year olds, and both groups differed from the older ones.) Most importantly, there were no significant effects of time. Across all ages, children correctly recalled 72.9% of the prototype components in their initial interview and 73.7% 2 years later. When central and peripheral components were separately assessed, again there were no effects of time, although children correctly recalled proportionately more central than peripheral components (78.5% versus 66.7%, respectively). Two conclusions are salient: children were correctly recalling a substantial proportion of the structural components of their injury experience, and that recall was not deteriorating across a 2-year delay. In Peterson and Whalen (2001), the findings were the same for the proportion of components recalled for their injury experiences after a delay of 5 years: no deterioration across time in correct recall completeness. (However, they correctly recalled proportionately fewer of the components of hospital treatment across time, mostly because of confusions between different times of being there.) When one considers the young age of some of the children at the time of injury, such maintenance of recall is remarkable. After all, the 5-year delay across which they continued to show excellent recall is greater than their age at the time of their injury.

When the accuracy of recall was assessed using the completeness coding scheme, the pattern of findings was different: accuracy deteriorated across time. Fig. 5 depicts the change in accuracy of completeness components across time for different age groups. As is apparent, older children were more accurate than younger children, and deterioration across time was greatest between the initial and 1-year interview. Centrality of the components was important only for the former preschoolers: central

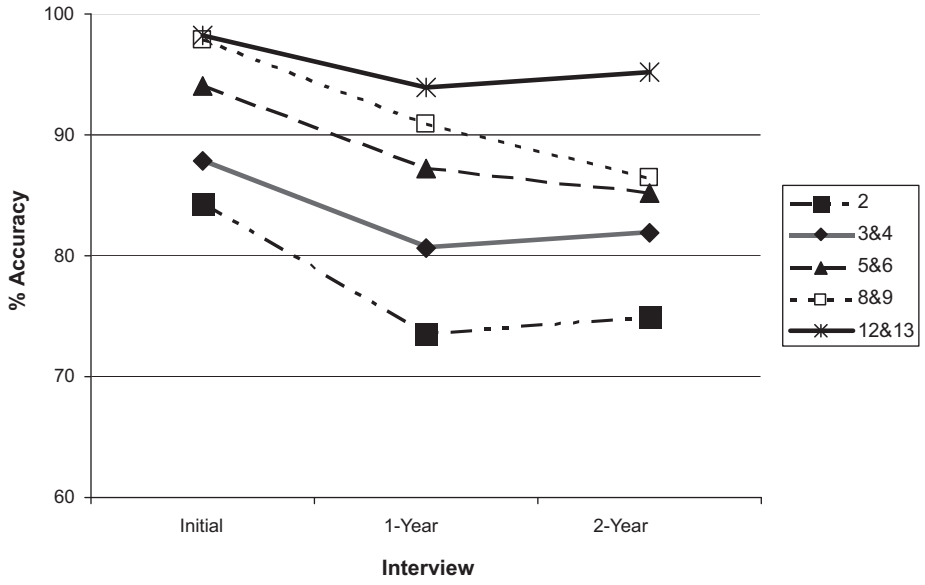

Fig. 5. The Time × Age interaction for the accuracy of completeness prototype components. *Note*: From Peterson, 2011.

components were recalled significantly better than were peripheral components for the 2-year-olds and marginally better ($p = .051$) for the 3–4-year-olds, but no differences for older children. Overall, although their accuracy for injury prototype components decreased they were still remarkably accurate, even across the considerable time delay of 2 years: about 75% accuracy for former 2-year-olds, more than 80% for 3–4-year-olds, more than 85% for 5–9-year-olds, and about 95% accuracy for 12–13-year-olds. Even after the lengthy delay of 5 years, children were still impressively accurate: over 70% accuracy for former 2-year-olds, about 75% for 3–4-year-olds, more than 85% for 5–9-year-olds, and more than 90% accuracy for 12–13-year-olds (Peterson & Whalen, 2001). A more detailed breakdown of errors in children's initial and 6-month interview can be found in Peterson (1996). In other research, children were provided with incorrect misleading or correct reinstating information a year after injury (Peterson et al., 2004); in re-interviews both a week and a year later, children did not incorporate the misleading errors into their memory accounts. Looking at data from all of these studies, one can conclude that accuracy for the children deteriorated across time, although recall of injury components was still mostly accurate 2 and 5 years after event occurrence.

The other scoring system that has been used to assess children's recall of salient events is a tabulation of unique narrative details, typically pertaining to persons, locations, actions, objects, and attributes (see Fivush, 1991; Peterson & Roberts, 2003). The most salient finding is that children provide more details 2 years later than initially. Specifically, the number of narrative details in the initial interview is 18.6, 33.2, 43.8, 50.5, and 54.9 unique details for the 2-year-old through 12–13-year-old groups of children, respectively. In their 2-year follow-up interview, these children provided 25.5, 45.3, 57.2, 63.4, and 58.2 unique units for the 2-year-old through 12–13-year-old groups of children, respectively. In other words, the children were providing an average of 10 additional narrative details 2 years later.

Across all children, the accuracy of unique narrative details was 92.4% in the initial interview, which decreased to 85.6% 2 years later. Of course, older children were more accurate than were younger children: the mean percentage accuracy for narrative details was 77.5%, 84.5%, 89.8%, 94.4%, and 95.2% for the 2- through 12–13-year-old groups, respectively, and the pattern across time is virtually identical to that depicted for completeness components in Fig. 5. (See Peterson, 2011, for differences between types of detail.) In other words, accuracy is decreasing in parallel ways regardless of whether one assesses prototype components or unique units of narrative detail. As well, the decrease in accuracy is relatively small, and at all ages, most of what children are reporting two years later is accurate.

In other research, Peterson et al. (2001) found that children mostly reported the same details when the consistency of their reports was assessed across four interviews occurring shortly after injury and after delays of 6 months, 1 year, and 2 years. However, if a new detail appeared in the last interview that had not been present earlier even though the children had had three earlier opportunities to provide it, accuracy was much lower.

Overall, then, it is too simplistic to state that children's reports get worse with time. Instead, the type of change depends upon what one is looking at. Children are getting better at providing narrative details over time, probably because their language skills such as vocabulary are improving, and their understanding of the interview process itself (such as interviewer expectations) is improving. In comparison, their correct recall of the major components of their injury experience remains unchanged, while their accuracy of recall is indeed getting worse. But the deterioration is relatively small. There are, however, other issues that should be considered.

Very young age at the time of event occurrence

One qualifier is very young age of the child, specifically, younger than age 2–2½ at the time of the event. Two reports compared memory reports of children who had been 1 versus 2 years of age at the time of their injuries, one spanning 2 years (Peterson & Rideout, 1998) and the other 5 years (Peterson & Parsons, 2005). For both, when children were interviewed later, there was a dramatic difference between children who had been 1 year of age at the time of injury and those who had been old enough to have been interviewed shortly after their injury (most 2-year-olds). In our data, this included children who were at least 26 months of age. All but one of these 2-year-olds recalled considerable correct information about their injury 5 years later, although recall was nonetheless notably poorer than that

of children who had been 3 or 4 years old at the time of injury. In comparison, few of the younger children recalled anything at all: 17 of the 27 children who were under 26 months of age at the time of injury recalled nothing and often even denied the event had occurred. This included one child who had been so distressed that he screamed hard enough to have ruptured blood vessels and showed signs of post-traumatic stress for several years after the event. Of the 10 children who reported some recall, probable intrusions were rife and the ratio of intrusions per correct information was .86 (i.e., almost one-to-one). Thus, recall of the former 1-year-olds after 5 years was usually an amalgamation of multiple events into a report that purported to be about a single target injury event, if they recalled anything at all. Such amalgamated reports would be problematic in a forensic arena. Only one of the former 1-year-olds had what we classified as 'good' recall, i.e., generated at least 10 correct units of information about the target event with little intrusion from other events. (Note that this summary differs from that presented in Peterson & Parsons, 2005: similar to the division used in Peterson & Rideout, 1998, children were divided into those who could be interviewed at the time of injury and thus could verbalize about the event which had occurred several days before versus those who were not able to be interviewed. For cleanliness of presentation, reviewers asked that the children be divided into 1- versus 2-year-olds in Peterson & Parsons, but here we revert to the former division. Thus, the two 25-month-olds have here been combined with the 1-year-olds.)

Effects of stress on children's reports

A perennial question for studies having relevance to forensic issues is the effect of children's emotional reactions to the events. Studies conducted with *adults* clearly show that high levels of distress significantly compromise accuracy of recall (see Deffenbacher, Bornstein, Penrod, & McGorty, 2004, for a meta-analytic review), but there is currently little clarity in the research exploring the effect of stress on children's recall (Peterson, 2010). One problem is definitional: how do different researchers define their high-stress groups? In some studies (e.g., Peters, 1997), the 'high stress' group is composed of children who look worried about an unexpected event and have elevated blood pressure and pulse rates. In contrast, our high stress group was composed of children who screamed in pain and were often described as hysterical by adult witnesses. According to Deffenbacher et al., one cannot put together the findings of studies that have such disparate classifications of what constitutes a 'high stress' response.

In the series of studies done in my lab, children have varied widely in their emotional reactions to their injuries. Some children have screamed hysterically whereas others have not cried at all. When interviewed, some children described highly emotional reactions to their injuries (e.g., "I was just screeching!" "I was very very crying!") whereas others did not (e.g., "It didn't hurt that bad." "I didn't even cry."). We capitalized on this wide variation in children's distress responses to explore the effect of stress on their memory reports.

A number of studies have reported analyses of stress effects on recall (e.g., Peterson, 2010; Peterson & Bell, 1996; Peterson & Biggs, 1998; Peterson & Warren, 2009; Peterson & Whalen, 2001). Earlier reports mostly evaluated stress effects on the completeness and accuracy (the latter determined by means of completeness coding), but the most recent report assessed stress effects on both completeness and amount of unique narrative detail, with accuracy assessed using the more fine-grained coding system, i.e., narrative detail (Peterson, 2010). That study reported data from initial as well as 1- and 2-year follow-up interviews. Across all studies we have conducted, the effect of stress was modest and depended upon which event (injury or hospital treatment) children were recalling, their age, interview delay, and how recall was coded.

Consider first children's injury event. *Adults* consistently show compromised accuracy when stress levels are high (see review in Deffenbacher et al., 2004), but for *children*, stress only compromised the accuracy of injury recall for 2–6-year-olds in their initial interview (Peterson, 2010). The accuracy of 2-year-olds' recall of narrative details deteriorated from approximately 95% to 80% when stress levels were classified as moderate or high, and decreases in accuracy diminished with increasing child age. However, for all ages there was no association between stress and accuracy in either follow-up interview. Nor was there any association between stress and accuracy in an initial or 5-year interview when accuracy was coded in terms of completeness components (Peterson & Whalen, 2001). In terms

of the completeness of children's recall of injury components, there was a small albeit statistically significant decrease in recall completeness as stress increased (74.0%, 73.3%, and 72.3% completeness for low, moderate, and high stress, respectively), but only in the initial interview, with no effects in later interviews (Peterson, 2010). In terms of the number of unique narrative details, stress had a different effect: there was no difference between children in the low or moderate distress groups, but highly distressed children provided more, not fewer, narrative details in both their initial and 1-year interview. The oldest children continued to provide more narrative details in their 2-year interview. Thus, in contrast to what was found for other aspects of the children's reports, high stress levels had a facilitative effect. However, highly distressed children also seem to provide less evaluative and affective context during their initial interview (Peterson & Biggs, 1998).

The findings were different for the hospital event, an event that shared many components with other hospital visits (e.g., for illness). For the most part, there were few associations between stress and recall. Neither accuracy nor number of narrative details were related to stress level in any of the children's three interviews, and the only significant effects were for completeness but only in the initial interview. Increased distress was related to less complete recall.

Overall, the effects of stress were modest at best. They were often not found, and with one exception they were found only in the children's initial interview with no residual effects in later interviews. Nor was there consistency in the direction of effects: although it compromised completeness of both events in the initial interview and the accuracy of preschooler's recall of injury details in their initial interview, it was also associated with more detailed accounts.

There is another issue to be considered: how distress coding is derived. In all of the research conducted in my lab, parental (or other adult eyewitness) ratings of child distress were elicited by means of a rating scale varying from not at all distressed to highly distressed. Since the events we studied were unanticipated real-world events, the use of adult eyewitness reports was the best and most practical option available for determining children's level of distress. However, in naturally occurring events such adult eyewitnesses are sometimes either not present or not willing to provide veridical accounts (e.g., in abuse cases). A recent study explored the possibility of using 2–13-year-old children's own reports of emotional reactions for determining stress levels (Peterson & Noel, in press). A simple coding scheme was derived: how much crying the children reported. Their descriptions of crying were rated on a 3-point scale from none to a lot. Although children's crying has frequently been used to assess the intensity of their distress and pain in medical events (e.g., Wilkie et al., 1990), this was the first report to directly compare the efficacy of self-reports of crying with parental stress ratings in a forensically-relevant context.

The association between parental distress rating and children's self-reports of crying was high for every age group, across both events. Furthermore, repeated measures ANOVAs with stress rating a repeated measure (child versus parent) showed that the rater was nonsignificant; nor were there any interactions between rater identity and either age or gender. Furthermore, in Peterson (2010), all analyses exploring the relation between child distress and memory were calculated using both parental distress ratings and child self-descriptions of crying, and the findings of both analyses were similar. Thus, children's self-descriptions of emotional reactions seem to be a viable alternative to adult rating scales for assessing children's distress when adult eyewitnesses are either absent or uncooperative. A second study described in Peterson and Noel (in press) compared 2–6-year-old children's self-descriptions of crying with a version of the Faces Pain Scale (Bieri, Reeve, Champion, Addicoat, et al., 1990). Children's self-descriptions of crying were a much better and more reliable measure of child distress than the Faces Pain Scale in that they were markedly more closely matched with adult ratings of child distress.

Thus, it appears that children's descriptions of crying might serve as a reliable measure of child distress when no cooperative observers are present. In the above studies, children were interviewed about naturally occurring injuries; such events are likely to share similarities with the sorts of events about which they testify in court, including stressful abusive events. Child distress is often considered by interviewers when judging the quality of children's reports in both forensic and clinical contexts (e.g., O'Kearney, Speyer, & Kenardy, 2007; Payne et al., 2006). Since researchers are limited in the amount of distress they can expose children to in the more controlled environment of the laboratory, these findings suggest that children themselves may provide a possible linguistic way of assessing their own levels of distress in naturalistic settings.

Timing of the initial interview

In all of the above studies, children had been initially interviewed within a few days of injury. But in forensic situations such timely initial interviews do not always occur. What happens if the initial interview is delayed? Tracy Tizzard-Drover and I explored this with children who had been 3–9 years old at the time of injury (Tizzard-Drover & Peterson, 2004). One group was interviewed for the first time a year after injury (although parents were interviewed immediately). A second group was interviewed twice: immediately and a year later. The third group was interviewed immediately and after 6 months and a year. Although there was no impact of either timing or frequency of interviews for the 5–9-year-olds, there was for the 3–4-year-olds. Preschoolers whose initial interview took place after a year had less complete and less accurate recall than did agemates with early interviews. Children who had had prior interviews also had more extensive free recall during their 1-year interview. These findings suggest that having a prior highly structured and organized early interview helped former 3–4-year-olds, although it had little effect on the memory reports of older children.

A year later the children who had been initially interviewed after a 1-year delay as well as those who had three prior interviews (immediately and after 6 and 12 months) were interviewed again 2 years after injury (Peterson et al., 2005). Surprisingly, there were no differences between the two groups in terms of completeness or accuracy of recall, contrasting with findings of Tizzard-Drover and Peterson (2004) in which preschoolers benefitted from having an early interview. This study suggests that it may not matter if that organized first interview takes place a full year later when the events are as salient as the children's injury events had been, consistent with research showing that the first interview need not be immediately after the target event for benefits to occur (McGuigan & Salmon, 2004). However, these events are public and widely discussed so formal interviews may have little additional benefit. But events that involve criminal sexual conduct are private and do not have this history of frequent discussion prior to an initial forensic interview, and for such events, the timing of interviews may be more important.

The lack of effects for interview history on children's recall of their injury was not replicated when they were asked to recall the hospital treatment event. For all of the age groups, having an early interview helped. Thus, an early extensive and organized interview helped children recall the harder-to-remember event, the one that was more confusing and had aspects that overlapped with different events. This suggests that early interviews may play a more important role when events are repetitive (such as repeated abuse) or otherwise less memorable than when they are as highly unique and salient as children's injury experiences had been.

Nature of the interview

A problematic issue for forensic interviewers is that young children typically provide little information in free recall or in response to open-ended questions (see review in Pipe, Thierry, & Lamb, 2006). Although children provide more information in response to focused prompts and closed question types such as yes/no questions, the quality of their responses is potentially problematic (Lamb, Orbach, Hershkowitz, Horowitz, & Abbott, 2007; Larsson & Lamb, 2009). For example, in our lab we documented response biases in response to yes/no questions (Peterson & Biggs, 1997; Peterson, Dowden, & Tobin, 1999; Peterson & Grant, 2001). Others have shown that focused questions are often suggestive or leading, and may encourage children to respond even when unsure (Lamb et al., 2007; Melnyk, Crossman, & Scullin, 2006). Thus, they increase the risk of error as well as interviewer contamination.

Recently we assessed one interviewing technique for maximizing the information children provide in open-ended recall, namely the Narrative Elaboration (NE) training technique (Saywitz & Snyder, 1996; Saywitz, Snyder, & Lamphear, 1996). This was the first study to use this procedure to assess children's memory for real life, emotionally charged events. Children between 3 and 7 years of age were interviewed using the NE procedure and compared with matched children who had been interviewed with the same standardized interview used in all prior research in my lab. The NE procedure involves pre-interview training of children to use cue cards that encourage them to provide information about participants, setting, actions, and dialog/thoughts/emotions. These cue cards have line drawings representing each category of information visually. Children are read a short book and then practice and

modeling are used to help them learn the meaning of the cards. Subsequently, the researcher placed all four cards in front of the children and asked for a free recall account of their injury. They were told they could use the NE cards to help them remember if they wished. After free recall, children were shown each card individually and asked: "What else does this card help you remember about when you got hurt?" Following this, children were questioned using our standardized interview. The control children had been given the same free recall prompts and same standardized interview.

Although children in both groups provided the same number of unique narrative details in free recall, NE children provided almost 15 additional narrative details after prompted to look at the cue cards, most of which were confirmed as correct. Thus, overall, children who were interviewed by means of the NE procedure provided considerably more information in open-ended recall than did control children (38.1 versus 17.5 narrative details, respectively). There is one other way in which the recall of NE and control children differed, namely narrative quality. Most research in this field has looked at the amount of unique information children provide in their interviews, and its accuracy. But there are a number of indicators of report quality that narrative researchers have often used (see Peterson & Roberts, 2003), including the length of children's open-ended reports, references to emotions and cognitions, descriptive details, use of evaluative linguistic devices, and various measures of coherence.

Importantly, children who had been interviewed via the NE technique provided longer, more emotionally evaluated, more descriptive, and more coherent open-ended recall than did control children. There were no differences between the two groups when just their initial free recall was compared; rather, these differences all appeared after children were shown the NE cue cards and asked if they had anything more to add. Thus, the use of the cue cards encouraged children to provide more elaborate and more coherent memory accounts prior to the beginning of more focused interview prompts. The NE cue cards not only inform children that the interviewer wants a detailed report, they also show them some of the sorts of information that the interviewer is interested in. That is, children are provided with substantial cues about the expectations of the interviewer. And the lengthier, more descriptive and more coherent accounts they produce are likely to be more credible in a forensic situation (Bala, Lee, & McNamara, 2001).

Parent conversational style

Over the past several years, a substantial body of work has shown that the way parents habitually talk with their children can influence their ability to remember the events of their lives (see review in Fivush, Haden, & Reese, 2006; for a review of the body of work done in my lab, see Peterson & McCabe, 2004). For example, the sorts of information that parents emphasize in parent–child talk about past events influences what sorts of information children include in the narratives they tell others about the events of their lives, such as contextual orientation to where and when events occurred (Peterson & McCabe, 1992, 1994 – see Peterson & McCabe, 2004, for other examples of how parent–child talk influences the content and even structure of children's reports). However, the aspect of parent–child memory talk that has received the most attention is called an elaborative style of memory-talk (Fivush et al., 2006; Nelson & Fivush, 2004). Some parents engage in memory-talk with their children that is elaborative and topic-extending. These parents encourage children to elaborate on what the parent or child previously said, and they provide additional elaborative information in their own conversational turns. They encourage and support their children's contributions and foster lengthier discussion of past events rather than curtailing such discussion. In contrast, other parents ask a few formulaic questions about an event and engage in little of this elaborative exchange. Considerable research has shown that these parental differences in their style of memory-talk are related to how much information children later provide in memory conversations (Fivush et al., 2006). However, all of this research had involved children's memory for everyday, non-stressful events.

Does the way parents habitually talk about past events with their children also influence children's recall of such highly salient and stressful events as personal injuries – events that are inherently highly memorable? To address this, Jessica Sales, Michelle Reese, Robyn Fivush and I asked parents of 2–5-year-olds to talk with their children about a stressful event (an injury requiring hospital treatment) as well as a fun, non-stressful event (Peterson et al., 2007). From these parent–child conversations

Table 1
Means for children of low versus high elaborators for the recall variables in the initial interview.

Type of data	Event	Low elaboration (S.D.)		High elaboration (S.D)	
Narrative Details	Injury	15.9	(7.9)	22.3	(9.3)
	Hospital*	9.9	(7.2)	21.0	(12.6)
Completeness	Injury	61.7%	(21.6)	72.6%	(15.4)
	Hospital*	42.5%	(26.7)	60.8%	(19.1)
Accuracy	Injury	89.6%	(9.8)	91.1%	(9.3)
	Hospital**	80.4%	(27.2)	90.2%	(11.6)

Note: From Peterson et al., 2007.
* $p < .05$.
** $p < .001$.

we were able to assess the degree of elaboration of parents' conversational style. Children were also interviewed by the researcher about their memory of both their injury and subsequent hospital treatment in that initial visit (prior to the parent–child conversation) as well as re-interviewed 2 years later.

Correlational analyses showed that parental conversational style made a difference in terms of the amount of unique narrative detail children provided, their account completeness, and accuracy of recall, for both the injury and hospital event with only one exception – accuracy of injury recall. (Maternal elaboration scores were entered as a continuous variable.) To illustrate the differences, Table 1 shows the means for all child recall measures when parents are divided into high-elaborators and low-elaborators by means of a median split. The correlational analyses for the 2-year follow-up also included children's recall scores during their initial interview. Both the children's age and their parents' score on the parental elaboration measure were consistently related to the recall measures. In addition, the children's earlier recall scores were related to their recall 2 years later. A series of hierarchical regression models showed that age predicted all three measures of recall quality, but parental elaborative style was also a significant predictor over and above age for all three recall measures for the harder-to-remember hospital event. In fact, parental elaboration was the most important predictor for children's accuracy of hospital recall. In addition, an age x elaboration interaction contributed to the completeness and accuracy of children's recall about the hospital event. Specifically, an elaborative parental conversational style facilitated recall accuracy for younger children and the recall completeness for all but 4-year-olds. In terms of children's recall in their 2-year interview, the only significant predictor for most measures was their prior recall. The fact that parental conversational style was predictive of recall in the initial interview but not in the later one suggests that a habitual elaborative style may help children create a more elaborated representation initially, which is demonstrated by their higher memory scores at the time of their initial interview. This more elaborated representation is then better recalled over time, which accounts for why parental elaborative style is correlated with better recall in both the initial and 2-year interview but no longer a predictor in the regression analyses at 2 years since the variance related to prior recollection had already been removed. Interestingly, a number of other variables were not correlated with the children's recall, including language skills as measured by the PPVT, temperament as assessed by the EAS scale, maternal or paternal education, or the number of siblings in the home (Peterson & Warren, 2009).

Summary

Children demonstrate excellent long-term recall for injuries requiring emergency room treatment. However, their recall of events with components that are repeated in other events as well as probably less coherently understood by the child (such as the details of what happened in the hospital) is not as good. There are also a range of factors that affect their recall. There was a sharp change in children's ability to recall events over long delays depending upon whether they were under or over approximately 2 years of age at the time of event occurrence, which concurs with other research on highly salient events (Terr, 1988). Children who experienced injuries when they were too young to be able

to be interviewed about them (and thus probably engage in conversation about the events with parents or others) mostly did not recall these events several years later, and if they did recall them, their recall was characterized by multiple intrusions from other similar events. There was no other sharp break in the quality of children's memory reports dependent upon child age, including within versus outside of the age typically identified as the period of partial childhood amnesia. However, their reports were influenced by other factors besides age, including stress (although the effects were quite modest) and parental styles of memory-talk with their children. Whether or not initial interviews took place immediately or a year later had little effect on the long-term memory reports of the children. As well, providing children with cues for elaboration (such as by using Narrative Elaboration cue cards) helped them provide more (and more coherent) information in response to open-ended questioning.

Conclusions and implications

In terms of forensic implications, the studies reviewed above clearly show that children can have excellent memory for highly salient events over long periods of time. This is not to say that they are not still vulnerable to suggestion, coercion, response manipulation through reinforcement, or other problematic effects (Lamb et al., 2007; Melnyk et al., 2006). Fundamentally, children should be interviewed carefully to minimize interviewer contamination. Nevertheless, they have surprisingly good memory skills and are able to recall highly salient and emotional events across a long time span. Their reports of the overall components of highly salient experiences such as injuries do not seem to deteriorate over time, and in general, their memory for such events remains detailed and mostly accurate, although there is some deterioration in accuracy. The fact that these conclusions hold not only for delays across 2 years but are also consistent with research spanning 5 years suggests that these memories of highly salient events can be well-retained for even longer periods of time.

Similar conclusions are suggested by the childhood amnesia studies cited above. Even when the memories come from the period identified as partial childhood amnesia, some memories are well-retained. More specifically, those memories that were coherent and emotional when they were first elicited as the children's very earliest memories are the ones most likely to continue to be recalled. This was even true when 4-year-olds were recalling memories that dated from when they had been only 2 years of age.

There is another forensically important point: The data showing that children provide more narrative detail across time when recalling highly salient injuries suggest that it is not reasonable to assume that if children add more information to an eyewitness report in a later interview, they are necessarily fabricating or misremembering. The addition of more information is normative. This has also been found when children were asked to talk about destructive hurricanes (Fivush et al., 2004; Sales et al., 2005). Children simply are not good at reporting everything they remember, but they increasingly learn the rules of the 'memory game' as they get older.

Let us return to the case cited earlier (England & Wales Re H 2005) in which the Court of Appeal stated that detailed long-term memories of events that happened when children were under 8 or 9 years of age were inherently unreliable because children should not be able to report detailed memories from such early events. The data presented here simply do not support this claim. According to our research on children's memory for injuries requiring hospital emergency room treatment, memories of injuries dating from when children had been less than approximately 2 years of age were found to be more problematic, according to the series of studies on children's memories of salient injuries. They were more likely to be either forgotten or contained lots of intrusions from other similar events. However, injuries that occurred when children had been 2 years of age were still retained quite well even 5 years later, although admittedly they were not recalled with the same elaborative detail or accuracy as events that occurred when children had been 3 or more years old. Memories dating from these latter ages were recalled very well over a considerable number of years.

When one looks at the research on childhood amnesia, similar conclusions can be reached. Although the majority of research shows that children indeed lose some memories from their preschool years (Cleveland & Reese, 2008; Fivush & Schwarzmueller, 1998; Van Abbema & Bauer, 2005), this is not an across-the-board phenomenon. It is important to emphasize that there are differences between memories in retention, depending upon such factors as the content, personal salience,

and coherence of the memory. As well, elaborative parent–child discussion of the events may help a young child develop a coherent memory of the event that improves its likelihood of retention, although other factors may also help children develop a coherent event memory, such as thinking about the event a lot (such as may occur with abuse events). Looking at children's memory for autobiographical events overall, some memories are lost but others are not. And those that are retained long-term are those that are likely to be personally meaningful, emotional, and coherent.

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