



## **Episodic and Script Memory in Children**

### **A Selected Bibliography**

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## **Scope**

This bibliography lists articles and chapters covering a variety of issues related to children's memory. All publications are English language. This bibliography is not comprehensive.

## **Organization**

Publications are in date descending order from 2015-1986 and alphabetically within each year. Links to publications are provided when possible.

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# Episodic and Script Memory in Children

## A Selected Bibliography

Roberts, K. P., Brubacher, S. P., Drohan-Jennings, D., Glisic, U., Powell, M. B., & Friedman, W. J. (2015). Developmental differences in the ability to provide temporal information about repeated events. *Applied Cognitive Psychology, 29*(3), 407-417.

Children (n = 372) aged 4–8 years participated in one or four occurrences of a similar event and were interviewed 1 week later. Compared with 85% of children who participated once, less than 25% with repeated experience gave the exact number of times they participated, although all knew they participated more than once. Children with repeated experience were asked additional temporal questions, and there were clear developmental differences. Older children were more able than younger children to judge relative order and temporal position of the four occurrences. They also demonstrated improved temporal memory for the first and last relative to the middle occurrences, while younger children did so only for the first. This is the first systematic demonstration of children's memory for temporal information after a repeated event. We discuss implications for theories of temporal memory development and the practical implications of asking children to provide temporal information. Copyright © 2015 John Wiley & Sons, Ltd.

Brubacher, S. P., & La Rooy, D. (2014). Witness recall across repeated interviews in a case of repeated abuse. *Child Abuse & Neglect, 38*(2), 202-211.

In this *illustrative* case study we examine the three forensic interviews of a girl who experienced repeated sexual abuse from ages 7 to 11. She disclosed the abuse after watching a serialized television show that contained a storyline similar to her own experience. This triggered an investigation that ended in successful prosecution of the offender. Because this case involved abuse that was repeated on a weekly basis for 4 years we thus investigated the degree to which the child's narrative reflected *specific episodes* or *generic accounts*, and both the interviewer's and child's attempts to elicit and provide, respectively, specific details across the 3 interviews collected in a 1 month period. Across the 3 interviews, the child's account was largely generic, yet on a number of occasions she provided details specific to individual incidents (*episodic leads*) that could have been probed further. As predicted: earlier interviews were characterized more by

episodic than generic prompts and the reverse was true for the third interview; the child often responded using the same style of language (episodic or generic) as the interviewer; and open questions yielded narrative information. We discuss the importance of adopting children's words to specify occurrences, and the potential benefits of permitting generic recall in investigative interviews on children's ability to provide episodic leads. Despite the fact that the testimony was characterized by generic information about what usually happened, rather than specific episodic details about individual occurrences, this case resulted in successful prosecution.

Brubacher, S. P., Powell, M. B., & Roberts, K. P. (2014). Recommendations for interviewing children about repeated experiences. *Psychology Public Policy and Law*, 20(3), 325-335.

For just over 2 decades, researchers have been conducting empirical studies devoted to understanding children's memory for, and ability to describe, individual occurrences of events they have experienced repeatedly. This knowledge is critical because children making allegations of repeated abuse are required to provide details particular to an individual incident in many jurisdictions internationally. Much of this work has thus far been conducted in rigorously controlled analog settings, and empirical study of their generalizability to the context of field interviews is urgently needed. We outline in detail the empirical and theoretical foundations that underlie a set of specific suggestions that practitioners might consider when assisting children to report as much information as possible about individual occurrences of repeated abuse. Our recommendations cover both presubstantive (i.e., "practice") and substantive phases of the interview. The particular challenges involved with describing individual incidents of repeated events are discussed, followed by evidence-based guidelines aimed at overcoming these difficulties. We highlight research that has included comparisons between lab and field data, and draw attention to areas of understanding that require further validation in forensic interviews. The inaugural guidelines we present are not meant as a replacement to existing best-practice interviews, but to serve as more detailed procedures in cases of repeated allegations. (PsycINFO Database Record (c) 2014 APA, all rights reserved)

Connolly, D. A., & Gordon, H. M. (2014). Can order of general and specific memory prompts help children to recall an instance of a repeated event that was different from the others?. *Psychology, Crime & Law*, 20(9), 852-864.

Does asking about the general event before asking about a specific instance help children to report details of a particular instance of a repeated event that was different from the others? Six- to eight-year-old children either experienced or heard stories about a magic show. An equal number of children had one, four, or six similar experiences. One week later, half of the children were asked to describe what *happens* during the magic shows and then what *happened* during the target experience and half were asked what *happened* followed by what *happens*. Following free recall, all children were asked cued recall questions about the target instance. Memory reports were more complete when the general prompt was administered first than when it was administered second. Implications for the forensic interviewing of children who allege repeated abuse are discussed.

Brubacher, S. P., Malloy, L. C., Lamb, M. E., & Roberts, K. P. (2013). How do interviewers and children discuss individual occurrences of alleged repeated abuse in forensic interviews?. *Applied Cognitive Psychology*, 27(4), 443-450.

Police interviews (n = 97) with 5- to 13-year-olds alleging multiple incidents of sexual abuse were examined to determine how interviewers elicited and children recounted specific instances of abuse. Coders assessed the labels for individual occurrences that arose in interviews, recording who generated them, how they were used and other devices to aid particularisation such as the use of episodic and generic language. Interviewers used significantly more temporal labels than did children. With age, children were more likely to generate labels themselves, and most children generated at least one label. In 66% of the cases, interviewers ignored or replaced children's labels, and when they did so, children reported proportionately fewer episodic details. Children were highly responsive to the interviewers' language style. Results indicate that appropriately trained interviewers can help children of all ages to provide the specific details often necessary to ensure successful prosecution. Copyright © 2013 John Wiley & Sons, Ltd.

Hershkowitz, I., Lamb, M. E., Katz, C., & Malloy, L. C. (2013). Does enhanced rapport-building alter the dynamics of investigative interviews with suspected victims of intra-familial abuse?. *Journal of Police and Criminal Psychology*, 30(1), 6-14.

Professional guidelines for forensic interviews of children emphasize cognitive factors associated with memory retrieval and pay less attention to emotional factors that may inhibit cooperativeness. Can an additional focus on rapport-building alter the dynamics of interviews with alleged victims of intra-familial abuse, who are often uncooperative? Transcripts of interviews with 199 suspected victims who made allegations when interviewed were coded to identify expressions of interviewer support and children's reluctance and uncooperativeness in the pre-substantive portions of the interviews. Half of the children were interviewed using a Protocol that emphasized enhanced rapport-building and non-suggestive support, the others using the standard NICHD Protocol. Although there were no group differences in the use of recall-based questions, interviews conducted using the rapport-focused Protocol contained more supportive comments and fewer unsupportive comments. Children interviewed in this way showed less reluctance and the level of reluctance was in turn associated with the number of forensically relevant details provided by the children. A focus on enhanced rapport-building thus altered interview dynamics without changing the appropriateness or forensic riskiness of the questions asked.

Scarf, D., Gross, J., Colombo, M., & Hayne, H. (2013). To have and to hold: Episodic memory in 3- and 4-year-old children. *Developmental Psychobiology*, 55(2), 125-132.

Episodic memory endows us with the ability to reflect on our past and plan for our future. Most theorists argue that episodic memory emerges during the preschool period and that its emergence might herald the end of childhood amnesia. Here, we show that both 3- and 4-year-old children form episodic memories, but that 3-year-old children fail to retain those memories following a delay (Experiments 1 and 2). In contrast, 4-year-old children retained episodic memories over delays of 24 hr (Experiment 1) and 1 week (Experiment 3). This marked change in the retention of episodic memories between 3 and 4 years of age suggests that it is our ability to retain, rather than to form, an episodic memory that limits our ability to recall episodes from early childhood.

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Brubacher, S. P., Roberts, K. P., & Powell, M. (2012). Retrieval of episodic versus generic information: Does the order of recall affect the amount and accuracy of details reported by children about repeated events?. *Developmental Psychology*, *48*(1), 111-122.

Children (N = 157) 4 to 8 years old participated 1 time (single) or 4 times (repeated) in an interactive event. Across each condition, half were questioned a week later about the only or a specific occurrence of the event (depth first) and then about what usually happens. Half were prompted in the reverse order (breadth first). Children with repeated experience who first were asked about what usually happens reported more event-related information overall than those asked about an occurrence first. All children used episodic language when describing an occurrence; however, children with repeated-event experience used episodic language less often when describing what usually happens than did those with a single experience. Accuracy rates did not differ between conditions. Implications for theories of repeated-event memory are discussed. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

Pyykkönen, P., & Järvikivi, J. (2012). Children and situation models of multiple events. *Developmental Psychology*, *48*(2), 521-529.

The present study demonstrates that children experience difficulties reaching the correct situation model of multiple events described in temporal sentences if the sentences encode language-external events in reverse chronological order. Importantly, the timing of the cue of how to organize these events is crucial: When temporal subordinate conjunctions (before/after) or converb constructions that carry information of how to organize the events were given sentence-medially, children experienced severe difficulties in arriving at the correct interpretation of event order. When this information was provided sentence-initially, children were better able to arrive at the correct situation model, even if it required them to decode the linguistic information reversely with respect to the actual language external events. This indicates that children even aged 8–12 still experience difficulties in arriving at the correct interpretation of the event structure, if the cue of how to order the events is not given immediately when they start building the representation of the situation. This suggests that children's difficulties in comprehending sequential temporal events are caused by their inability to revise the representation of the current event structure at the level of the situation model. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

Brubacher, S. P., Glisic, U., Roberts, K. P., & Powell, M. (2011). Children's ability to recall unique aspects of one occurrence of a repeated event. *Applied Cognitive Psychology*, 25(3), 351-358.

Preschool and school-age children's memory and source monitoring were investigated by questioning them about one occurrence of a repeated lab event ( $n = 39$ ). Each of the four occurrences had the same structure, but with varying alternatives for the specific activities and items presented. *Variable* details had a different alternative each time; *hi/lo* details presented the identical alternative three times and changed once. *New* details were present in one occurrence only and thus had no alternatives. Children more often confused *variable*, *lo* and *new* details across occurrences than *hi* details. The 4- to 5-year-old children were less accurate than 7- to 8-year-old children at attributing details to the correct occurrence when specifically asked. Younger children rarely recalled *new* details spontaneously, whereas 50% of the older children did and were above chance at attributing them to their correct occurrence. Results are discussed with reference to script theory, fuzzy-trace theory and the source-monitoring framework. Copyright © 2010 John Wiley & Sons, Ltd.

Brubacher, S. P., Roberts, K. P., & Powell, M. (2011). Effects of practicing episodic versus scripted recall on children's subsequent narratives of a repeated event. *Psychology, Public Policy, and Law*, 17(2), 286-314.

Children ( $N = 240$ ) ages 5 to 8 years participated in 1 or 4 activity sessions involving interactive tasks (e.g., completing a puzzle); children with single-event participation served as a control group. One week after their last/only session, all children were practiced in episodic recall of unrelated experiences by asking about either the (a) a single-experience event, (b) a specific instance of a repeated event, or (c) scripted recall of a series of events. Children were subsequently interviewed in an open-ended, nonsuggestive manner about 1 of the activity sessions; children with repeated experience were permitted to nominate the session they wanted to talk about. For children who participated 4 times, practice recalling a specific instance benefited 5- and 6-year-old children most; they reported more target details than other conditions and showed awareness of the repeated nature of the activity sessions. Accuracy levels were maintained regardless of practice type. Children with single-event experience were largely unaffected by manipulation of practice condition. Practical implications for interviews with child victim/witnesses and theoretical

implications on children's ability to recall specific incidents of repeated events are discussed. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

Feltis, B. B., Powell, M. B., & Roberts, K. P. (2011). The effect of event repetition on the production of story grammar in children's event narratives. *Child Abuse & Neglect, 35*(3), 180-187.

This study examined the effect of event repetition on the amount and nature of story-grammar produced by children when recalling the event. Children aged 4 years (N = 50) and 7 years (N = 56) participated in either 1 or 6 occurrences of a highly similar event where details varied across the occurrences. Half the children in each age and event group recalled the last/single occurrence 5–6 days later and the other half recalled the last/single occurrence after 5–6 weeks (the final and single occurrence was the same). Children's free recall responses were classified according to the number and proportion of story-grammar elements (Stein & Glenn, 1979—setting, initiating event, internal response, plan, attempt, direct consequence, and resolution) as well as the prevalence of causal links between the individual story-grammar elements. More story-grammar detail and more links between individual story-grammar elements were reported about the final compared to single occurrence. The amount of story-grammar increased with age and decreased over time. Further, an interaction was revealed such that the effect of retention interval on the production of story-grammar was negligible for older children who experienced the repeated event. Event repetition has a beneficial effect on the production of children's story-grammar content in situations where event details varied from occasion to occasion. This study highlights the importance of eliciting free recall when conducting evidential interviews with child witnesses about repeated events.

Ghetti, S., & Lee, J. (2011). Children's episodic memory. *Wiley Interdisciplinary Reviews: Cognitive Science, 2*(4), 365-373.

Episodic memory develops during childhood and adolescence. This trajectory depends on several underlying processes. In this article, we first discuss the development of the basic binding processes (e.g., the processes by which elements are bound together to form a memory episode) and control processes (e.g., reasoning and metamemory processes) involved in episodic

remembering. Then, we discuss the role of these processes in false-memory formation. In the subsequent sections, we examine the neural substrates of the development of episodic memory. Finally, we discuss atypical development of episodic memory. As we proceed through the article, we suggest potential avenues for future research.

Rhodes, S. M., Murphy, D., & Hancock, P. J. (2011). Developmental changes in the engagement of episodic retrieval processes and their relationship with working memory during the period of middle childhood. *British Journal of Developmental Psychology*, 29(4), 865-882.

We examined the development of children's engagement of the episodic retrieval processes of recollection and familiarity and their relationship with working memory (WM). Ninety-six children (24 in four groups aged 8, 9, 10, and 11 years) and 24 adults performed an episodic memory (EM) task involving old/new, remember/know (R/K), and source memory judgements and numerous WM tasks that assessed verbal and spatial components of WM and delayed short-term memory (STM). Developmental changes were observed in EM with younger children (8-, 9-, 10-year-olds) making fewer remember responses than 11-year-olds and adults while 11-year-olds did not differ from adults. Only children aged 10 years plus showed a relationship between EM and WM. EM was related to verbal executive WM in 10- and 11-year-old children suggesting that children at this stage use verbal strategies to aid EM. In contrast, EM was related to spatial executive WM in adults. The engagement of episodic retrieval processes appears to be selectively related to executive components of verbal and spatial WM, the pattern of which differs in children and adults.

Schneider, L., Price, H. L., Roberts, K. P., & Hedrick, A. M. (2011). Children's episodic and generic reports of alleged abuse. *Applied Cognitive Psychology*, 25(6), 862-870.

With the present data, we explored the relations between the language of interviewer questions, children's reports, and case and child characteristics in forensic interviews. Results clearly indicated that the type of questions posed by interviewers—either probing generic or episodic features of an event—was related to the specificity of information reported by children. Further, interviewers appeared to adjust their questioning strategies based on the frequency of the alleged

abuse. Children alleging single instances of abuse were asked more episodic questions than those alleging multiple abuses. In contrast, children alleging multiple incidents of abuse were asked a greater proportion of generic questions. Given that investigators often seek forensically relevant episodic information, it is recommended that training for investigators focus on recognition of prompt selection tendencies and developing strategies for posing non-suggestive, episodically focused questions. Copyright © 2010 John Wiley & Sons, Ltd.

Yang, T. X., Chan, R. C., & Shum, D. (2011). The development of prospective memory in typically developing children. *Neuropsychology*, 25(3), 342-352.

This study aimed to use specifically designed tasks to capture time-based, activity-based, and event-based prospective memory (PM) performance in typically developing school-age children. Method: Two PM tasks (Fishing Game & Happy Week) were used to examine the developmental patterns of PM in these children. Retrospective memory (RM) was also examined in these tasks. A total of 120 children aged between 7 and 12 years (10 girls and 10 boys in each age band) were recruited. Tests of working memory, inhibition, and IQ were also administered. Results: The age effect on PM accuracy was significant, with improvements identified between ages 7 to 8 and 10 to 11 years. For both tasks, performance on the time-based PM task was significantly poorer than that on the event-based PM task, which in turn was significantly poorer than that on the activity-based PM task. In terms of errors, results indicated that while errors associated with the PM component of the tasks decreased with age, errors associated with the RM component showed an inverted-U shape. The different patterns of errors suggest qualitative as well as quantitative differences in PM development in children. Finally, IQ, working memory, and inhibition were found to relate to PM when age was partialled out. Conclusions: Results of the study highlight the importance of contextual cues, such as activities and events, for prospective remembering in children. In addition, they have provided a general picture of PM development in school-age children and have implications for educators and parents. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

Czernochowski, D., Mecklinger, A., & Johansson, M. (2009). Age-related changes in the control of episodic retrieval: an ERP study of recognition memory in children and adults. *Developmental Science*, 12(6), 1026-1040.

We examined developmental aspects of the ability to monitor the temporal context of an item's previous occurrence while event-related potentials (ERPs) were recorded. In a continuous recognition task, children between 10 and 12 years and young adults watched a stream of pictures repeated with a lag of 10–15 intervening items and indicated recurrences. In a second run, these already familiar pictures were repeated as non-targets along with new pictures, while subjects were instructed to indicate only recurrences *within* the run. Young adults were able to maintain high performance levels in both tasks, whereas children had longer response times and committed a large number of false alarms to non-targets. ERPs in both age groups showed similar parietal old/new effects for target repetitions within runs. In addition, adults' ERPs showed similar old/new effects at frontal electrodes for repetitions and non-targets, presumably reflecting assessments of familiarity, whereas for children repeated relative to first presentations were associated with more negative-going waveforms at anterior frontal recording sites. Together, these results suggest a continuing maturation of the brain networks assessing novelty or familiarity. Recollection as indexed by parietal old/new effects appeared similar between young adults and children, but the development of controlled episodic retrieval, resulting in recollection of non-target information, appears to continue well into adolescence.

Guadagno, B. L., & Powell, M. B. (2009). A qualitative examination of police officers' questioning of children about repeated events. *Police Practice and Research: An International Journal*, 10(1), 61-73.

For an offender to be convicted in relation to repeated child abuse, most jurisdictions require that each separate act be identified with reasonable precision with reference to time, place, or some other unique contextual detail (*S v. R*, 1989). The current study provided a qualitative examination of the way in which police officers assist children to identify and distinguish between occurrences of a repeated event. Field, as well as mock interviews (about an innocuous staged event) were examined, with child witnesses' ages ranging from 3 to 16 years. Overall, several problems in the questioning were highlighted. These included: over-reliance on specific questions, use of 'labels'

for occurrences without inquiring as to whether these were unique, and frequent shifting of the focus between occurrences. The implications of these findings are discussed.

Odegard, T. N., Cooper, C. M., Lampinen, J. M., Reyna, V. F., & Brainerd, C. J. (2009). Children's eyewitness memory for multiple real-life events. *Child Development, 80*(6), 1877-1890.

Connolly, D. A., Price, H. L., Lavoie, J. A., & Gordon, H. M. (2008). Perceptions and predictors of children's credibility of a unique event and an instance of a repeated event. *Law and Human Behavior, 32*(1), 92-112.

Perceptions of children's credibility were studied in two experiments wherein participants watched a videotape of a 4- to 5- or a 6- to 7-year old child report details of a play session that had been experienced once (single-event) or was the last in a series of four similar play sessions (repeat-event). The child's report was classified as high or low accurate. In Experiments 1 and 2, reports of repeat-event children were judged to be less believable on several measures. In Experiment 1, younger children were viewed as less credible than older children. In both experiments, neither undergraduates nor community members correctly discriminated between high- and low-accurate reports. Content analysis in Study 3 revealed the relationship between age and event frequency and children's credibility ratings was mediated by the internal consistency of children's reports. Recent research on children's reports of instances of repeated events has identified several challenges facing children who report repeated abuse. These data bring to light another potential difficulty for these children. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

Stokes, D. J., Dritschel, B. H., & Bekerian, D. A. (2008). Semantic and episodic autobiographical memory recall for memories not directly associated with childhood sexual abuse. *Journal of Family Violence, 23*(6), 429-435.

A pattern of overgeneral autobiographical memory recall for memories not directly associated with the abuse has been found in previous research. However, studies with a non psychiatric population are limited. In a non psychiatric student population sample, this study will use two methods of

accessing autobiographical memory, The Children's Autobiographical Memory Inventory (CAMI) and the Autobiographical Memory Task (AMT). Contrary to the predictions, this study did not find that episodic recall to the AMT was less specific and episodic recall to the CAMI contained greater detail for both the abuse group and the trauma control group compared to a no trauma control group. Significant differences were found between groups on personal semantic recall with the CSA group reporting significantly lower semantic recall than the two control groups. These findings are relevant to therapeutic interventions as well as having potential implications for interviewing and obtaining statements to be used as evidence.

Hoerl, C. (2007). Episodic memory, autobiographical memory, narrative: On three key notions in current approaches to memory development. *Philosophical Psychology*, 20(5), 621-640.

According to recent social interactionist accounts in developmental psychology, a child's learning to talk about the past with others plays a key role in memory development. Most accounts of this kind are centered on the theoretical notion of autobiographical memory and assume that socio-communicative interaction with others is important, in particular, in explaining the emergence of memories that have a particular type of connection to the self. Most of these accounts also construe autobiographical memory as a species of episodic memory, but its episodic character, as such, is not typically seen as falling within the remit of an explanation in social interactionist terms. I explore the idea that socio-communicative interaction centered on talk about the past might also have an important role to play, quite independently of considerations about the involvement of the self in memory, in accounting for the emergence of memories that are episodic in character, i.e., memories that involve the recollection of particular past events. In doing so, I also try to shed light on a distinctive role that talk about the past plays in socio-communicative interaction.

Powell, M., Roberts, K., & Guadagno, B. (2007). Particularisation of child abuse offences: Common problems when questioning child witnesses. *Current Issues in Criminal Justice*, 19(1), 64-74.

Price, H. L., & Connolly, D. A. (2007). Anxious and nonanxious children's recall of a repeated or unique event. *Journal of Experimental Child Psychology*, 98(2), 94-112.

The current study examined 4- and 5-year-olds' memory for an event that was experienced once or was the first in a sequence of four similar events. The event was private swimming lessons for beginners that, because of natural variation in fear of water, were experienced as stressful for some children and not stressful for others. Consistent with much previous research, there was evidence that repeat-event children remembered less than did single-event children. There was some evidence for a beneficial influence of stress on resistance to suggestions. No other effects of stress were found in either the single- or repeat-event children. Implications for the debate on the influence of stress on memory and for children's testimony are discussed.

Connolly, D. A., & Price, H. L. (2006). Children's suggestibility for an instance of a repeated event versus a unique event: The effect of degree of association between variable details. *Journal of Experimental Child Psychology*, 93(3), 207-223.

Are children who experience an event repeatedly more suggestible about an instance of the event than children who experience it once? Researchers have answered this question both in the affirmative and in the negative. In this study, we hypothesized that the degree of association between details that changed across instantiations of the event would help to explain the discrepancy. Preschoolers (4- and 5-year-olds) and first graders (6- and 7-year-olds) participated in either a single play session or four repeated play sessions, each of which contained 16 critical details. Across play sessions in the repeat-event condition, half of the critical details were associated and half were not associated. During a biasing interview 2 weeks later, children were misinformed about half of the critical details. The next day, children answered free and cued recall questions about the target play session. Among older children, repeat-event participants were more suggestible than single-event participants, especially for high-association details. Among younger children, repeat-event participants were more suggestible than single-event participants for low-association details. Consistent with some current theories of children's memory, older children were more suggestible than younger children.

Isaac, C. L., Cushway, D., & Jones, G. V. (2006). Is posttraumatic stress disorder associated with specific deficits in episodic memory?. *Clinical psychology review, 26*(8), 939-955.

People with PTSD often report difficulties remembering day to day information unrelated to their traumatic episode. In addition, structural and functional imaging techniques have identified abnormalities in the brains of people with PTSD in regions known to be important for memory functioning. Nevertheless, studies investigating cognitive functioning in people with PTSD have reported widely varying results. The aim of this review is to investigate studies reporting performance on tests of episodic memory. Specifically, papers were examined in relation to the hypothesised memory functions of the frontal lobes, the hippocampus and the amygdala. It is concluded that while there is reasonable evidence of frontal lobe involvement, memory deficits caused by hippocampal involvement have been more difficult to detect. There are no published studies looking at the involvement of the amygdala although preliminary evidence suggests that people with PTSD do have memory deficits resulting from dysfunction of this structure. Reasons for the inconclusiveness of the results are discussed.

Melinder, A., Endestad, T. O. R., & Magnussen, S. (2006). Relations between episodic memory, suggestibility, theory of mind, and cognitive inhibition in the preschool child. *Scandinavian Journal of Psychology, 47*(6), 485-495.

The development of episodic memory, its relation to theory of mind (ToM), executive functions (e.g., cognitive inhibition), and to suggestibility was studied. Children (n= 115) between 3 and 6 years of age saw two versions of a video film and were tested for their memory of critical elements of the videos. Results indicated similar developmental trends for all memory measures, ToM, and inhibition, but ToM and inhibition were not associated with any memory measures. Correlations involving source memory was found in relation to specific questions, whereas inhibition and ToM were significantly correlated to resistance to suggestions. A regression analysis showed that age was the main contributor to resistance to suggestions, to correct source monitoring, and to correct responses to specific questions. Inhibition was also a significant main predictor of resistance to suggestive questions, whereas the relative contribution of ToM was wiped out when an extended model was tested.

Sluzenski, J., Newcombe, N., & Ottinger, W. (2004). Changes in reality monitoring and episodic memory in early childhood. *Developmental Science*, 7(2), 225-245.

The purposes of this research were to examine the developmental relation between reality monitoring and episodic memory, to link reality monitoring to autobiographical memory by using extended naturalistic events, and to examine prefrontal functioning as a potential contributor to development in reality monitoring and episodic memory. In Experiment 1, 4-year-olds were worse than 6- or 8-year-olds at reality monitoring after a week delay, despite the fact that they remembered more about real than imagined events and remembered different aspects of each. In Experiments 2 and 3, reality monitoring and episodic memory were evaluated for 4- and 6-year-olds immediately after the events occurred and, in Experiment 3, again after a week delay. Reality monitoring was at higher levels for both age groups, but age differences remained. These data suggest that preschoolers' difficulties with reality monitoring result from a combination of episodic memory deficits and strategic differences. In addition, correlation analyses more directly linked preschoolers' reality monitoring to episodic memory and supported the hypothesis that episodic memory development is related to prefrontal functioning.

Pearse, S. L., Powell, M. B., & Thomson, D. M. (2003). The effect of contextual cues on children's ability to remember an occurrence of a repeated event. *Legal and Criminological Psychology*, 8(1), 39-50.

This study examined the usefulness of contextual cues in enhancing the accuracy of children's narrative accounts of an occurrence of a repeated event. Children aged 6 to 7 years took part in the same staged event four times whereby 16 target details varied in each occurrence (e.g. the colour of a cloak varied each time). Three days later, the children's free recall of the final occurrence was elicited. This occurrence was identified in one of two ways. Either it was identified via the temporal term 'last', or else the term 'last' was combined with a feature related to the environmental context or setting that was unique to the occurrence (i.e., the interviewer referred to a new object that was worn throughout the occurrence or a new person who carried out the event). For each condition, performance was compared to that of children who experienced the event only once. Children's memory of details specific to the target occurrence was better after the single than the repeated event. However for both event types, children who were given the contextual and temporal cue

performed better than those who were given the temporal cue only. The benefit of using a contextual cue did not result in an increase in errors. Contextual cues (generated by an interviewer) can facilitate children's recall of an occurrence of an event. However, further research needs to determine whether this finding would generalize to a more practical situation where the child (rather than the interviewer) generates the cues.

Powell, M. B., & Thomson, D. M. (2003). Improving children's recall of an occurrence of a repeated event: is it a matter of helping them to generate options?. *Law and Human Behavior, 27*(4), 365-383.

Three experiments were conducted to explore whether children's recall of an occurrence of a repeated event could be improved by encouraging them to consider various details that occurred across a series of events prior to making a judgement about which details were included in the target (to-be-recalled) occurrence. Experiment 1 explored whether children's recall of the target occurrence was better after the interviewer presented all the items from the series prior to the child identifying the final item. Experiment 2 explored whether having the children generate all the items facilitated their subsequent recall of the target occurrence. Finally, Experiment 3 directly compared the effectiveness of the above 2 procedures. Regardless of the children's age, the retention interval, or the type of item, children's capacity to identify which details were included in a target occurrence was enhanced when they were initially provided with all the possible details from the series of events. However, without relying on the interviewer to generate the options, the benefit of the technique was directly contingent on the children's ability to generate content details; this was a distinct source of difficulty for the children... (PsycINFO Database Record (c) 2012 APA, all rights reserved)

Powell, M. B., Thomson, D. M., & Ceci, S. J. (2003). Children's memory of recurring events: Is the first event always the best remembered?. *Applied Cognitive Psychology, 17*(2), 127-146.

Three experiments were conducted to examine the effect of age (4–5 and 6–8 years) and retention interval on children's ability to remember separate occurrences of a repeated event that varied in terms of content (items, dialog, etc.) Experiment 1 explored children's ability to recall the first

versus last occurrence of a series of six events, at either one week or six weeks delay. Experiments 2 and 3 explored children's ability to identify the position of items in terms of their order of presentation within the series across two retention intervals. Overall, the results revealed clear age differences in children's performance. In general, the 6- to 8-year-old children performed better on all tasks than the 4- to 5-year-old children. Further, the older children showed relatively good memory of the first and last items compared to the middle items, although the last items were more likely to be forgotten or misplaced in the sequencing tasks over time than the first items. For the younger children, the patterns of results were sometimes but not always consistent with that of the older children. The relevance and generalisability of these findings to the legal setting are discussed as well as directions for future research. Copyright © 2002 John Wiley & Sons, Ltd.

Connolly, D. A., & Lindsay, D. S. (2001). The influence of suggestions on children's reports of a unique experience versus an instance of a repeated experience. *Applied Cognitive Psychology, 15*(2), 205-223.

In Experiment 1 we compared the influence of misleading suggestions on 4-, 6-, and 8-year-olds' reports of details of an instance of a repeated experience versus a unique experience. For children who experienced the event repeatedly, some components remained constant across instances (fixed) whereas others varied (variable). Relative to children who had experienced the event only once, those who had experienced it repeatedly were less affected by suggestions regarding fixed details and more affected by suggestions regarding variable details. In Experiment 2 a misinformation effect was observed in responses to questions about variable details but not in responses to questions about fixed details. Copyright © 2001 John Wiley & Sons, Ltd.

Roberts, K. P., & Powell, M. B. (2001). Describing individual incidents of sexual abuse: A review of research on the effects of multiple sources of information on children's reports. *Child Abuse & Neglect, 25*(12), 1643-1659.

For successful prosecution of child sexual abuse, children are often required to provide reports about individual, alleged incidents. Although verbally or mentally rehearsing memory of an incident can strengthen memories, children's report of individual incidents can also be contaminated when they experience other events related to the individual incidents (e.g., informal

interviews, dreams of the incident) and/or when they have similar, repeated experiences of an incident, as in cases of multiple abuse. Research is reviewed on the positive and negative effects of these related experiences on the length, accuracy, and structure of children's reports of a particular incident. Children's memories of a particular incident can be strengthened when exposed to information that does not contradict what they have experienced, thus promoting accurate recall and resistance to false, suggestive influences. When the encountered information differs from children's experiences of the target incident, however, children can become confused between their experiences—they may remember the content but not the source of their experiences. We discuss the implications of this research for interviewing children in sexual abuse investigations and provide a set of research-based recommendations for investigative interviewers.

Tulving, E. (2001). [Episodic memory and common sense: how far apart?](#) *Philosophical Transactions of the Royal Society B: Biological Sciences*, 356(1413), 1505-1515.

Research has revealed facts about human memory in general and episodic memory in particular that deviate from both common sense and previously accepted ideas. This paper discusses some of these deviations in light of the proceedings of The Royal Society's Discussion Meeting on episodic memory. Retrieval processes play a more critical role in memory than commonly assumed; people can remember events that never happened; and conscious thoughts about one's personal past can take two distinct forms—'autonoetic' remembering and 'noetic' knowing. The serial—dependent—-independent (SPI) model of the relations among episodic, semantic and perceptual memory systems accounts for a number of puzzling phenomena, such as some amnesic patients' preserved recognition memory and their ability to learn new semantic facts, and holds that episodic remembering of perceptual information can occur only by virtue of its mediation through semantic memory. Although common sense endows many animals with the ability to remember their past experiences, as yet there is no evidence that humanlike episodic memory—defined in terms of subjective time, self, and autonoetic awareness—is present in any other species.

Farrar, M. J., & Boyer-Pennington, M. E. (1999). Remembering specific episodes of a scripted event. *Journal of Experimental Child Psychology, 73*(4), 266-288.

Children's memory for a specific episode of a repeated event was investigated in 2 experiments. In Experiment 1, eighty 4- and 7-year-olds experienced a standard novel event 1, 2, or 4 times, followed by an episodic event for those children who had multiple standard event experiences. The episodic event involved the addition of both schema-typical and schema-atypical activities to the standard event. Following a 1-week delay, children were asked to recall both event types. Four-year-olds were more confused than older children regarding when the new activities had been experienced, although experience improved memory for the schema-atypical activities. In contrast, 7-year-olds were able to establish more accurate memories for both the schema-typical and the schema-atypical changes. Experiment 2 demonstrated that 4-year-olds could, however, establish distinct memories for both types of changes when the standard event was simplified. The results are discussed in terms of the development of the relation between script memory and memory for a specific instance of an event.

Powell, M. B., Roberts, K. P., Ceci, S. J., & Hembrooke, H. (1999). The effects of repeated experience on children's suggestibility. *Developmental Psychology, 35*(6), 1462-1477.

The effect of suggestive questions on 3- to 5-year old and 6- to 8-year old children's recall of the final occurrence of a repeated event was examined. The event included fixed (identical items) as well as variable items where a new instantiation represented the item in each occurrence of the series. Relative to reports of children who participated in a single occurrence, children's reports about fixed items of the repeated event were more accurate and less contaminated by false suggestions. For variable items, repeated experience led to a decline in memory of the specific occurrence; however, there was no increase in susceptibility to suggestions about details from nontarget occurrences. Although younger children and children who were interviewed a while after the event were more suggestible, respectively, than older children and those interviewed soon after the event, repeated experience attenuated these effects. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

Tulving, E., & Markowitsch, H. J. (1998). Episodic and declarative memory: Role of the hippocampus. *Hippocampus*, 8(3), 198-204.

The fact that medial temporal lobe structures, including the hippocampus, are critical for declarative memory is firmly established by now. The understanding of the role that these structures play in declarative memory, however, despite great efforts spent in the quest, has eluded investigators so far. Given the existing scenario, novel ideas that hold the promise of clarifying matters should be eagerly sought. One such idea was recently proposed by Vargha-Khadem and her colleagues (Science 1997; 277:376-380) on the basis of their study of three young people suffering from anterograde amnesia caused by early-onset hippocampal pathology. The idea is that the hippocampus is necessary for remembering ongoing life's experiences (episodic memory), but not necessary for the acquisition of factual knowledge (semantic memory). We discuss the reasons why this novel proposal makes good sense and why it and its ramifications should be vigorously pursued. We review and compare declarative and episodic theories of amnesia, and argue that the findings reported by Vargha-Khadem and her colleagues fit well into an episodic theory that retains components already publicized, and adds new ones suggested by the Vargha-Khadem et al. study. Existing components of this theory include the idea that acquisition of factual knowledge can occur independently of episodic memory, and the idea that in anterograde amnesia it is quite possible for episodic memory to be more severely impaired than semantic memory. We suggest a realignment of organization of memory such that declarative memory is defined in terms of features and properties that are common to both episodic and semantic memory. The organization of memory thus modified gives greater precision to the Vargha-Khadem et al. neuroanatomical model in which declarative memory depends on perihippocampal cortical regions but not on the hippocampus, whereas episodic memory, which is separate from declarative memory, depends on the hippocampus. (C) 1998 Wiley-Liss, Inc.

Fivush, R. (1997). Event memory in early childhood. In N. Cowan (Ed.), *The Development of Memory in Childhood* (pp. 139-161). New York: Psychology Press.

Connolly, D. A. (1996). A developmental evaluation of frequency memory for actions presented in lists, scripts, and stories. *Memory, 4*(3), 243-264.

In Experiment 1, adults estimated the frequency of typical and atypical actions presented in stories about scripted routines. Judgments of frequency were more accurate for atypical than for typical actions. In Experiments 2 and 3, children and adults estimated the frequency of atypical actions that were presented in lists, or embedded in stories that described activities that are scripted, or in stories that described unfamiliar activities. The results supported Hasher and Zacks's (1984) proposal that encoding of frequency information is automatic and invariant across a wide range of ages. However, both children's and adults' frequency estimates were influenced by manipulations that varied the difficulty of retrieving the representation of each occurrence of an event. The studies also provide novel support for the Script-Pointer-Plus-Tag theory of script memory.

Davidson, D., & Jergovic, D. (1996). Children's memory for atypical actions in script-based stories: An examination of the disruption effect. *Journal of Experimental Child Psychology, 61*(2), 134-152.

The disruption effect was examined in two recall experiments with 6- and 8-year-old children. The disruption effect refers to the finding that atypical actions that disrupt the goal or subgoals in a story are better recalled than atypical actions that are irrelevant to the goals. However, in the first recall experiment, vivid irrelevant actions were better recalled than disruptions that were obstacles (i.e., blocked or impeded the flow of the story's actions in some way), but were not better recalled than disruptions that were distractions, or unexpected mishaps. In order to examine why the disruption effect was found for distractions but not for obstacles several factors were considered, including type of disruption, typicality ratings, and the potential consequences that could be generated from the disruptions. The results of a second recall experiment suggest that disruptions that lead to more potential consequences, particularly more severe consequences, are better recalled than other disruptions. The results of these experiments provide evidence that the disruption effect is more complex than originally believed and may be dependent upon both the type of irrelevant and disruptive atypical actions present in a story.

Hudson, J. A., Fivush, R., & Kuebli, J. (1992). Scripts and episodes: The development of event memory. *Applied Cognitive Psychology*, 6(6), 483-505.

This article reviews recent research on how children organize general script knowledge and memories of specific episodes in memory. First, we discuss developmental issues concerning how children represent single episodes during the initial stages of script acquisition. Research indicates that even very young children quickly grasp the role of variation and invariance in recurring experiences. After only a few varying experiences, children come to expect more variation, but if the initial experiences are invariant they expect that all future occurrences will be the same. However, there are developmental differences in children's ability to 'sort out' a standard script from its variations if a single experience is different from all others during the initial four or five exposures with an event. In the second section we focus on how typical and atypical episodes are remembered after a script is established. Here, there are few developmental differences. Very young children up to adults are better able to recall deviation episodes than episodes that closely follow a script. However, cueing plays an important role in remembering both routine and deviation episodes. In the last section we discuss explanations for developmental differences in children's memory for specific episodes during the initial phases of script acquisition and suggest areas for future research.

Farrar, M. J., & Goodman, G. S. (1990). Developmental differences in the relation between scripts and episodic memory: Do they exist?. In R. Fivush, & J. Hudson (Eds.), *Knowing and remembering in young children. Emory symposia in cognition*, Vol. 3, (pp. 30-64). New York, NY, US: Cambridge University Press.

Myles-Worsley, M., Cromer, C. C., & Dodd, D. H. (1986). Children's preschool script reconstruction: Reliance on general knowledge as memory fades. *Developmental Psychology*, 22(1), 22-30.

Examined children's memory for preschool routines as a function of current grade level and successive modifications to the schoolday script. In Exp I, 50 preschoolers through 3rd graders who had attended the same preschool were tested with pictures for recognition of preschool script components (item memory) and memory for their sequence (order memory). In Exp II, 40 children in kindergarten through 3rd grade who had never attended preschool performed the same tasks.

For preschool attendees, an evolving general schoolday script biased memory away from atypical activities unique to preschool and toward typical activities common across most grades. A comparison of preschool attendees and nonattendees showed that over time, item memory depended progressively less on experience-based or episodic memory and progressively more on general knowledge or semantic memory. Order memory was more experience-based and more durable than item memory over the 5-yr period. Results suggest that as memory fades, children reconstruct an old script by integrating remembered information with their growing general knowledge of similar events. (19 ref) (PsycINFO Database Record (c) 2012 APA, all rights reserved)