RUNNING HEAD: Children's ability to recall unique aspects

Children's ability to recall unique aspects of one occurrence of a repeated event

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Abstract

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-oldchildren 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.

Research Article

In many cases of child sexual abuse, the victims' memories and accounts of the alleged abuse are of primary importance in order for prosecution to proceed properly. In recent years there has been increasing focus on understanding children's memory representations of repeated events (e.g., Powell, Roberts, Thomson & Ceci, 2007; Price, Connolly & Gordon, 2006; Roberts & Powell, 2006). As many victims of child abuse often experience the abuse on multiple occasions (e.g., see Lamb, Sternberg, Esplin, Hershkowitz, Orbach & Hovav, 1997), it is especially relevant to characterize how these experiences are represented from both a practical and theoretical standpoint (see Roberts, 2002; Roberts & Powell, 2001, for reviews).

Many jurisdictions require that child witnesses are able to particularize; that is, to describe one instance with a reasonable degree of precision and to contextualize that instance with respect to time and place (Guadagno, Powell & Wright, 2006; *R. v B. (G.)*, 1990; Roberts, 2002; *S v. R*, 1989). Identifying and distinguishing a specific occurrence of a repeated event is an extremely daunting and difficult task for most children (Connolly & Lindsay, 2001; Hudson, 1990; Powell, Roberts, Ceci & Hembrooke, 1999; Powell & Thomson, 1996).

The purpose of this study was to examine whether pre-school and school-age children can notice and make use of distinctive information contained within a set of similar, repeated events to distinguish among them, and whether these abilities vary developmentally. This is the first study to examine children's memories of details (actions or objects) that are present in only one of four event occurrences and are thus not part of the general event script ('*new*' details[1]: for example, on the third day *only*, children do a warm-up activity). This type of event detail is different from typical/atypical or episodic deviations present in previous research (e.g., Farrar & Boyer-Pennington, 1999; Farrar & Goodman, 1992). While prior experiments have included new/deviation details in a final target occurrence that were not previously presented in earlier 'standard' visits, in the current research *new* details were present in any one of the repeated occurrences, not just at a final deviation visit. Other research has included some degree of variation in every occurrence (e.g., Kuebli & Fivush, 1994; Powell & Thomson, 1996; Powell et al., 1999) but in these studies, every instance of variation still includes a 'slot' in the script. For example, Kuebli and Fivush (1994) had children make the same crafts on four occasions; the same nine steps were executed every time, but sometimes the specific item (e.g., the object used to create the bird's beak) or the specific action (e.g., how the pipecleaner tail was fastened) was changed. In contrast, the *new* details in the current research do not have 'slots' within the event script, but they are still plausible within the context of the event, such as getting warmed up only in occurrence three. These *new* details allow us to determine how children characterize completely unique event features within the context of a series of similar events. Children may recognize the *new* detail as a distinguishing feature of the occurrence, and as such they may be better able to separate memories for these occurrences from other similar occurrences, resulting in more informed source decisions at retrieval (Johnson, Hashtroudi, & Lindsay, 1993).

Further, this is the first study to examine children's repeated-event memory using an optimal interview procedure where the child is given the freedom to report the occurrence *they remember best*, unlike previous research where children are oriented to a pre-determined occurrence, typically the last one (e.g., Connolly & Lindsay, 2001; Farrar & Goodman, 1992; Powell et al., 1999). This procedure avoids constraining a child to discuss the occurrence that the experimenters have chosen, and allows for clear and unabridged insight into what details were especially salient to the child. Such a procedure is especially beneficial for the current experiment because we are exploring a detail-type that has not previously been considered in repeated-event research and thus do not want to place restrictions on what is reported.

Children's Memories of Repeated Experiences

Memory for *fixed* items across multiple experiences (i.e., details that are exactly the same during each occurrence) is strong and accurate in children and adults, as compared to recall of a single experience (Connolly & Lindsay, 2001; Hudson, 1990). Even very young children (i.e., 4-5 years) can be as accurate as older children (7-8 years; Powell et al., 1999). In contrast, when examining *variable* items (i.e., details that are repeated each time, such as always playing a counting game, but with different *instantiations*, such as counting frogs in Occurrence 1, counting cars in Occurrence 2, etc.), recall of a specific occurrence tends to be filled with intrusions of instantiations from the other occurrences. These are referred to as ‘internal intrusion errors’, and are the most common type of errors found in children’s recall of repeated events (Powell et al., 1999; Powell & Thomson, 1996). For example, Powell and colleagues found that 3-5 (Powell et al., 1999) and 4-5 year olds (Powell & Thomson, 1996) made a similar number of internal intrusions as older children (6- to 8-years old) when asked specific questions about items.

In one of the earliest experiments on repeated-event memory, a distinctive memory pattern was found for a third type of item (Powell & Thomson, 1996). Specifically, *hi/lo* items had two different instantiations; one was presented twice as often as the other across the series (e.g., a highlighter pen was used in four occurrences [high frequency]; a pencil in the other two [low frequency]). All of the errors made by the children who participated in the repeated event were internal intrusion errors, primarily because children recalled the *hi* instantiations more readily than the *lo* instantiations, and so were less likely to attribute the *lo* instantiations to the correct occurrence. Older children (6- to 8- year olds) made more of these errors in free recall than did younger children (4- to 5- year olds) because they reported far more *lo* instantiations. Thus, while the older children still confused details across occurrences, they were more likely to spontaneously report deviations than were the younger children.

In summary, details that are presented in the same way each time are well-remembered and accessible (i.e., *fixed* items, and the *hi* frequency instantiation of *hi/lo* items). Details that have several alternatives across sessions are easily confused (*variable* items), and variations (i.e., the *lo* frequency instantiation of *hi/lo* items) are rarely reported when a higher frequency item is available.

Children’s Memories for Distinctive Information

Although low frequency details (*variable* and *lo*) are less accurately reported than *fixed* and *hi* details, these findings do not address the question of whether truly unique items (i.e., those that occur only once in any format across the entire series of events) are distinctive, and encoded as such. Objects or actions that occur in just one occurrence may be more memorable than other detail-types that always occur in some format (even if the exact instantiations differ). Conversely, they may be less often reported, especially by younger children (4- to 5- year olds), because they are arbitrary to the event sequence; that is, since each new item only occurs one time across the four event occurrences, they cannot be logically related to other items within each event. Research has demonstrated that 3- and 5-year old children report less information from arbitrarily connected versus logically connected events, even with repeated experience (Fivush, Kuebli & Clubb, 1992).

While *new* details have not been previously examined, three theoretical models motivated our predictions concerning children's reporting of this detail-type: script theories (e.g., Farrar & Goodman, 1992; Hudson, Fivush & Kuebli, 1992; Hudson & Nelson, 1986), Fuzzy-Trace theory (e.g., Brainerd & Reyna, 1990) and the Source-Monitoring Framework (e.g., Johnson et al., 1993). Script theories suggest that after a certain amount of experience with an event, people form a general representation of what details are usually present, and also are able to note deviations that are not typical of the event script. One such theory, the Schema Confirmation-Deployment Model (Farrar & Goodman, 1992) suggests that this process requires more experiences for 4-year old than 7-year old children and adults because younger children take longer to confirm which objects and actions are relevant for the script. Thus, high frequency details (*hi*) can be confirmed quickly because they are always presented in the same way, while low frequency (*variable* and *lo*) details pose more of a challenge for preschool children because these details are absorbed into the general script representation, or are not encoded, during the confirmation phase. Even though children as young as 30-months old have been able to generalize actions by a third experience (Bauer & Fivush, 1992), older children and adults progress through this 'script confirmation' phase more quickly and are thus able to enter into 'deployment' sooner (i.e., notice event deviations, such as *variable* or *lo,* or completely *new* details, and modify the original script). According to the 'script pointer + tag hypothesis', *new* details do not match existing patterns within the confirmed script and may be useful as 'tags' (e.g., "the time she gave us leaf badges to wear"), which are tied directly to the memory trace and thus, easier to recall (Graesser, Gordon & Sawyer, 1979).

Fuzzy-trace theory posits that for any experience, verbatim and gist traces are encoded simultaneously and in parallel. Verbatim traces refer to the exact surface details of an event (e.g., "I wore a leaf badge and the leader wore a blue cloak"), and include source information (e.g., "on the last day"). Gist traces refer to the overall meaning or structure of the experience (e.g., "we listen to stories and the leader wears a cloak"). Pre-schoolers take longer than school-aged children to form a gist representation and their verbatim traces decay more rapidly (Brainerd & Reyna, 1990, 1998, 2004). This combination of weakened verbatim traces *and* a weak gist to assist in event reconstruction make it especially difficult for young children to accurately describe a single occurrence of a repeated event. Event repetition strengthens the verbatim traces for details that are always or often the same (e.g., *fixed, hi*), and in contrast, strengthens the gist traces of items that have varying alternatives (e.g., "there was always a badge") but not the alternatives of those items (e.g., "it was a *jellybean* badge"; Roberts & Powell, 2006). Since *new* items have no alternatives, both verbatim and gist traces will be weak, so these details should be infrequently reported. Older children's verbatim traces decay more slowly than do younger children's, however, so older children should have a better memory for *new* details.

The Source-Monitoring Framework asserts that source is attributed at retrieval through a decision-making process about the qualitative properties of memories (e.g., "I remember the blue cloak the best, so it was probably on the last day"). Children are capable of remembering the content details of repeated events; for example, that a story was read each time, and the stories were about a boat, a birthday party, a mouse and a dog, but the problem lies in their ability to accurately tag the specific detail to the correct occurrence in a series of events (Powell & Thomson, 1996; Powell et al., 1999). These errors may also be referred to as 'source-monitoring errors,' or 'source confusions' which are akin to internal intrusions.

The repeated-event nature of the current paradigm promotes developmental differences in source-monitoring ability because the occurrences are highly similar, and younger children (4- to

5- years old) are especially vulnerable to the effects of similarity (Johnson et al, 1993; Lindsay et al, 1991; Roberts & Blades, 1999). Details presented at higher frequencies (e.g., *hi*) will be more frequently recalled and, as they are present in more than one occurrence, source decisions are less necessary. Thus, age differences would not be expected for *hi* details. In contrast, infrequent details such as *lo* and *variable* instantiations would require source decisions and so it is expected that 7- to 8- year old children will outperform 4- to 5- year old children at attributing these detail-types to the correct occurrence. Age differences can also be expected with respect to *new* instantiations. The source-monitoring framework posits that distinctive information may be encoded differently than mundane information. Specifically, more cognitive operations such as organization and elaboration should take place when distinctive information is encountered (Johnson et al., 1993). These elaborations promote the binding of event features, such as activities and objects, so that more informed source decisions can be made concerning which details were present in a given occurrence (see Shimamura, 1995 for a review). Thus, at least for older children, correct source attribution for this detail-type should be better than for *variable* and *lo*, because they are not a variation of a previously presented item, as are the other types.

In summary, all three theories suggest that *hi* instantiations will be retrieved the most often, and will be the most accurately attributed of all detail types; these effects will not vary developmentally. Similarly, all predict that *variable* instantiations will be reported, but confused across occurrences, that *lo* instantiations will be rarely reported, and that there will be age differences favouring older children in accurate source attribution of *variable* and *lo* instantiations. Regarding *new* details, script theory and the source-monitoring framework predict that these details will stand out and be bound with its occurrence whereas new details are likely to be simply forgotten according to fuzzy-trace theory. All three theories predict that younger children will be significantly less likely to report new details than older children.

Method

Design & Participants

The mixed design was a 2(age: 4-5- years vs. 7-8- years) x 4(item frequency type: *hi*, *lo*, *variable*, *new)* with the last factor within-subjects. Originally, 57 children were recruited to take part in the present study. Eighteen children were excluded; 6 missed either an event or interview session, 9 were lost due to parental constraints and/or cancellations, and data from 3 children were discarded because the interviewer did not ask open-ended questions in recall. These age groups were chosen to ease comparisons with previous literature and to show developmental differences across a period of significant growth in source-monitoring skills (Roberts, 2002).

The final sample consisted of 39 children (21 males, 18 females); 18 4- to 5-year-old children with a mean age of 62.15 months (*SD* = 6.62, range 49.87–71.50 months), and 21 7- to 8-year-old children with a mean age of 95.58 months (*SD* = 7.04, range 84.67–107.40 months). The sample was predominantly middle-income and Caucasian. Children were recruited through a local daycare and through a database of local parents who had expressed interest in developmental research. Parents and teachers were instructed not to discuss the activities with the children, or to inform them that they would be interviewed about their memories. Children were assigned randomly to two counterbalanced item sets, under the constraint that age and gender be equated across the sets. Parents of children recruited through the database were compensated $10 for their time and travel expenses, and the children received a small toy after each session. The daycare received a donation of $5 for each child that participated.

Materials

Materials were based on previous research on children's memories for repeated events (Powell et al., 1999; Powell & Thomson, 1996; Powell & Thomson, 2003). As with the previous research, in order to control for item effects, two sets of counterbalanced items (Group 1 and Group 2) were created for the study. That is, *variable* items in Group 1 were reassigned to serve as *hi/lo* and *new* in Group 2, and so on. The two groups did not differ significantly in the amount of information reported, or on any accuracy measures, *t*s < 1, *p*s = *ns,* and are collapsed in all analyses.

Each occurrence consisted of 14 target items with different frequencies: *variable* (6 items, e.g., the content of the story differed every time), *hi*/*lo* (6 items, e.g., children received hand sanitizer to get refreshed in three of the four occurrences and a fan in the remaining occurrence; each occurrence thus contained 1-2 *lo* instantiations). Each of the *new* details (8 in total) only appeared once throughout the series, and each occurrence included two distinct *new* objects or actions. For example, in Occurrence 1 of Group 2 (refer to Appendix A), children were introduced to ‘Pop the Fox’ (first *new* detail of the occurrence) and also a ‘noisy walrus’ (second *new* detail). Neither the fox nor the walrus were ever present in any of the other occurrences.

Procedure

The event. The event, always referred to in plural as the ‘[name of university] Activities,’ was carried out four times over a two week period by a trained research assistant (RA) with groups of one to five children. The events took roughly 20 min and were scheduled at approximately the same time of day with two occurrences per week. Two RAs were responsible for conducting the events, and each ran approximately half of the children. The event included a number of different activities. In every occurrence, the leader would tell the children that they were participating in the ‘[name of university] Activities’, and put up a poster of the relevant upper-case letter for the university. After this beginning phase, the remaining activities took place. Activities that occurred every time include: the leader putting on a cloak, then reading a story using a bookmark and completing a puzzle with the children. Then the children got refreshed, made a picture with magnets, and played a counting game. For a full list of activities and objects in each occurrence, see Appendix A. Note that the list is organised by detail-type; the numbers represent the temporal order of the activities.

The interview. Five to seven days after the last occurrence of the Activities, children individually participated in an interview, which lasted 20 to 30 min, and occurred in a different room than the Activities, with a different RA. The children were first asked to talk about themselves, in order to build rapport with the interviewer. The interviewer then explained she was naive about the event (e.g., “I wasn’t there when you did the ‘[name of university] Activities’, but I’d really like to know what happened”). Once the child mentioned any information about the Activities (all did), they were immediately asked whether the activities happened one time or more than one time. Subsequently, the children were asked to talk about “the time they remembered best”, and the interviewers used open ended prompts such as “tell me more”, “what else happened,” and “what happened next/after that.” Details freely recalled by children about this target occurrence were tallied and used in analyses.

In past research interviewers have asked about a specific target occurrence, using temporal labels, such as ‘the last time’ (Farrar & Goodman, 1992), or contextual labels such as ‘the time you wore the badge’ (Powell & Thomson, 2003). This procedure restricts the child to describing the occurrence that the interviewer has chosen, which may not be the one that the child is most capable of talking about. In the present study, then, labels for the occurrence being discussed were chosen by either the child or the interviewer. If the child used a clear and distinctive label that was unique to the occurrence (e.g., “I remember the *last time*” or “I remember the *time with the yellow cloak*”), then this label was used in the remainder of the questioning. If the child did not identify a clear label, the interviewers were instructed to use something the child said (which was unique to an occurrence) or temporal labels such as ‘the first time’.

In order to help with labelling the occurrence, the interviewers in this study were not completely blind; they knew which instantiations were distinctive to every occurrence, and were aware which labels were appropriate in order to make the coding for accuracy possible. If the child did not come up with a discriminatory label on their own, the interviewers were instructed to use a distinctive instantiation mentioned by the child as the label. For instance, in Group 2, Occurrence 1 (refer to Appendix A), some distinctive instantiations were: the walrus (*new*), the yellow cloak (*variable*), or the fans for getting refreshed (*lo*) as they only happened in the first occurrence.

When the child's free narrative was exhausted, 20 specific questions were asked, one for each target item presented in Appendix A (e.g., what did you sit on the time [child's label]; what was the story about the time [child's label]). The questions pertained to the child-nominated occurrence, were asked in random order, and the child was not asked about an item if that item was used as their label. For instance, for a child who was asked to recall 'the time you sat on garbage bags', the question 'What did you sit on?' was omitted.

Coding

Interviews were audio-taped, videotaped and transcribed verbatim for coding purposes. Each of the items (e.g., "she read us a story") as well as the instantiations of those items (e.g., boat story, or party story) that the child mentioned in Free Recall of their nominated occurrence was noted, along with the frequency type (*hi, lo, variable, or new*), as well as which occurrence(s) the instantiations occurred in (1, 2, 3, or 4). There were three categories for coding responses: (i) an instantiation was coded as an *accurate* attribution if it was present in the target occurrence; (ii) an instantiation was coded as an *internal intrusion* error if it had been present in one of the three non-target occurrences; (iii) any reference to an item/activity/object that was not present in any of the occurrences was coded as an *external intrusion* error (these were extremely rare, however, and are not considered further); (iv) Specific Questions only: in addition to the above categories, 'don't know' and 'other' (e.g., when the child provided an answer that was semantically unrelated to the question) were created. Eight specific questions probed all eight *new* items presented across the series regardless of which session children elected to talk about. Thus, for six of those questions, the correct response would be that the instantiation did not occur in the particular session.

Proportional accuracy scores were computed by dividing the total number of accurate attributions of each detail type (*hi/lo*, etc.) by the total number of instantiations of that type mentioned (recall) or asked about (specific questions). For example, a child who recalled four *variable* instantiations, three of which actually happened in the target occurrence, would have a proportion accuracy attribution score of .75 for *variable* instantiations in free recall. Proportional scores for internal intrusions, external intrusions, don’t know, and other responses were similarly calculated.

Results

Recall Data

We first examined which occurrences children nominated to describe. The two age groups differed in their pattern of choices. Younger children chose the last occurrence most often (*n* = 9, 50%), followed by the first (*n* = 6, 33%), second (*n* = 2, 11%) and third (*n* = 1, 6%). Older children, in contrast, were roughly equivalent in their choice to describe the first (*n* = 7, 33%), third (*n* = 7, 33%) and last occurrences (*n* = 6, 29%), and only one elected to describe the second (*n* = 1, 5%).

The recall portion of the interview could not be analyzed using a mixed-measures analysis of variance (ANOVA), as the children rarely spontaneously mentioned all of the item types in their recall. Table 1 presents the mean proportion of accurate attributions by detail-type for the younger and older groups. The table includes the number of children who mentioned each detail, as well as the results of one-sample *t*-tests assessing whether the children’s attributions were different from chance. In summary, few younger children mentioned *new* details (*n* = 3) or *lo* (*n* = 7) instantiations spontaneously, and none were accurately attributed. Ten younger children mentioned *variable* instantiations, but their source score was no different to chance (chance = 25% because *variable* instantiations were present in 1 of 4 occurrences). Source attribution of *hi* instantiations was better; 14 mentioned them, and were above chance (chance = 75% because *hi* instantiations were present in three of four event sessions) in attributing them to the correct source. Approximately half (*n* = 11) of the older children mentioned *new* items and were accurate at attributing them correctly to their nominated occurrence almost three-quarters of the time. Children in the older age group generally mentioned more instantiations than the younger age group. Their accuracy at attributing instantiations to the correct occurrence was above chance only for *new* and *hi* instantiations.

Specific Questions

Each type of response (accurate source attribution, internal intrusion, don't know) was analysed using the proportional scores in 2(age: 4-5- years vs. 7-8- years) x 4 (item frequency type: *hi* vs. *lo* vs. *variable* vs. *new)* mixed ANOVAs. Alpha was set at .05. Six follow-up paired-samples *t*-tests (i.e., all possible comparisons of item frequency types) were conducted to compare proportion accurate source attributions across item frequency. Alpha was corrected for multiple comparisons (.05/6 tests) and was set at .008.

Accurate source attributions. As was predicted, the between-subjects effect of age was significant, $F(1, 37) = 30.96$, $\eta_p^2 = .47$, $p < .001$; older children were more accurate ($M = .50$, $SD = .12$), than younger children ($M = .29$, $SD = .12$). There was a main effect of item frequency type, $F(3, 35) = 61.82$, $\eta_p^2 = .63$, $p < .001$. Children were more likely to attribute the correct *hi* instantiation to its occurrence than *new, variable* and *lo* instantiations as was originally predicted. The analysis also revealed that *new* instantiations were accurately attributed to the target occurrence (or correctly rejected) more often than were *lo* instantiations. No other significant within-subjects effects were found at a corrected alpha level of .008. The interaction was not significant, $F(3, 35) = .731$, $\eta_p^2 < .02$, $p = ns$. See Table 2 for means and *t*-tests.

Internal intrusions. Because of the opportunity to provide 'don't know' and 'other' responses to specific questions, proportion inaccurate is not the exact opposite of proportion accurate, and so internal intrusions (source confusions) were analysed. The test of sphericity was significant, and a Greenhouse-Geisser correction was applied. The main effect of age on proportions of internal intrusion errors was not significant, $F(1, 37) < 1$, $\eta_p^2 < .01$, $p = ns$. An effect of item frequency type was found, $F(1.87, 35) = 28.30$, $\eta_p^2 = .43$, $p < .001$. Children made more internal intrusion errors in recall of *lo* and *variable* instantiations than *new* and *hi* instantiations. It was also found that children misattributed *hi* frequency instantiations less often to the target occurrence than *new* details. The interaction between age and item frequency type did not reach significance, $F(1.87, 35) = .36$, $\eta_p^2 < .01$, $p = ns$. See Table 2 for means and *t*-tests.

'Don't know' responses. Although we did not make predictions regarding 'don't know' responses, 87% of children made at least one 'don't know' response to the 20 specific questions.

The effect of age was significant, $F(1, 37) = 11.33$, $\eta_p^2 = .23$, $p = .002$. The younger children ($M = .25$, $SD = .16$) were significantly more likely to respond ‘don’t know’ than were older children ($M = .08$, $SD = .16$). The effect of item frequency type was also significant, $F(3, 35) = 5.86$, $\eta_p^2 = .14$, $p = .001$. Children were significantly more likely to give a ‘don’t know’ response to questions about *new* and *variable* instantiations than *hi* instantiations. No other within-subjects effects were found. The interaction between age and item frequency type was not significant, $F(3, 35) = .46$, $\eta_p^2 < .02$, $p = ns$. See Table 2 for means and *t*-tests.

Discussion

Past research has indicated that children often have difficulties isolating one episode of a repeated event (Connolly & Lindsay, 2001; Hudson, 1990; Powell et al., 1999; Powell & Thomson, 1996). Although there is a large amount of empirical data showing that repetition affects memory, we do not yet fully understand how children represent events that vary slightly each time, as is more typical of everyday events. We investigated whether details *unique* to an instance of a repeated event, and thus not part of the general script, would be more accurately attributed by children to their nominated target occurrence than other types of low-frequency details. This research is intended to be the first step in understanding whether children who can identify these unique features can be encouraged to use them to more precisely isolate individual instances of repeated events.

As expected, both younger and older children were most accurate at attributing *hi* instantiations to the correct occurrence, and there were no age differences. There were also no age differences in specific questioning in the proportion of internal intrusions for any item type, in keeping with findings suggesting that repeated experience minimizes age differences in intrusion errors when asked specific questions (Powell et al., 1999; Powell & Thomson, 1996). The data concerning *hi* instantiations replicate studies finding that oft-repeated items are recalled as accurately by younger children as older children (e.g., Powell et al., 1999). In contrast, children were much less accurate when discussing *lo* instantiations, and there were clear age differences in free recall. Descriptively, more 7- to 8-year-olds (81%) reported *lo* instantiations than did 4- to 5-year olds (39%). Not one *lo* instantiation provided by a younger child was accurately attributed, while approximately half (48%) of the *lo* instantiations reported by the older children were. *Variable* instantiations were reported by children of both age groups as predicted, and they did not differ in their accuracy in free recall or in response to specific questions. Thus, children's recall of self-nominated occurrences was comparable to their recall of an experiment-nominated occurrence for the item types that have been used in previous research.

Turning now to the *new* details that were only presented once across the series, there was evidence that children were better able to attribute these details to the correct source than the other low frequency types (i.e., *lo* and *variable*). Specifically, there was a greater proportion of accurate attributions to questions about *new* details than *lo* items; accurate recall of new items was above chance for older children, and there were fewer internal intrusions about *new* than *lo* and *variable* items. Several contemporary theories that can be applied to memories of repeated events (script, the source-monitoring framework, fuzzy trace) predict that unique (or *new*) details may be distinctive, depending upon the phase of script development, strength of verbatim traces, and/or ability to make source distinctions. These items may, therefore, enable children to retrieve details from a specific occurrence while minimally intruding details from other occurrences.

In general, script theory is useful in predicting what children remember at the general script level, but fails to account for the different source errors children make when asked to speak about one specific occurrence. The schema-confirmation-deployment model (e.g., Farrar & Goodman, 1992) accounts for why instantiations are absorbed into the script or not, but does not describe whether or how those instantiations can be attributed to the correct occurrence. As the *new* details were presented evenly across the four occurrences, and because one-third of the older children, who performed adequately on this detail-type, nominated the *third* occurrence to describe, primacy and recency effects do not easily explain our results. Rather, it seems that the *new* details 'stood out'. According to the schema confirmation-deployment model, *new* details would be considered atypical to the script and thus episodically encoded leading to enhanced memory for the item.

Both fuzzy-trace theory and the source-monitoring framework make useful predictions as to why children make source errors. The 4- to 5- year old children in this sample retrieved less information and were less accurate about which session it occurred in than the 7- to 8- year old children, giving support to fuzzy-trace theory's assertion that younger children's verbatim traces decay more quickly. Our findings suggest that the verbatim traces of the older children for the *new* items must have been stronger at retrieval than those of the younger children because half of the older children reported these details while only three younger children did so. The prediction that older children would more *accurately* attribute *new* items was supported by data from the free recall phase, as the older children were above chance at retrieving the correct *new* item, while the younger children were not.

Thus, it is possible that the 7- to 8-year old children were making some effective source decisions at retrieval, but only with respect to the most distinctive details; the *new* details. Older children (6- years and older) are better at monitoring sources than are younger children (4- year olds) (Drummey & Newcombe, 2002; Roberts & Blades, 1999), and distinctive information should be more accurately attributed than more routine details (Johnson et al., 1993). As such, the source-monitoring framework predicted that there were would be fewer internal intrusions about *new* items than other items. This effect was demonstrated in free recall for the 7- to 8- year old children, suggesting that the *new* items made their corresponding source more distinctive and, therefore, made it easier to distinguish the different occurrences. It could be suggested that source information is encoded, as suggested by fuzzy-trace theory, but in the case where these verbatim traces have decayed, source attributions can still be made at the retrieval stage, as suggested by the source-monitoring framework. Thus, for children in this age range, distinctive details may serve as effective labels for interviewers to use in eliciting information about a specific occurrence, even when memory has decayed somewhat.

Although specific predictions were not made, there were a significant number of 'don't know' responses, accompanied by variability across age and item type. It was evident that 4- to 5- year old children were significantly more likely to use this response, suggesting that they failed to retrieve the verbatim detail altogether, due to its trace decay. Additionally, children were more likely to realize that they did not know the answer when asked about a *new* or *variable* instantiation, than when asked about a *hi* or *lo* instantiation. These findings complement those reported by Roberts and Powell (2005) who reported that 5- to 6-year old children were more confident in their answers about high frequency than low frequency instantiations. Together, these studies are intriguing in that they suggest some metacognitive functioning about variations in the difficulty of source decisions, despite the younger age.

Conclusions

One of the strengths of this research design is that we were able to ask the children about the time they remembered best. Due to the number of variations present in each occurrence we did not have to rely on the assumption that children would remember one specific deviation episode provided by the interviewer, as previous research has done (Farrar & Boyer-Pennington, 1999; Farrar & Goodman, 1992; Powell et al., 1999; Powell & Thomson, 1996). This design also more closely resembled the reality of everyday life; that is, even events that are routine often include unpredictable variations as well as constants. Although the nature of events and their details are not often known to field interviewers, understanding the conditions in which children's discrimination is heightened is useful for developing interview practices and procedures.

The current research examined whether uniqueness helps children to distinguish between a series of similar events. While the children rarely mentioned *new* details spontaneously, free recall data demonstrate that when they are recalled by older children, their source accuracy is above chance. In fact, they were accurate almost three-quarters of the time (73%). Accordingly, we tentatively suggest that *new* details may be an avenue to assist older children with discriminating between instances of a repeated event because interviewers can be more confident that new items (compared to other item-types) have been accurately contextualized. These item-types may then serve as meaningful labels for separate instances, which were not constrained by the interviewer (e.g., 'the time there was a walrus' versus 'the time bird sounds were heard').

Anecdotal evidence from forensic transcripts of interviews about repeated-abuse allegations suggests that children 7-years and older *do* spontaneously mention occurrences of abuse in which something different from usual transpired (e.g., “I remember that time because I fell onto the floor”). Future research incorporating a similar design could examine whether children who are directly asked to talk about ‘unique’ aspects of one occurrence are better at distinguishing between the similar occurrences than children who are simply asked to talk about the ‘time they remembered best’.

Footnotes

[1]In some previous research (e.g., Powell & Thomson, 1997) *variable* items (i.e., those in which the instantiation changes each time, such as leader's cloak; yellow, green, red, blue) have been referred to as "new" or "unique." In the current study, *new* items refer to details that are only present in one occurrence in any form (e.g., a walrus joined the group in occurrence 1 only, and was never seen again).

Appendix A
Example Target Items and Instantiations: Group 2

	Item	Frequency	Occ 1	Occ 2	Occ 3	Occ 4
4	Fox	New	‘Pop’ the fox joins activity			
5	Noisy animal	New	Walrus			
2	Children sit on	New		Garbage Bag		
19	Put objects away in	New		Lunchbox		
6	Warm-up activity	New			Jump	
12	Music for relaxing	New			Birds	
1	Children’s badge	New				Leaves
13	Part of body to relax	New				Stomach
3	Leader’s cloak	Variable	Yellow	Green	Red	Blue
7	Story content	Variable	Winter	Party	Dog in city	Boat
9	Bookmark	Variable	Black triangles	Orange circles	Pink hearts	Purple squares
11	Clown Puzzle	Variable	Bike	Juggling	Tightrope	Car
16	Container to hold magnets	Variable	Purse	Envelope	Box	Jar
17	Counting objects	Variable	Frogs	Cars	Flowers	Tambourines
8	Source of story	Hi/Lo	Library	*Leader wrote*	Library	Library
10	Utensil to write down name of story	Hi/Lo	Pencil	Pencil	Pencil	*Pen*
14	Refresh activity	Hi/Lo	*Fans*	Hand sanitizer	Hand sanitizer	Hand sanitizer
15	Magnet picture	Hi/Lo	Airport	Airport	*Construction*	Airport
18	Objects hidden under	Hi/Lo	Blanket	Blanket	Blanket	*T-shirt*
20	Leader’s next stop	Hi/Lo	Hospital	*Movie*	Hospital	Hospital

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Table 1

Means by Age and Detail-Type of Accurate Attributions in Free recall with Chance t-tests

	4- to 5- Year Olds				7- to 8-Year Olds			
Detail-Type (chance %)	*M*	*SD*	*n*	*t-test*	*M*	*SD*	*n*	*t-test*
New (25%)	.00	.00	3	NA	.73	.47	11	$t(10) = 3.39$, $p = .007$
Variable (25%)	.23	.22	10	$t(9) = .19$, $p = ns$	.40	.36	20	$t(19) = 1.79$, $p = ns$
Hi (75%)	.91	.27	14	$t(13) = 2.22$, $p = .045$	.92	.15	20	$t(19) = 5.11$, $p < .001$
Lo (25%)	.00	.00	7	NA	.48	.45	17	$t(16) = .96$, $p = ns$

Table 2

Mean Proportions of Accurate Attributions, Internal Intrusions and Don't Know Responses to Specific Questions as a Function of Detail Type

	Accurate Attribution	Internal Intrusion	Don't Know
Significant differences[a]	*Hi > new, variable & lo* *New > lo*	*Variable, lo & new > hi* *Variable > new*	*New & variable > hi*
Hi	.82 (.23) [b]	.06 (.10)	.08 (.20) [c]
4-5 year olds	.72 (.28)	.07 (.11)	.16 (.28)
7-8	.91 (.11)	.05 (.10)	.01 (.04)
New	.34 (.23)	.36 (.21)	.24 (.22)
4-5	.22 (.14)	.40 (.24)	.31 (.27)
7-8	.44 (.25)	.32 (.18)	.17 (.14)
Variable	.27 (.21)	.49 (.22)	.19 (.20)
4-5	.19 (.16)	.47 (.21)	.27 (.22)
7-8	.33 (.23)	.51 (.23)	.11 (.13)
Lo	.18 (.31)	.55 (.44)	.12 (.30)
4-5	.03 (.12)	.58 (.46)	.25 (.39)
7-8	.31 (..37)	.52 (.43)	.02 (.11)

[a] Significant *t*-tests evaluated at alpha < .008

[b] Standard deviations in parentheses

[c] Scores may be less than 1.00 because of coding for "other" responses.