2016

Children's Ability to Identify an Unusual Occurrence of a Repeated Event

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Bachelor of Arts, Honours Psychology

University of Guelph, 2014

THESIS

Submitted to the Department/Faculty of Psychology

in partial fulfilment of the requirements for

Master of Arts, Developmental Psychology

Wilfrid Laurier University

Abstract

Research on script memory shows that individuals have a difficult time isolating single instances of a repeated event because a generic script (e.g., one has a generic script for typical grocery shopping; grab a cart, gather items, then pay) has formed over time. Scripts capture the "gist" of what usually happens and allow individuals to predict what *probably* occurred based on the robustness of the script. Thus, individuals are able to identify details of what occurs; however, piecing which details came from a particular incident poses its challenges, especially for children. *Source monitoring* is the ability to accurately differentiate sources (e.g., "Was I at Sobeys or was I at Zehrs?") and state the details which occurred during this *one* incident. Due to the formation of scripts and their general representation, it is challenging to source monitor. Federal laws require children testifying in court regarding abuse to give specific details of *one* incident in order to be credible. However, as described, due to the formation of scripts, the accuracy or ability to *monitor the source* of these details is jeopardized. The present study examined an interview technique focusing on "different times" (often referred to as "deviations") from scripted memories which may aid children in accurately recalling details from particular incidents. Children (N = 89, 5-6 and 7-8-year olds) participated in five repeated incidents (referred to as "events") where for half of the children, the fourth event was "different" from the usual script (e.g., one event was about animals and the other events were about the human body). Children in the control condition also engaged in five events, however, there was no "different event" in which half of the children experienced all five events about the human body and for the other half, all events were about animals. Three to seven days after the fifth (final) event, children were interviewed and asked to talk about the fourth event. For the "different" condition, this was a deviation from the usual event

script, and for the control condition the fourth day is a usual scripted event-no "different event". Results revealed that children in the "different" condition had higher accuracy scores as well as lower errors in the details provided compared to the control condition. However, the different condition did not recall a higher number of details about the events compared to those in the control condition. Additionally, both 7-8-year olds and 5-6-year olds performed equally well on accuracy scores and number of errors mentioned. Conclusions from this study reveal that focusing on deviations or "different days" aids children in reducing errors in the information they provide about that day compared to a "usual" scripted day. These findings could be beneficial for the types of questions forensic interviewers use with children who are testifying in court about multiple repeated events. Specifically, asking children questions about a time that stood out to them (i.e., a "different time") could be beneficial for increasing source monitoring and number of details children describe, ultimately helping the child to become more credible in their testimony.

Key Words: Repeated events, scripts, source monitoring, episodic memory, script memory

Acknowledgments

First and foremost, I would like to thank my advisor, Dr. Kim Roberts, for her knowledge, expertise, and support throughout the thesis process and the entirety of my Masters degree. Without her guidance and efforts in the Child Memory Lab, this research would not have been possible.

In addition, I would like to thank my advisory committee, Dr. Joanne Lee and Dr. Judy Eaton. I was assigned a teaching assistantship working with Dr. Lee for a semester where I sat in on her lectures and met with her frequently. From this, I have learned her enthusiastic and interactive teaching style in which her huge knowledge base of children's language development was taught. I also witnessed her positive interactions with the students, including myself, which always reflected encouragement and a fun environment to learn in. Dr. Eaton is a colleague of Dr. Roberts that I have recently met and become familiar with during advisory committee meetings. I appreciate her time, attention to detail in my writing, and her unique perspective coming from both a psychology and criminology background.

I would like to thank Dr. Leanne Gosse for taking the time to be a member of my examination committee. Although I have not worked with her personally, I am honoured for her to be part of this process and I look forward to meeting with her.

I would like to send out a huge thank you to all members of the Child Memory Lab who graciously took the time to learn about my thesis and enter the public schools to help me run events and conduct interviews with the children as well as their help in the lab with transcribing, coding, and helping enter data. More specifically, I would like to thank Candice Sommers, Becky Earhart, Jenn Lawley, Hannah Cowan, Shawneen

Dayman, Kelsey Donald, Harneet Kang, Kayla Nokes, Elysa Keunen, Kathy Zhang, Vivian Qi, Jocelyn Enright, and Bryanna Gallant.

I would also like to thank the principals, teachers, parents, and children at the schools within the Waterloo Regional District School Board as well as Owl daycares throughout Waterloo, Kitchener, and Cambridge. Without their help collaborating with our research lab, this data collection and research would not have been possible. I would also like to thank the Social Sciences and Humanities Research Council (SSHRC).

Finally, I would like to thank friends and family. A heart-felt thank you is most definitely in order for Becky Earhart who has been a sincere, patient, and knowledgeable mentor for me during my entire time as a Masters student here at Laurier. You have been there starting in the first days of my experience at Wilfrid Laurier as a new graduate student, where you helped me learn about academics but also about life as a busy student. Thank-you for all our chats!

Last, I would like to extend a very sincere thank you to my family and loved ones for their support, patience, and huge amounts of encouragement. Your love has ultimately given me the drive and endurance to pursue and complete my thesis. Thank you.

Table of Contents

List of Tables

List of Figures

Children's Ability to Identify an Unusual Occurrence of a Repeated Event

Suppose someone asked you to imagine yourself going to a restaurant. Automatically you might picture yourself waiting for the hostess, walking to the table, accepting a menu, ordering a meal, eating, paying and then eventually leaving. These details create the "gist" of what *usually happens* when going out for a meal. Over time, these routine actions become solidified in one's mind and are ultimately combined to form what Schank and Abelson (1977) describe as a "script." Scripts are important for everyday life as they help predict future events and ultimately guide daily behaviour.

Script Theory

Scripts can be described as generic schemas or representations of events (e.g., grocery shopping, weekly meetings, or even a morning routine). Since scripts are formed for repeated events in one's life, they can be used to predict future circumstances in which similar events might occur (Hudson, Fivush, & Kuebli, 1992). Thus, scripts can be beneficial for making sense of the world around us, making predictions about the future, and even for cognitive development in children as young as three years of age who begin to show the use of scripts in pretend play and pretend talk with scripts such as "playing school" or "playing office" (Nelson & Gruendel, 1979).

As scripted activities occur over long periods of time, the scripts for these activities become more robust and thus relied upon to describe what *probably* occurred, which can have negative consequences, especially for children (Slackman & Nelson, 1984). For children testifying in court regarding abuse, the ability to deliver specific details is crucial for their case, however, relying on scripts for what "usually happens" during the abuse can negatively influence the child's testimony by only being able to discuss generic details ("Always happens at

grandma's house" instead of "One day it happened outside and I was cold"). Consider another example using adults and grocery shopping. If one was asked about a time he/she went grocery shopping five years ago, or even two months ago, the individual would likely rely on his/her script of "grocery shopping" to guess or anticipate what *probably* occurred. With a script like grocery shopping that occurs repeatedly and has occurred for a long period of time spanning most of one's life, this individual can be fairly confident that when grocery shopping months ago they had a cart, bought vegetables, then browsed the frozen section and paid before leaving the store. An individual can be fairly certain of these details because he/she recalls the script of "grocery shopping" based on what *usually happens*. Therefore, it is clear that relying on scripts tends to give a generic and general account of what occurred. Although these generic details tend to be accurate, they lack specificity such as time of day, location, clothing worn, or what items were bought on a particular day.

Everyday life can also be impacted by relying on scripts. For example, consider working at a business firm where weekly meetings are common. If a colleague who missed the meeting asked you what happened at the meeting last Wednesday, you may not remember the precise details and could get it mixed up with other regular meetings (e.g., Did the boss say to carry out a specific task during the group meeting, or was that during the other one-on-one meeting you had? Did your boss ask you to write up the meeting notes for last week or was it the week before?) Clearly, the script of "work-related meetings" can become generic over time and the particular details of specific instances are lost from memory, or dissociated from the script.

Scripts can also have practical costs for adults and children. For example, in children's eyewitness testimony, the ability to isolate single instances from the general script (by identifying specific details) is necessary to be a credible witness. Children testifying in court

regarding repeated abuse are asked to speak about specific instances (i.e., separating events from the script) (S.v.R, 1989). Federal laws require children to discuss particular details such as location, time of day, and even clothing worn. If the abuse is repeated and children have built up a script, their credibility is compromised if they are only able to generalize what happened during the abuse instead of isolating single instances. With the harsh consequences of only focusing on the "gist" of what happens during abuse, it is critical that children learn how to remember specific details. The aim of the present study was to systematically test a new interview question to increase children's ability to give accurate and specific details of a single event.

It is important to note that not only do the details of the event become scripted, but also the ordering in which they occur. Going back to the grocery shopping example, the details tend to happen the same way each time in a structured, predictable way (e.g., always start with a cart and always pay last) (Roberts & Powell, 2001). Clearly, not only are events formed into scripts, but the temporal order of the items is ordered in predictable ways making it very difficult to pull apart these instances.

Children tend to use script-like speech when explaining events. One example of script speech is the use of timeless present tense as well as generic language: "It *always* happens when grandma leaves." Children relying on scripts also tend to use a general you pronoun: "*You* gotta listen carefully or *you* get in trouble" (Nelson & Gruendel, 1979; Schank & Abelson, 1977). These characteristics of "script-like" speech are detrimental for children's testimony because they lack specificity and details particular to a single episode of abuse, all of which are contrary to the precise details expected from children in court. Further, in mock jury research, children who speak generically are perceived as less credible than children who speak in the past tense (e.g., He waited until grandma left) (Connolly, Price, Lavoie, & Gordon, 2008). It is evident

then that accurately attributing details from one source to another, which is termed *source monitoring* (Johnson, Hashtroudi, & Lindsay 1993), at least partly occurs due to the formation of scripts, which ultimately present general information rather than specific details of single incidents.

Alternative Theories of Memory Influencing Source Monitoring

Fuzzy-trace theory outlines children's source errors by describing the means by which events are stored in memory and later retrieved (Brainerd & Reyna, 1990). Fuzzy-trace theory posits that specific details of an event (e.g., clothing worn, time of day, and location) are stored verbatim, or in other words, exactly how they actually occurred, whereas the overall theme and structure of the event is stored as "gist" memory, lacking specificity. These dual ways of storing information about a single event (verbatim versus gist) deteriorate in different ways over time. As time passes from the event, gist memory begins to take over and the verbatim traces become weakened (especially rapid for younger children). Therefore, based on this theory, it seems memory responsible for recalling specific details (i.e., verbatim) may not be readily available for children when needed at the time of testifying. Children should be asked about specific details of an event first during an interview followed by questions regarding gist information or what *usually happens*. Additionally, these memory traces can be strengthened if individuals are exposed to information that is consistent with what occurred in a target event before or after the event. For example, if a child is abused and then watches a T.V. show afterwards where the situation is very similar, the memory traces will be strengthened (Brainerd, Reyna, Howe, & Kingma, 1990).

Fuzzy-trace theory, however, lacks the ability to explain how children can accurately attribute details (accurate source monitoring) to individual occurrences (verbatim details),

although the theory posits that verbatim memory traces decay quicker than "gist" memory (see Roberts, 2002, for a review). It is unclear then, how children who after a period of time would only have memory for the "gist" of what occurred are able to identify verbatim-like details (time of day or what clothing was worn). This lack of explanation suggests there is another mechanism or strategy children use when monitoring source.

Associative activation theory is used to help explain how individuals make false memories which is defined in McGeown, Gray, Robinson, and Dewhurst (2014) as saying something occurred when it really did not. Associative activation theory states that it is the automaticity that results from associations in memory which causes false beliefs. In a study of 8- to 11-year-olds by McGeown et al. (2014), children were assigned to one of two conditions. The first condition had children demonstrate their semantic language skills through some language tests. Children were then read a series of words from ten different lists. Examples of words from one list were: water, fish, swim, stream, lake, ocean, flow, frog, and beach. Children in the second condition were tested on their phonological knowledge and given lists of words like: let, sat, said, net, sit, cell, wet, seat, sent. Children in both conditions were read the words verbally and then asked to say which ones they had heard back to the experimenter. It was found in the semantic condition that those with higher scores on semantic knowledge had recalled more false words than those with lower scores. Associative activation theory states that since the words are similar, the children had more associations in memory and the automaticity of these associations allowed them to recall false words. These findings are consistent with the script theory where the associations between events and activities that occur during the abuse form strong associations. The opposite was found in the phonological condition. Those with higher scores on phonological knowledge scored lower on false recall (McGeown et al., 2014). It is hypothesized here that

children are looking at the differences between words rather than similarities. This study evidently shows that strong associations in memory can have negative impacts on memory leading to false word recollection.

The Source-Monitoring Framework

Related to script theory, source monitoring is a broad framework which refers to correctly identifying which details came from a particular event or episode (Johnson et al., 1993). "Source" refers to the conditions when a memory was acquired such as how it was perceived, or in other words, how one understands or conceptualizes the origin of their memory, "Did I actually tell my husband to pick up milk on his way home or did I just imagine it? Did I tell my boss I will be late on Friday or did I dream it?" Both of these source decision processes require distinguishing between memories that come from different sources of information. Once identifying the origin and "source" of a memory, the individual may then be able to gather other details and piece together a full event in one's memory. Referring back to children's testimonies, where children are asked to discuss isolated instances of abuse, accurate source monitoring (i.e., recalling accurate details about *one* day without mixing them up from other times in between) is pertinent to being viewed as a credible witness (S.v.R, 1989).

Script Theory and Source-Monitoring Framework

When one experiences events repeatedly, the ability to accurately monitor source becomes more difficult due to the "script" that is easily retrievable. As time passes, the account of what happened becomes more generic and less specific to individual episodes (Schank & Abelson 1977; Hudson & Mayhew, 2009). From these findings, it is evident that scripts are very robust and so it is also clear that memories for repeated and single episodes of an event are qualitatively different from one another (see Roberts & Powell, 2001 for a review). Monitoring

source for scripted events is therefore very difficult because tracing back to the source origin of a memory (e.g., did I order salad at dinner last week or chicken?) requires separating this specific restaurant visit from all the other times one has gone out for dinner. (i.e., separating instances from the script as a whole). Evidently, then, scripts and source monitoring work in tandem, ultimately influencing one's ability to not only remember specific instances of a repeated event, but also accurately identifying the details of this incident (i.e., source monitoring).

Thus, the aim of the present research is to better identify how children are able to discuss separate instances of events that are repeated. More specifically, this research study seeks to corroborate and isolate interview techniques that are beneficial to helping children accurately discuss single events and the specific details that form together to create a single event. It is clear that better understanding of memory for scripts and repeated events in one's life could help in serious circumstances such as children testifying in court, or even better, help understand scripts in everyday life for adults such as meetings or everyday routines.

Developmental Pathway of Source-Monitoring Ability

Children tend to struggle with source monitoring, and especially younger children (5-6 years of age) compared to older children at about 7-10 years of age. Although there is a huge improvement in children's ability from ages 3-8, these improvements occur gradually over this course of time (Roberts, 2002).

The developmental path of children has been studied to better understand the mechanisms behind changes in source monitoring that occur with age. It seems younger children at about 5-6 years of age are beginning to reason about their knowledge of the origin of sources using implicit and explicit reasoning (Robinson, 2000). Implicit reasoning is more direct with questions such as "tell me everything you remember from ___" whereas explicit reasoning asks questions such as,

"did _____ occur in story 1 or story 2?" (Roberts & Blades, 2000). Children who are younger than 5 or 6 years old, however, lack the ability to reason about how they know the origin of something (e.g., "I know what the object is and Suzy does not because I looked at it and she did not"). These reasoning skills suggest implicit source monitoring is formed and occurs before explicit source monitoring (Robinson, 2000).

Perception and senses also influence source monitoring accuracy, showing differences between children and adults. Roberts and Blades (1995) had groups of children (3, 4, and 6-year-olds) and adults hide counters under objects on a table and had another group of children and adults *pretend* to do so. After a 5-minute delay, a memory test was given that went through the objects asking if the child or adult did indeed hide counters under this object or just pretend to do so. Results showed no age differences in understanding if they did indeed actually hide the object or just pretend to do so. However, after a three-day delay, there was evidence to show all age groups did confuse whether they did hide counters under some objects or just pretended. Children performed worse than adults after this delay (Roberts & Blades, 1995).

There also appear to be developmental differences among children's ability to build scripts and accurately monitor source when asked about specific instances of the scripted events. The schema-confirmation-deployment hypothesis posits that younger children at 4 years of age take longer to process new or atypical information than typical information compared to older children at 7 years of age (Farrar & Goodman, 1992). The schema-confirmation-deployment hypothesis also states that younger children are still developing schemas or scripts and take longer to do so compare to older children. Thus, it is more difficult for a younger child to create a separate memory for "deviations" or atypical information from a typical script if a script has not yet been developed. In other words, children tend to have poor source monitoring accuracy

for atypical details if they have not developed a script before being exposed to these deviated details. Farrar and Goodman (1992) found an age difference as well in terms of deviations that are presented within scripted events. 4-year-olds were more confused (i.e., had poorer source monitoring accuracy) compared to 7-year-olds about which details of an event belonged to the standard event or the deviated episode. Additionally, they found that the longer the script had to form (i.e., one time compared to three times), the better the child was at recalling information about the deviated event. These results suggest the stronger the script, the easier a deviated episode is recalled or perhaps "stands out" from the scripted episodes in between.

In summary, the studies illustrate that older children give more details about various events or specific incidents than younger children, and are also more accurate in these details (i.e., better able to monitor-source accurately). More specifically, when focusing on deviations within script research, both older and younger children are able to identify deviations. However; younger children tend to not give as many details about this deviated or "different" instance because they are still building a script, whereas older children are better able to recognize deviations due to their script formation occurring faster. Taken together, these developmental differences should be considered when creating appropriate interview protocol for different age groups.

Factors Influencing Ability to Monitor-Source

It is important to explore the factors that influence the processes behind children's source-monitoring errors and in particular, how their formation is later recalled when retrieving information from memory. Listed below are several factors which influence children's ability to accurately monitor source. These factors are explored to further understand how younger

children and older children differ in their memory recall of specific incidents and how these factors can be considered when creating interview protocols.

Cognitive Growth. The changes in monitoring source among children are largely due to growth in the frontal lobe, particularly the prefrontal cortex, as a result of improved cognitive abilities such as executive function. Executive functioning has a number of different components but there is consensus on two particular aspects that are both of relevance to source-monitoring ability (Poole & Lindsay, 2002). The first component is the ability to inhibit and ignore other competing information from various other sources as well as other events when trying to focus on relevant source details from *one* episode of a repeated event. The second component of executive functioning is working memory. Working memory contributes to accurate source-monitoring by helping to encode and keep relevant details in memory. To identify the source of a memory then involves determining which information will be useful to make decisions about sources (Gerrie & Garry, 2007 as cited in Earhart & Roberts, 2014). Both inhibitory control and working memory develop together as a child ages, suggesting at least one mechanism for the improvement of source monitoring with age.

Theory of Mind. Mental-state understanding (often called "Theory of mind") is another developmental milestone that also develops in early preschool years, and is believed to play a role in source-monitoring accuracy. Theory of mind is the ability to understand various mental states such as beliefs, thoughts, intents, or knowledge and attribute them to oneself and to others. It is not until about age four that children begin to understand that an object or source is viewed differently by themselves and others based on perspective of mental properties (i.e., that other people have different perspectives from one's self) (Premack & Woodruff, 1978).

Theory of mind is related to source monitoring-accuracy and improvement of theory of mind is associated with a decline in suggestibility. Bright-Paul, Jarrold, and Wright (2008) had 3-6-year-olds complete an eyewitness memory task in which they watched a film about robbery. One day later, children in the "mislead" condition were read a story about the film they had watched the day before, but 6 of the 12 target details that were mentioned in the story were inaccurate (e.g., in the film Sarah eats a sandwich, but the story says she ate cake). Children later were asked to make judgments about which source particular details came from (e.g., asking if Sarah ate cake in the film, the story, both the film and the story, or neither one). On a separate day, children also completed six different theory-of-mind tasks to create a theory of mind composite score. The results of the study illustrated that independent of verbal ability, an improvement in theory of mind predicted reductions in suggestibility. Additionally, theory of mind scores and suggestibility scores were highly correlated with chronological age and verbal mental age, which demonstrates that theory of mind and suggestibility are highly related and, thus, influence one another. Specifically, these results indicate that the more theory of mind is developed, children are perhaps less susceptible to suggestibility effects.

Similar Sources. One factor that has been shown to influence accurate recall of repeated events is being exposed to other related or similar events.

Auditory Cues: Lindsay, Johnson, and Kwon (1991, Experiment 1) illustrated that children (4 years of age), but not adults (undergraduate students), confused memories more readily if they came from similar (vs. different) sources. All participants were presented with two speakers (i.e., two sources), one on the left of them and one to the right, which read aloud 48 words. For half of the children and adults, the words were read aloud in the same voice from each speaker. For the other half of the children and adults (the target condition), the words were

read aloud in two different voices - one from each speaker. After a brief distractor task, participants were read aloud the words again and asked if they came from the right or left side, or if the word was not said at all. Results indicated that children in the same voice condition had lower source monitoring accuracy compared to those in the different voice condition. That is, children who heard the same voice from both the right and left made more errors regarding which side a particular word came from compared to children who heard a different voice on each side. Adults, however, did not have significantly higher source monitoring scores in the different voice condition. Children performed worse than adults in the same voice condition, but they performed just as well as adults but not in the different voice condition. Together, these results illustrate that when trying to monitor source between two similar sources, children perform worse when sources are more different, and also perform worse than adults on this task. Although everyone is susceptible to the similarity effect, it appears preschoolers are especially susceptible to it.

Other Perceptual Cues: Characteristics of the actual event also influence source monitoring. Memory of an actual perceived event will have perceptual and contextual detail; however, an imagined event will not have the same perceptual information. Thus, individuals must use other comparisons to make accurate judgments if an event did indeed occur or if it was encoded into memory from another external source such as T.V., a police officer, social worker, peer, or parent. To examine real events compared to imagined events or vivid events from another source, Roberts and Blades (1998) had children watch two different events - one which was a live performance and one on T.V. In both performances the experimenter made a puppet; however, there were small differences between each performance (e.g., the puppet had different names in each performance and wore different clothing). Despite these differences, everything

else was identical: same actor, same temporal order of events, and same voice. Results from the study showed even more source confusions compared to that of earlier studies due to the two events being almost identical (compared to Roberts & Blades,1998) where the two events had different themes: one event was about a hospital and one about a birthday although they had very similar actions. It is clear from these two studies examining source similarity and its effects on source monitoring accuracy that the more similar the sources are, the more difficulty children have with source monitoring.

In Lindsay, Johnson, and Kwon (1991, experiment 2), three groups of participants (4-year-olds, 6-year-olds, and college-age adults) listened to two different stories. The two stories were both about the circus, but for half of the participants, both stories were read by two similar females (similar storytellers condition) and the other half of participants heard one story by a female and the other story by a male (dissimilar storytellers condition). After hearing the stories, a memory test was given which stated certain items or activities from the story and the participants had to respond if the detail came from the first story, second story, or neither one. With respect to source monitoring results, source monitoring accuracy increased with age and was also higher for items that were unique to each story compared to items that were common across both. In addition, source monitoring scores were higher for those in the dissimilar storytellers condition compared to those in the similar storytellers condition. These results and the listed studies above suggest that various contexts and external sources (e.g., T.V. versus, live performances, and even words and sources from just a voice) contribute to both children and adults having difficulty monitoring source when the sources are similar.

Reality Monitoring: Children also have more difficulty than adults when it comes to monitoring source for events in which they are asked to imagine themselves doing something

compared to actually participating in an event. Johnson and Raye (1981) refer to distinguishing real from imagined events as *reality monitoring*. Characteristics of imagined acts and actual acts carried out by the same individual should contain similar content, and thus, as shown with the previous two experiments, similarity among sources elicits lower source monitoring. Lindsay, Johnson, and Kwon (1991) had a group of children (7-10-year-olds years old) and adults actually engage in an act and imagine themselves engaging in this act (Actual-Self/Imagined-Self condition), and another group of they were asked to actually watch an actor carrying out a task or imagine the actor carrying out a task (Actual-Other/Imagined-Other condition). Thus, for *actual* tasks, participants either engaged or watched someone, and for an *imagined* task, participants either imagined themselves or someone else. After a distractor task, participants were asked about the actions that took place and if it had been imagined or performed. Results showed that when the same actor was in the imagined and actual actions compared to when it was a different actor, participants made more reality monitoring errors; however, adults still performed better than children on this task. As predicted, all participants confused memories of imagined versus actual actions when the same actor participated in both the actual and imagined activities. Also, compared to adults, children made more errors in terms of identifying which actions were imagined or actually took place. These results suggest that both adults and children are susceptible to confuse memories of both real actions and actions they only imagined someone carrying out. Children are especially shown to make these errors more often than adults.

Cue Salience. Not only is the type of cue important (e.g., perceptual contextual or affective characteristics), the number of cues may also impact children's ability to monitor-source accurately. Bird (2015) had children 3-5 years old and 6-8 years old and adults,18-21 year olds watch a video with two segments each showing actors carrying out various tasks. In one

segment, there was only one difference between the two actors (e.g., T-shirt colour) and in the second video the two actors had five differences (e.g., one actor wore a hat, the other did not, they had different coloured pants on, etc.). After a distraction task, children participated in a source monitoring interview where questions were asked about the videos, for example, "which actor picked up the ball? Alexia or Candice?" Results showed that adults were more accurate when asked questions about the videos where the actors had more differences between them, which aligns with the similarity effect that the more differences between two sources, the easier it is to distinguish them. In addition, contrary to the hypothesis, younger children (3-5-year-olds) did not have higher source monitoring accuracy for the condition in which there was only one difference between the actors. This hypothesis that younger children would perform better when there was only one cue difference was predicted because of the children's limited cognitive capacity, in that they would find it difficult to form the multiple cues into one source and would become more confused. However, this does not seem to be the case. These results suggest that both children and adults are better able to distinguish between sources when there is more than one difference between them.

Suggestibility. Leichtman and Ceci (1995) ran an experiment where children were going to meet a man named "Sam Stone" and were told a story about him before they met him. Children were informed that Sam is clumsy and is always going around breaking objects. The children then met Sam as he came in to speak with them. Ten weeks later when children were asked if Sam broke anything when they met him, 37% of the children inaccurately stated that Sam was clumsy and that he ripped a book. It is evident that based on general suggestive comments, children can be influenced to believe false actions and in particular, *before* the interview takes place. Similarly, exposed to related events *after* abuse takes place also has

negative implications for accurate source monitoring. A highly suggestive interview in which the interviewer discusses inaccurate details about the event to the child is harmful because children may later integrate these comments into their narratives (for example, Roberts & Blades, 2000; see Roberts & Powell, 2001 for a review).

It is important to note, however, that being exposed to related events *after* abuse takes place has both positive and negative consequences on source monitoring. Positive effects include being exposed to conversations with adults, for example, where the adult reinforces the child's memory of that event by discussing accurate details that match the child's experience. This discussion allows the child to rehearse the memories and strengthen memory traces of what occurred. Negative aspects that occur after an event of abuse takes place would be a highly suggestive interview where the interviewer may have questions which state inaccurate details about the incident. When asked later, the child may include these details in their own accounts of what happened (see Roberts & Powell, 2001 for a review). Clearly, factors from all aspects of a child's life influence their memories and, therefore, their experiences in the court. Some examples might be conversations with family, with police and professionals in the law who interview the children, or even personal experiences with dreams, watching TV, or the rehearsal of thoughts influence memories. Lastly, the legal system itself influences the child's experience by creating these federal laws requiring children to isolate one incident of abuse.

From all the various listed factors above including cognitive growth milestones, theory of mind development, similarity of sources, and suggestibility, the process of monitoring-source for children is highly complex, requiring a rich understanding from researchers as these factors ultimately influence a child's ability to appear credible in eyewitness testimony.

Script Deviations

As mentioned at the beginning of this thesis, individuals create scripts for events that are repeated and these scripts become relied upon over longer periods of time (Schank & Abelson, 1977). The field of script research shifted over the next decade to analyze script "deviations" and how they influence source monitoring accuracy.

Farrar and Boyer-Pennington (1999) had children engage in standard events (where the theme was about "magic" with typical activities that match this theme such as mixing coloured paint, as well as participating in an 'episodic' event (children's last event) where either standard activities occurred (the same as the standard event with 'magic' themed activities) or atypical activities occurred that did not relate to magic such as playing with play-doh. Children either participated only once, three times, or five times. Free recall and contextual recall interviews took place one week after the last event asking children about the time they played with the wizard with the moon/star (as a label to refer to the standard events) or the time they played with the wizard the *last* time (episodic event) as well as contextual recall where children were brought into the room and asked what happens at each location in the room where the activities took place. Results indicated that younger children (4-year-olds) were less accurate than 7-year-olds when asked when the typical and atypical changes occurred in which event (lower source accuracy).

Even within atypical details of an event, there are some that seem to be better recalled than others which as discovered through the *disruption effect.* Davidson and Jergovic (1996) had 6- and 8-year-olds listen to two different events: grocery shopping and going to the movies and were then asked to rate 16 sentences from each event. Two types of atypical details were placed into each event: distractions and obstacles. Correspondingly with the disruption effect, the study

found that atypical actions that impede the goal of the story are better recalled than atypical details that are irrelevant to the story. These findings suggest that even within deviations there are some that are more salient than others which is important to understand in real-life scenarios during court. If a child could focus on deviations that affected the abuse taking place (i.e., the goal of the abuser) such as grandma coming home early, this may serve as an 'episodic lead' for the child compared to a deviation about location of the abuse, such as the abuse taking place in the living room as usual, it happened in the bathroom. The disruption effect is also stronger and more evident with a delayed recall between the events and interview than with a shorter delay (Hudson, 1988).

Clearly, there is merit to trying to engage children on focusing on atypical details of events, and specifically, the atypical details that caused major disruption to the event they were engaged in.

Limitations in Current Literature

It is evident from both script and repeated event research that children form scripts that impact their ability to identify details of single episodes, especially if the script has been repeated for a long period of time. As shown above, deviations (atypical details within an event) are more easily recalled compared to details of the event that are "usual" or typical. However, there is a lack of knowledge about deviations within repeated events.

There have been other strategies to aid children's source monitoring through studying primacy and recency effects. Asking about the "first time" something happened (primacy) and "last time" (recency) have been shown to be more salient than other times in between and thus, more memorable, which leads to giving high levels of details about these instances compared to usual times in between (Powell & McMeeken, 1998). However, younger children struggle with

temporal meaning which doesn't develop until about age 8 to 10 (Gosse & Roberts, 2014). Thus, incorporating an interview technique focusing on 'deviations' could potentially be beneficial for children of all ages because it does not require temporal knowledge. Using a strategy of isolating one event (the deviated time) may help to generate new episodic leads (Brubacher, Powell, & Roberts, 2014). New leads may, in turn, elicit more detail and even high source accuracy, all of which improve the ability to discuss an isolated event with credibility and, ultimately, improve chances of prosecution in child abuse cases.

Basis of Present Research

It has been found that children recall more of what *usually occurs* during an event than of what happened during a specific event episode (Fivush, Kuebli, & Clubb, 1992; Nelson, 1986) and as shown throughout the introduction discussing script theory and the source monitoring framework. With this knowledge, various interview strategies have been implemented to aid children to accurately monitor-source of specific incidences. For example, children who received Breadth prompts first (e.g., "What *happens* at the Laurier activities?") compared to Depth prompts (e.g., "what happened during a *specific* incident") reported more details across the interview than did children who received Depth prompts first, and older children reported more items in Breadth Breadth than Depth Depth (Brubacher et al. 2014). These results illustrate that discussing events generically first in an interview compared to specific incidents may be more beneficial for amount of detail provided by children as well as higher accuracy of these details. Consequently, discussing a generic phase first also serves as a strategy for children to create "episodic leads" (i.e., "I must have forgot my wallet on the last day because I had it in my pocket," which then reminds the child the last day was the only day they weren't wearing their coat) (Brubacher et al., 2014).

Moreover, using various techniques such as rapport building (creating a nurturing environment), using open-ended questions (less opportunity for suggestibility), and a variety of free recall questions such as, "tell me what usually happens", or "tell me about the day you wore the necklace" all help create a positive interview structure for acquiring accurate source information. Focus questions (closed-ended forced questions) are also used to help ask specific questions about details the child may not have remembered on their own in the free recall phase in order to gather more information (e.g. "what were you wearing the last time you went grocery shopping?") (see Brubacher et al., 2014, for a review). Although focus questions tend to yield more inaccurate answers than free recall questions, they allow for the researcher or interviewer to gather information about details the child may have forgotten to bring up during their free recall phase (Roberts & Blades, 1995;1998).

Understanding how to create an interview protocol that abides to children's developmental capacities (e.g., not using temporal questions with younger kids such as asking about the first or last time), yet still creating ways to probe for details of specific instances without creating suggestibility effects, poses its challenges for researchers. However, with what has been discussed above regarding deviations, the goal of this study is to test a new technique using the collaboration of already known successful techniques (using a generic phase first followed by asking about specific instances, using open-ended questions, and building rapport) and combining these strategies with the use of deviations or 'atypical' details that were shown to be more easily recalled in scripts than typical details (Davidson and Jergovic,1996; Farrar and Boyer-Pennington, 1999). Combining deviations from script research into repeated events will allow us to systematically test a new interview protocol for children that may improve source accuracy and number of details when asked about specific incidences of repeated events.

The Present Study

This research project strived to answer if asking about a "different" time (deviation from a script) compared to a scripted time elicits a higher number of details as well as higher accuracy in children's accounts of what occurred during the fourth event (either "different" or scripted time). The study used both free recall and focus questions to gather number of details as well as source accuracy. In other words, the results will show if asking about a "different" time compared to the "last time" would elicit higher accuracy through focus questions.

These two questions will provide insight into how a deviation in the middle of a scripted event either helps children to create episodic leads to this 'different' time (i.e., having higher accuracy and providing more details about this event compared to a regular scripted event) or creates a disruption in children's ability to monitor source. In other words, the study is exploring if there are more beneficial times we can ask children about events that will help them 'pull out' a single episode.

Hypotheses

Condition Differences

Hypothesis 1: Those in the different condition will give a higher number of details and be more proportionally accurate in these details (higher source-monitoring accuracy) compared to those in the control condition. Thus, a main effect of condition is expected for accuracy and number of details given with the different condition on average, giving a higher number of details and having higher accuracy.

Age Differences

Hypothesis 2: Older children (7-8 years of age) will provide more details and be more accurate in the details listed than younger children (5-6 years of age). Thus, a main effect of age is predicted

for number of details given and accuracy of these details for free-recall.

Hypothesis 3:

Focus Questions for fourth day: Those in the "different" condition will be more accurate compared to the control condition, therefore, a main effect of condition is expected for accuracy of focus questions about the last day. As well, a main effect of age is predicted in that older children will be more accurate than younger children.

Focus Questions for last day: Those in the "different" condition and control condition will be equally accurate when asked about the last day, thus, no main effect of condition is expected. Additionally, a main effect of age is predicted in that older children will be more accurate than older children.

Exploratory Hypothesis: We are exploring if asking about a "different" time yields higher source monitoring accuracy than asking about the "last time" (asking about the last time has already been shown to aid children in remembering more about recent times than any other times in between; Powell & McMeeken, 1998). To be clear, we can only analyze this hypothesis with those who are in the "different" condition as the control did not experience a "different day." Thus, a main effect of focus questions is expected for accuracy in that accuracy of the fourth day will be more accurate than the last day.

Method

Design

Refer to Figure 1 for a representation of the design and conditions including which variables are counterbalanced. There were a total of four conditions in the study, a control

condition for 5-6-year-olds (n = 21, 4 of which were 5-year-olds and 17 were 6 year-olds), a control condition for 7-8-year-olds (n = 20, 12 of which were 7-year-olds and 9 were 8 year-olds),in which no "different day occurred. There was a different condition for 5-6-year-olds (n = 18, 5 of which were 5-year-olds and 13 were 6 year-olds) and a different condition for 7-8-year-olds (n = 30, 13 of which were 7-year-olds and 16 were 8 year-olds) in which case both groups had one day that "deviated" from the other four days. Children in each condition participated in the five events (called "Laurier Activities") followed by an interview 3 to 7 days later.

Participants

Eighty-nine 5-to-8-year-olds were recruited from local elementary schools in the Waterloo Regional District School Board (WRDSB), as well as local day cares in the Waterloo region. 49 of the participants were female and 40 were male. A total of 27 stated they were Canadian, 9 identified as Asian, 35 identified as Caucasian, and the remaining 18 did not list their ethnicity or were "other." A total of 77 other children were excluded from the study due to attrition. Reasons for attrition were the child missing at least one event or more, or missing the final interview, errors that occurred during the interview, or parents later decided they did not want their child to miss recess time. School principals and day care supervisors who agreed to participate signed a consent form. Parents of children also read and signed consent forms agreeing to allow their child to participate in the research. Additionally, before each event and before the final interview, verbal assent was received from each child.

Materials

Each event contained 15 target *items*. For example, reading a story would be considered one item (refer to appendix A, B, and C for a full list). Each item has *instantiations* for each event. For example, one day the story (item) was about frogs, the next day about wolves. These specific

variations of the items will be referred to as instantiations (refer to appendices A, B and C for a full list of each group's items and instantiations). There were two groups of events: a "different" condition in which children engage in these events on five different days, with the fourth event being slightly different from the other four days. The second group is a control condition in which all five events are similar with no "different" day. Events were counterbalanced in that those who were in the different condition experienced four days engaging in activities about the human body and a "different" day learning about animals, and some groups engaged in four days learning about animals and one day learning about the human body. In addition, one control condition experienced all five events learning about the human body, while others experienced all five days learning about animals. Counterbalancing in each condition was done to reduce error overall by controlling for any confounding factors such as a child enjoying learning about animals more compared to the human body.

Procedure

Events. Children participated in a total of five events scheduled over the course of three weeks (called the "Laurier Activities"). Events occurred in one of two different schedules: Monday, Wednesday, Friday or Tuesday and Thursday until five events had been reached (refer to figure 1 for a timeline). Trained research assistants (RAs) ran the events and the same assistant ran all five events for a given group of children and is referred to as the *leader*. Events lasted for about 15 minutes in length in groups of about ten children. Within the "different" condition, half of the children experienced four events with activities revolving around the concept of the human body, and one day about animals, and the other half of this condition was counterbalanced and experienced four events with activities about animals, and one day about the human body. For example, in the four human body events, there were items such as a story about the human heart,

a connect-the-dots drawing that makes an ear, and a puzzle of a foot. The remaining event, which was the fourth event, was "different" for this group and was about animals. Thus, on this day, the same items occurred, but the theme was substituted to match animals. For example, the story was about frogs, the connect-the-dot made a seal, and the puzzle was an octopus. Refer to Appendices D and E for script examples of what occurred during the "different" day or a usual scripted day.

The "different" time was purposely placed as the fourth event to ensure that children have developed a script during the first three events before this "different" event occurs. Having developed a script will ensure that the children, especially younger children can differentiate a "usual" time from this "different" time. Older children have been shown to better recall deviations from repeated events due to forming a script quicker than younger children's and thus, the deviations "stand out" more (Farrar & Goodman, 1992). An additional fifth event has been added to avoid having the "different" time also be the *last* time. Having the "different" time also be the "last" time could be problematic because children tend to remember the "last" time better compared to all other events in between, thus, if we placed the different time as the last time there could be confounding results.

Those in the control condition will experience a similar format with five events with different instantiations for the items on each day, however, there is no "different" day. Instead, they will experience a usual scripted episode.

Interviews. Interviews took place three to seven days after the last event and were about 25 minutes in total depending on how much information children remembered. The rationale for this time interval is to ensure children aren't interviewed too soon and relying on verbatim memory, as well as to try and mock real-life scenarios in which children are likely not

interviewed within days of abuse. Additionally, we didn't go any later than seven days for practical reasons with the children's school schedules. Children were assigned to an interview that corresponded to the appropriate event condition they were in, either the "different" condition or control. Trained RAs carried out the interviews one-on-one and were both audio and video-recorded. RAs were both experienced (had carried out similar interviews in past studies) or inexperienced (trained for this study, however, this was their first time interviewing children).

Practice Phase/Rapport Building (approximately 3 minutes)

The practice phase began with the interviewer explaining to the child that during the interview there are no right or wrong answers and that he or she is there to help the interviewer remember what happened at the Laurier Activities. In order to build rapport with the child, he/she was told "tell me something about yourself" (e.g., their favourite sport or their friends at school). Afterwards, children were asked about a repeated event that their parent has already listed on their consent form that the child likes to do (e.g., swimming lessons, hockey, and soccer). The interviewer asks the child to talk about *one* time at soccer. For example, "Your parents told me you really like swimming lessons! Tell me all about *one* time at swimming lessons from the very beginning to the very end." Brubacher, Roberts, and Powell (2011) have shown that using an incident specific practice phase with children who have experienced repeated events helps them to later give more details when asked about a specific target incident compared to those not given a practice phase.

Generic Phase-Free Recall (approximately 5 minutes)

During the generic phase, children were asked to speak about what "usually" happens at the Laurier Activities. This phase helps the child to begin thinking about the Laurier Activities in

general and to give an account of their overall 'script' of the Laurier Activities. Refer to appendices I and J for samples of interview protocol for both conditions).

Target Phase-Free Recall (approximately 4-5 minutes)

This phase of the interview asked children in the "different" condition to specifically talk about the "different" event or to talk about a "usual" scripted day which was referred to as the "necklace time", in which the children wore a necklace that had a jelly bean on it or feathers (whichever was available on the given day). Both the "different day" and "necklace day" were the fourth event. The child was asked, "Tell me about a time that was different" or "tell me about the time you wore a necklace." This phase was direct in its questions to explore how the children remember a time that deviates from the usual script versus just a normal scripted time in the middle of the events.

Focus Questions (approximately 5-6 minutes)

Fifteen focus questions were then given to the child to test recognition memory (refer to appendix F and G). Focus questions were given for the fourth (target) event (for half this is the "different" time and for the other half this is the "necklace" time). Examples of focus questions for the fourth day would be, "What was on the leader's lab coat the different day?" or, "what was on the leader's lab coat the necklace day?" Additionally, focus questions were given to the children asking about the "last" time at the Laurier Activities (thus, each child experienced two sets of focus questions). Focus questions are an additional measure used to capture all details of the event (e.g., in the present study, if the child did not discuss puzzles in free-recall, we can still ask their memory about this item during the focus questions). We also included additional questions about the "last" time as a way to compare if asking children about a "different" time helps children above and beyond just asking about the "last" time which has been shown to be

effective for accurate source monitoring (Powell & McMeeken, 1998). Additionally, focus questions were counterbalanced to reduce fatigue effects (i.e., half the children in both conditions were asked about the last time first and half were asked about the different time first).

Having the opportunity to compare asking children about a "different" time and the "last" time also helps us and other researchers in the future to understand if having a deviation in a script disrupts memory for the whole script (i.e., memory of the "last" time is not very accurate because there has been a deviation in a previous event). These comparisons will aid to discover if asking children about "different" times is beneficial or not for their memory during testimony.

Coding

All data were double coded by two Research Assistants in the Child Memory Lab at Wilfrid Laurier University. If there was a disagreement, the interview was re-coded by both assistants until consensus was met. Coders were trained by the principal investigator.

Free-recall coding

The first portion of the interview was free recall which is broken up into two parts: the first asking what *usually happens* at the Laurier Activities and the second part asking about the fourth event. For both of these sections, the free-recall coding analyzed number of details provided about the Laurier Activities as well as the accuracy of these details.

Number of details were analyzed and coded from the interviews which were transcribed and audio-checked. "Details" are defined as any *items* or *instantiations* the child mentioned about the Laurier Activities. Details were underlined and then recorded in a spread sheet (refer to appendix J for a sample of the coding sheet) and broken down into the items (e.g., puzzle, hangman) as well as instantiations (for a puzzle the instantiations might be octopus, lizard,

dinosaur, caterpillar, and fish). Number of details can be recorded from both sections of the free-recall interview as separate sections on the coding sheet.

The first portion of the free-recall interview was coded for accuracy because when children are given the opportunity to freely discuss generic details, they tend to be more accurate compared to asking about a target time (in this case, asking about the fourth day) (Brubacher, Roberts, & Powell, 2011).

Next, accuracy was recorded on the same spreadsheet and was recorded for the second half of the free-recall interview (just about the fourth event) for both the control condition and the 'different' condition. As shown on the spread sheet, the item the child says is recorded, the occurrence the child stated that it happened (in this case, occurrence 4 which is the occurrence in question), and then the actual occurrence that this item or instantiation took place in. From here, the distance index was calculated to identify the amount of discrepancy from the accurate occurrence to what the child discloses to be "true". Accuracy will inform us of the child's source monitoring rate by calculating a proportion. For example, if the child had five items out of the 15 correct, five divided by 15 is 33% accuracy for the target event (fourth event). The distance index, on the other hand, will allow for determining any patterns, that is, which events children are pulling information from with respect to the target event. For example, if asking about the last day (event 5), and the child pulls a detail that was actually from the second event, the distance index would be calculated by subtracting two from five which is three. Thus, the child is pulling details from three events away for this particular item.

Target coding

Focus questions. The two sets of focus questions were coded with one set asking about the last day of the Laurier Activities and the other set asking about the fourth event at the Laurier

activities (either "different" day or "necklace day"). Accuracy was recorded in the same way as the free-recall section as well as distance index.

Intrusion errors for both recall phases and focus questions were recorded. Intrusion errors are broken down into two types: internal and external. External errors encompass any items the child claims to have occurred that never happened at all at the Laurier Activities at all (e.g., a child saying one day they sat on sleeping bags, which didn't happen on any day). External errors could also occur if the child mistakes an overall item in the Laurier Activities as one of the instantiations. For example, saying on the last day the puzzle was a frog, however, there was *never* a day the puzzle was a frog. Internal errors on the other hand, are when the child mixes up instantiations for a particular item. For example, if on the last day the puzzle was an octopus, but the child says it was a lizard, this would be an internal error because it is true that on one day it was indeed a lizard, just not on the last day. Finally, children's "don't know" responses were also recorded to differentiate these responses from inaccurate answers.

Results

Analytic Strategy

Preliminary analyses were conducted first to identify any unanticipated differences between conditions. Subsequently, inferential analyses were then conducted to investigate the hypotheses of the study regarding age differences and condition differences with respect to source-monitoring scores (accuracy of details) as well as the amount of details given by children. Furthermore, inferential statistics were conducted to identify whether children who experienced a deviation in their script (different condition) give more details and are more accurate in these details than children in the control condition (in which all events were similar and no deviation

occurred). Number of details and accuracy are gathered from children's interviews, which has been separated into three parts. Within these three parts, there are seven dependent variables which will be measured throughout the preliminary analyses. They are as follows: 1. Free Recall Interview-part one, children are asked, "what usually occurs at the Laurier Activities?" Here, the two dependent variables are number of items recalled and number of instantiations recalled. 2. Free Recall Interview-Part two. Children in this part are asked about the fourth event (either, "tell me about a time at the Laurier Activities that was different" or, "tell me about the time you wore a necklace"*)* again, number of items and instantiations are both additional dependent variables that are measured.

The next three measures are all related to accuracy. One accuracy measure is taken from the instantiations listed from part two of the free recall interview (where source monitoring can be tracked as opposed to when asked about what "usually happens" at the Laurier Activities). Next, accuracy scores are gathered from both sets of focus questions, one from the "last day" and one from the "fourth day".

For the purpose of the data analysis, accuracy scores are converted into proportions (i.e., number of correct instantiations divided by the total number of instantiations listed).

As well, the degrees of freedom change depending on if free-recall or focus questions are being analyzed. There were a total of 88 participants who completed the free-recall interview and 89 who completed the focus questions.

Preliminary Analysis

Gender Analysis. To investigate if any gender differences existed in source-monitoring

scores, seven separate 2 (age; 5-6-years-old, 7-8-years-old) x 2 (gender: female, male) analysis of variance (ANOVA) were run for each of the seven dependent variables. First, source monitoring -scores for the free-recall portion asking about what *usually happens* (part 1 of the free-recall interview) focusing on number of items, did not reveal a main effect of gender, $F(1, 84) = 2.032$, $p = .158$, $\eta^2_p = .024$. Similarly, with number of instantiations recalled for this part of the interview as the dependent variable, there was no main effect of gender was not found, $F(1, 84) = .690$, $p = .408$, $\eta^2_p = .008$. Next, focusing on number of items and number of instantiations recalled by children in the second phase of the free-recall interview, where children were asked about the fourth day, there was no effect of gender for number of items recalled, $F(1, 84) = .145$, $p = .705$, $\eta^2_p = .002$, or for number of instantiations recalled, $F(1, 84) = .340$, $p = .562$, $\eta^2_p = .004$.

Accuracy for the free-recall portion of the interview was also a dependent variable in another ANOVA, which did not reveal an effect of gender, $F(1, 84) = .211$, $p = .647$, $\eta^2_p = .003$.

Next, for focus questions that asked about the fourth event, an ANOVA also did not reveal a main effect of gender, $F(1, 85) = 1.268$, $p = .263$, $\eta^2_p = .015$. Lastly, an ANOVA examining accuracy of focus questions asking about the last event also did not reveal a main effect of gender, $F(1, 85) = .443$, $p = .508$, $\eta^2_p = .005$. Since there are no main effects of gender on source- monitoring accuracy for any part of the interview (both free-recall and focus questions), gender was not included as a factor in any following main analyses.

Counterbalancing Event Theme. Although counterbalancing was completed to avoid any unexpected differences in source-monitoring scores among experimental conditions, analyses were still conducted to investigate any condition differences that may exist. As a reminder, both the control and different condition had events about the human body and animals

(this factor is called 'event theme') in a counterbalanced schedule. In order to test the effect of theme on source-monitoring scores, seven 2 (age; 5-6-years-old, 7-8-years-old) x 2 (event theme: animal, human body) ANOVAs were conducted.

First, number of items and instantiations were measured for the first part of the free-recall interview when children were asked about what *usually happens*. The ANOVA revealed no effect of event theme for number of items recalled, $F(1, 84) = .621$, $p = .433$, $\eta^2_p = .007$, or number of instantiations recalled, $F(1, 84) = .246$, $p = .621$, $\eta^2_p = .003$. Next, two more ANOVAS were run to investigate if there were any differences among the two themes for items and instantiations that were recalled for children in the second portion of the free-recall interview, where children were asked about the fourth event. Again, there was no significant main effect of event theme for items, $F(1, 84) = .004$, $p = .953$, $\eta^2_p = .000$, or for instantiations, $F(1, 84) = .009$, $p = .926$, $\eta^2_p = .000$.

Proportion of accuracy of instantiations of the free-recall portion of the interview also revealed no main effect of event theme, $F(1, 84) = .904$, $p = .344$, $\eta^2_p = .011$.

Lastly, ANOVAs were run to test if there were any differences among accuracy of the focus questions for the two different event themes. Results of the ANOVA for focus questions about the fourth event revealed no main effect of theme condition, $F(1, 85) = 1.967$, $p = .164$, $\eta^2_p = .023$. Contrary to our predictions, there was an effect of event theme for focus questions about the last day, $F(1, 85) = 5.817$, $p = .018$, $\eta^2_p = .064$, with those in the human body condition ($M = .249$, $SE = .133$) showing higher accuracy than those in the animal condition ($M = .182$, $SE = .129$). In any further analyses using accuracy of the focus questions for the last day, event theme was tested as a covariate: however, it was not significant when tested in future analyses and was

not included in any further main analyses.

Delay Effects. The amount of time between the last event (fifth event) and the time of the interview is defined as the delay effect. This delay effect could range anywhere from 3-7 days (3, 4, 5, 6, or 7 days). Thus, with a continuous predictor variable on accuracy scores, linear regression analyses were run for each of the seven dependent variables. First, looking at the free recall portion of the interview, and specifically when asked what *usually happens* at the Laurier Activities, a linear regression revealed no significant effect of delay for number of items, $F(1, 86) = 1.297$, $p = .258$, $R^2 = .122$, or number of instantiations, $F(1, 86) = 2.124$, $p = .149$, $R^2 = .155$. Next, linear regressions were both run again for the second part of the recall interview where children were asked about the fourth event (either the normal scripted day-the necklace day, or, the different day). Again, linear regressions revealed that the delay between the last event and the interview is not a significant predictor of number of instantiations remembered for the fourth event, $F(1, 86) = .767$, $p = .384$, $R^2 = .009$; however, delay between the last event and the interview was shown to be a significant predictor of number of items recalled, $F(1, 86) = 5.449$, $p = .022$, $R^2 = .060$. Thus, in future analyses investigating the number of items children recalled from the fourth event in free recall was tested as a covariate since it was significant, but did not remain significant in these future preliminary analyses and was therefore not included as a covariate in any future main analyses.

Next, testing if the delay between the last event and the interview was a significant predictor of the accuracy of instantiations recalled for the fourth event was conducted, which did not reveal to be a significant predictor, $F(1, 86) = .319$, $p = .574$, $R^2 = .004$.

Lastly, delay as a predictor on accuracy for the focus questions was tested. It was found

that delay did not significantly predict accuracy scores for the last day, $F(1, 87) = .031$, $p = .861$, $R^2 = .000$, or focus questions about the fourth day, $F(1, 87) = .100$, $p = .752$, $R^2 = .001$.

Interviewer Effects. Seven independent one-way ANOVAs were conducted, one for each dependent variable. The independent variable was "interviewer" with two levels (Interviewer; experienced or inexperienced). First, for free-recall regarding what *usually happens,* with number of items as the dependent variable, the ANOVA revealed no significant main effect of interviewer, $F(1, 86) = 2.791$, $p = .098$, $\eta^2_p = .031$. For number of instantiations for what usually happens, the ANOVA was also non-significant, $F(1, 86) = 1.402$, $p = .240$, $\eta^2_p = .016$. Next, for the free recall portion of the interview, the ANOVA revealed interviewer to also not be a significant predictor of number of items listed, $F(1, 86) = .294$, $p = .589$, $\eta^2_p = .003$ or for number of instantiations, $F(1, 86) = 1.738$, $p = .191$, $\eta^2_p = .020$.

For accuracy of instantiations for the next portion of the free-recall interview where children were asked about the fourth event, the ANOVA revealed interviewer effects to not be a significant predictor of accuracy, $F(1, 86) = 2.424$, $p = .123$, $\eta^2_p = .027$.

Lastly, ANOVAS were conducted for accuracy of focus questions. Interviewer was shown to be a significant predictor of accuracy for the focus questions about the last day, $F(1, 87) = 4.243$, $p = .042$, $\eta^2_p = .047$, but not for accuracy of focus questions for the fourth day, $F(1, 87) = 1.644$, $p = .203$, $\eta^2_p = .019$.

It is important to note, between experienced interviewers (have conducted interviews outside of the present study in similar research settings) and inexperienced interviewers (those who were trained for the present study but had no previous experience interviewing) were balanced across ages and conditions. Refer to Table 3 for a full depiction of interviewer type

(experienced or inexperienced) and the amount of interviews they conducted for each age group and condition group. Since both types of interviewers interviewed children across both age groups and conditions and were not shown to be significant predictors or details given and accuracy, interviewer effects were not tested as a covariate in any future analyses.

Order Effects. Focus questions were asked about the fourth day (which was either a scripted day for some kids, (i.e., the necklace day or, the "different day" and all children were asked about the last day. These were counterbalanced across conditions in which for half the children, focus questions about the last day were asked first and questions about the fourth day were asked last, and for the other half of children questions about the fourth day were asked first and questions about the last day were asked second to reduce fatigue and order effects. A 2 (Focus question order: Fourth day asked first, last day asked first) x 2 (Condition: Control, Different) ANOVA with accuracy of the fourth day as the dependent variable revealed no effect of order, $F(1, 84) = .005$, $p = .815$, $\eta^2_p = .001$. Running another 2 (Focus question order; Fourth day asked first, last day asked first) x 2 (Condition: Control, Different) ANOVA, but this time with accuracy of the last day as the dependent variable, did reveal a significant main effect of focus question order, $F(1, 85) = .14.94$, $p = .000$, $\eta^2_p = .149$. Thus, regardless of condition, both the control and different condition were more accurate on focus questions if asked about the last day first ($M = .21$, $SE = .13$) compared to being asked about the fourth day first ($M = .16$, $SE = .12$). Thus, there is evidence that fatigue effects do exist for the accuracy of focus questions about the last day at the Laurier Activities (but not for the fourth day). Thus, in future main analyses with accuracy of focus for the last day as the dependent variable, order of focus questions will be included as a covariate.

Descriptive Statistics. Across both the experimental conditions, 88 children participated

in the free-recall portion of the interview and 89 completed both sets of focus questions. Overall, children had source monitoring accuracy of 44% in the instantiations they listed during free-recall. As a reminder, accurate source monitoring is when children accurately state which details came from a particular and isolated event at the Laurier Activities. Source-monitoring scores were also taken from the focus questions. On average, both conditions were 21% accurate when recalling instantiations about the last day, and 20% correct when recalling instantiations about the fourth day.

With respect to amount of detail given, on average during generic instructions, "tell me what *usually* happens," children listed 6 items and 7 instantiations. When asked about a particular event, "tell me about the necklace day" or, "tell me about the time that was different" children on average listed 3 items and 2 instantiations. Thus, from brief descriptive analyses, we see children have higher accuracy (i.e., higher source-monitoring scores) during free-recall than when asked about focus questions.

Main Analysis

The main analysis of the study aimed to test source-monitoring ability of children. The results are reported based on seven main statistical analyses with each representing one of the seven dependent measures which ultimately give insight into children's source monitoring abilities based on condition and age differences. Age differences are tested as well as some exploratory analyses investigating the nature of children's source-monitoring.

As a reminder, Hypothesis 1 predicted the different condition to give a higher number of details (both items and instantiations) than the control group as well as to be more accurate in these details (i.e., higher source-monitoring scores). These analyses will come from data

gathered from the free-recall portion of the interview.

Hypothesis 2 predicated older children (7-8 years old) regardless of condition, to give more details and be more accurate in these details compared to younger children (5-6 years old). These scores are also taken from the free-recall portion of the interview.

Lastly, Hypothesis 3 focused on the focus questions only. Children were given two sets of focus questions (asked about the last day and asked about the fourth day). Hypothesis 3 predicted a main effect of condition in that the different condition would be more accurate when asked about the fourth day compared to the control condition when asked about the fourth day. Additionally, when looking at the focus questions about the last day, the hypothesis predicted a main effect of age in that older children would have higher accuracy than younger children, but regardless of condition (either control or different) should not impact accuracy about the last day, thus, no main effect of condition was predicted for focus questions about the last day.

Lastly, as an exploratory measure, it was predicted those in the "different" condition would have higher accuracy when asked about the "different" day compared to when asked about the last day.

Inferential Statistics

For hypothesis 1 and 2, it is important to note that the same ANOVA was used when reporting statistics for each hypothesis. Thus, a 2 (age; 5-6-years-old, 7-8-years-old) x 2 (condition: different, control) analysis of variance (ANOVA) was run and used when measuring the dependent variables in hypothesis 1 and 2. Therefore, when reading the results, only the relevant portion of the ANOVA is reported for its particular analysis. For example, for

hypothesis 1 measuring accuracy and number of details, only statistics from the condition are reported. For hypothesis 2, only age is reported from the ANOVA.

Number of Details (Hypothesis 1). Details were taken from both parts of the free recall portion of the interviews: the generic part, "what usually happens" and also from the target phase that asked children to speak about the fourth day (for those in the treatment condition this was the "different day" and for others in the control condition this was the "necklace day"). Four separate ANOVAs were run to examine number of details given in order to both analyze number of *items* mentioned by children and number of *instantiations* for both sections of the free-recall interview. First, when asked to generically speak about the Laurier Activities ("what usually happens at the Laurier Activities?"), both the control ($M = 6.33$, $SE = 1.83$) and different condition ($M = 6.15$, $SE = 1.96$) gave similar numbers of items as predicted, and thus there was no main effect of condition, $F(1, 84) = .405$, $p = .526$, $\eta^2_p = .005$.

Another ANOVA revealed the same trend when analyzing number of instantiations for both the control ($M = 7.24$, $SE = 5.24$) and different condition ($M = 7.10$, $SE = 5.10$) for this generic part of the interview. The ANOVA revealed no main effect of condition for number of instantiations given, $F(1, 84) = .086$, $p = .770$, $\eta^2_p = .001$.

Next, number of details from the fourth event was analyzed across conditions. An ANOVA investigated number of items reported by children when asked about the fourth event (for the different condition this was referred to as 'the different day', and for the control condition this was the 'necklace day' in which nothing unusual occurred). The ANOVA for items on the fourth day was tested with delay effects as a covariate which was marginally significant, $F(1, 83) = 3.806$, $p = .054$, $\eta^2_p = .044$. Thus, another ANOVA was run without delay as a covariate which

revealed a main effect of condition, contrary to what we predicted. In fact, results indicate that the control condition (M = 3.21, SE = 1.73) mentioned more items than the different condition (M = 2.20, SE = .1.57) when asked about the fourth event, $F(1, 84) = 8.577$, $p = .004$, $\eta^2_p = .093$.

Another ANOVA revealing number of reported instantiations for the fourth event between the control condition (M = 2.43, SE = 2.30) and the different condition (M = 2.04, SE = 1.70) showed no significant main effect of condition as predicted, $F(1, 84) = 1.46$, $p = .230$, $\eta^2_p = .017$.

Free-Recall Accuracy (Hypothesis 1). Accuracy scores for the free-recall portion of the interview are taken from the listed instantiations of the fourth event. Thus, there was one ANOVA conducted to investigate accuracy. It was expected that there would be a main effect of condition in that those in the different condition would have higher accuracy scores than the control condition. Results from a two-tailed ANOVA did not reveal the expected main effect of condition, $F(1, 84) = 3.19$, $p = .078$, $\eta^2_p = .037$; however, the means were in the predicted direction with the control group's average accuracy of instantiations (M = .35, SE = .39) lower than that of the different condition's average accuracy (M = .52, SE = .45). A one-tailed test was used since hypothesis one predicted a directional trend in that the different condition would have higher accuracy than the control. The one-tailed test revealed a significant main effect of condition, $F(1, 84) = 3.19$, $p = 0.039$, $\eta^2_p = .037$. Refer to table 1 for a table of average accuracy proportions for each section of the interview (including free-recall and focus questions).

In summary, the results show only some support for our predictions stated in hypothesis 1. In the generic phase of the interview ("what *usually* happens"), there were no main effects of condition as predicted. However, contrary to the hypothesis, when focusing on the target phase of the interview where children were asked to monitor-source (i.e., think about the exact details

that occurred for event 4), there was a main effect of condition. That is, children in the different condition reported fewer details than those in the control condition for number of items only (and not instantiations). With respect to accuracy in the free-recall target phase, the different condition was significantly more accurate than the control in the details reported for the target event.

Age Differences (Hypothesis 2). It was predicted that those in the older age group (7-8 year olds old) compared to the younger children (5-6 year olds old) would give a higher number of details during the free-recall interview as well as have higher accuracy in these details, regardless of condition (whether in control or different condition),. For the first part of the interview, where children were asked to speak about what *usually happens* at the Laurier Activities, A 2 (age; 5-6 years old, 7-8 years old) x 2 (condition; control, different) between-subjects analysis of variance with number of items as the dependent variable revealed a main effect of age showing older children ($M = 6.59$, $SE = 1.67$) gave a higher number of details than younger children ($M = 5.79$, $SE = 2.08$) across both conditions, $F(1, 86) = 4.18$, $p = .044$, $\eta^2_p = .047$. Another ANOVA examining number of instantiations for this generic part of the interview did not reveal a significant difference for this type of detail (instantiations), $F(1, 84) = 1.33$, $p = .252$, $\eta^2_p = .016$.

When focusing on the target phase of the interview, where children were asked to talk about the fourth event, we also expected a main effect of age for both types of detail (items and instantiations); however, results did not yield a significant difference in number of items given, $F(1, 84) = .263$, $p = .609$, $\eta^2_p = .003$, or number of instantiations given, $F(1, 84) = 1.329$, $p = .252$, $\eta^2_p = .016$.

An ANOVA was conducted to determine whether older children have a higher mean accuracy score than younger children. For accuracy, only instantiations for the fourth event were

examined because in the generic phase, there is no way to calculate accuracy as the children are speaking generically and are not asked to source-monitor. A 2 (age; 5-6 years old, 7-8 years old) x 2 (condition; different, control) between-subjects ANOVA was also used for this hypothesis with proportion accuracy for instantiations of the fourth event as the dependent variable. The ANOVA revealed no main effect of age, $F(1, 84) = .287$, $p = .594$, $\eta^2_p = .003$.

Hypothesis 2 was only supported for the generic part of the free-recall interview for number of items listed in which, as predicted, older children listed significantly more items than younger children. However, for all other types of details during the free-recall interview there were no significant age differences. Similarly, there were no main effects of age with respect to accuracy of these details, contrary to the hypothesis.

Focus Questions (Hypothesis 3). When analyzing focus questions, accuracy, age differences, and condition differences were analyzed.

Fourth Day. The analyses are split first by looking at each set of focus questions separately. First, focusing on the fourth day across the two experimental conditions, it was predicted there would be a main effect of age with older children having higher accuracy than younger. As well, a main effect of condition was predicted in that those in the different condition would have higher accuracy than the control. Lastly, it was predicted there would be an age by condition interaction for this fourth day in that the difference in accuracy scores would be much larger for older children than for younger children. This prediction comes from the confirmation deployment model which states older children are better able to identify deviations than younger children because they develop scripts quicker and thus have the mental capacity to process the deviations compared to younger children who are still building scripts (Farrar & Goodman,

1992).

A 2 (age; 5-6 years old, 7-8 years old) x 2 (condition; different, control) between-subjects ANOVA was conducted for these predictions with the accuracy of focus questions for the fourth day as the dependent measure. The ANOVA revealed no main effect of age, $F(1, 85) = .113$, $p = .737$, $\eta^2_p = .001$, as well as no effect of condition, $F(1, 85) = .591$, $p = .444$, $\eta^2_p = .007$. Thus, there was also no significant interaction as predicted.

Last Day. It was predicted there would be a main effect of age, with older children being more accurate than younger children. As well, it was predicted there would be no condition differences, in that the control and different condition should remember the last day equally well. A 2 (age; 5-6 years old, 7-8 years old) x 2 (condition; different, control) ANOVA was run with accuracy regarding the last day as the dependent measure. The ANOVA revealed evidence for these predictions as there was no significant condition differences, $F(1, 85) = .511$, $p = .477$, $\eta^2_p = .006$. However, contrary to our predictions, there were no significant age differences, $F(1, 85) = .176$, $p = .676$, $\eta^2_p = .002$.

Within Conditions. It was predicted that those in the different condition would have higher accuracy when asked about the fourth event ("different day") compared to when asked about the last event. This is due to the deviation helping isolate the different day compared to the last which is just a usual scripted day. If this prediction is true, then there should be a main effect of focus questions in that the mean of the accuracy regarding the fourth day will be higher than that of the last day for those in the different condition. In contrast, it was predicted that the control condition would have higher accuracy on the last day compared to the fourth day as the last day has been shown to be more memorable than other scripted times (as the fourth event is) due to its

recency effect. A 2 (age; 5-6 years old, 7-8 years old) x 2 (condition; different, control) x 2 (focus question condition) mixed ANOVA was run, but it was non-significant, $F(1, 85) = .064$, $p = .801$, $\eta^2_p = .001$, revealing that contrary to predictions, the different condition did not have higher accuracy on focus questions about the fourth day compared to the last day and the control condition did not have higher accuracy on the last day compared to the fourth day.

In summary, the focus questions revealed no differences in accuracy scores among conditions. In other words, children in the different condition and control condition performed equally well on focus questions about the fourth day and the last day, contrary to what was predicted. There was also no main effect of age for either set of focus questions, contrary to what was predicted.

Exploratory Analyses: Nature of Children's Source monitoring

Distance Index. First, a distance index was calculated which calculates the "distance" between the child's answer and the actual occurrence of a particular instantiation. Distance index scores were calculated for both the free-recall portion of the interview when children were asked about the fourth event and from the focus questions.

To shed light on how a distance index is calculated, take for example, if the child said on the fourth day the group made a puzzle (item) that was a lizard (instantiation), but in fact, the puzzle was actually a lizard during the first event. In this case the distance index would be 3 (4 minus 1). This distance index was calculated for all of the errors which are referred to as *internal errors* and an average was ultimately calculated. If the average is 2.5 out of the five events, then we can see the child tends to pick instantiations from 2.5 events away from the targeted event. We can also interpret this as the child pulling events from the middle events (because there are

five events total and 2.5 would be in the middle). Another example would be if the child has a score around one, then they are pulling details from only one event away (either before or after) the event they are being asked about. Thus, distance indexes tells us "how far away" children's errors are with respect to the accurate event and lower numbers indicate that the child is confusing the target event with nearby events, temporally speaking.

Three different distance indexes were calculated: one for free-recall (target phase, when asked about fourth day), and one for each of the two sets of focus questions. Results from the free-recall portion of the interview show on average children's distance index was .73 (*SE* .86) with the majority of children having a distance index of 1 and the second highest frequency having a distance index of 2. Thus, during free-recall source-monitoring tasks, children seem to pull details (instantiations) from one to two events away.

For the focus questions, there was a similar trend. When asked about the fourth day, children had an average distance index of 1.5 and standard deviation of .42. When asked about the last day, children had an average distance index of 2.2 and standard deviation of .86. Thus, when children are inaccurate, it is because they are on average showing a tendency to pull information and details from about 2 events away.

With respect to condition differences, both the control and different conditions reported similar answers in that both conditions pulled details from two events away.

Intrusion Errors. There are two types of intrusion errors children can make. As a reminder, *internal errors* (i.e., source-monitoring errors) occur when the child confuses details from one event to another (for example, if the child says on the fourth day the puzzle was a lizard (which was actually a dinosaur), but there was indeed a puzzle that was a lizard during another

event on another day). If the child stated the puzzle was a dog, and there was never a day that had a puzzle that was a dog, it is termed an *external error* because it is 'made-up'. Refer to the coding manual for a full description of each error.

Internal errors represent the number of source-monitoring errors and showed that on average for free-recall, 32% of children's responses were internal intrusion errors, or in other words, inaccurate source-monitoring. Based on condition specifically, the control condition reported more internal errors (M = 1.48, SE = 1.67) than the different condition, (M = .56, SE = 1.04) during the second part of the free-recall, $F(1, 84) = 10.10$, $p = .002$, $\eta^2_p = .107$. In terms of proportions, the control condition's internal errors made up 49.8% of their total responses and only 19% for the different condition.

Focus questions revealed some condition differences as well. Two separate 2 (age; 5-6 years old, 7-8 years old) x 2 (condition: control, different) ANOVAs were conducted with internal errors for the last day as one dependent measure and internal errors for the fourth day as the other dependent measure. First, looking at the fourth day, the control condition (M = 7.70, SE = .379) mentioned significantly more internal errors compared to the different condition (M = 5.362, SE = .368), $F(1, 85) = 19.40$, $p = .000$, $\eta^2_p = .186$. The ANOVA for the last day revealed no main effect of condition, $F(1, 85) = 3.51$, $p = .064$, $\eta^2_p = .040$.

Investigating internal errors as a proportion shows drastic condition differences in the amount of internal errors made. The control condition's internal errors on average made up 49.8% of their total responses, and only 37.3% for the different condition when asked about the fourth day. As well, for proportion of internal errors about the last day, the control condition's responses on average were made of 44.4% internal errors and 40.4% for the different condition.

With respect to age differences, there was no significant effect of age for either set of focus questions. Refer to tables 3, 4, and 5 for average number of internal errors of each portion of the interview based on age group and condition.

Next, analyzing external errors descriptively showed that overall, children tend to make external errors more frequently during focus questions about the last day, (M = 2.20, SE = 1.65) and fourth day (M = 2.15, SE = 1.71) compared to free-recall, (M = 1.08, SE = 1.62), ultimately suggesting children tend to make more external errors during forced-choice style questions compared to free-recall. Also, the control condition (M = 2.67, SE = 1.68), reported significantly more external errors than the different condition (M = 1.79, SE = 1.52), during the focus questions about the last day, $F(1, 85) = 6.68$, $p = .011$, $\eta^2_p = .073$. Means for conditions on the fourth day were in the predicted direction with control condition also giving more external errors than the different condition; however, this difference between groups was not significant.

Younger children were also more likely to make external errors on both sets of focus questions compared to older children, with a significant main effect of age for focus questions about the fourth day, $F(1, 85) = 5.103$, $p = .026$, $\eta^2_p = .057$, with younger children (M = 2.64, SE = 1.84) reporting more external errors than older children, (M = 1.78, SE = 1.52). See tables 6, 7, and 8 for all means for average external errors made for each age group and the three dependent measures (free-recall, and the two sets of focus questions).

'Don't know' responses. The number of times children said "I don't know" or something similar (e.g., "I can't remember", or "I'm really not sure") was also recorded, although it is important to note these could only be collected from the focus questions where children were explicitly asked questions (compared to the free-recall interview). A 2 (age; 5-6 years old, 7-8

years old) x 2 (condition: control, different) ANOVA with number of "don't know" responses from the fourth day as the dependent measure showed that the different condition (M = 3.21, SE = 2.73) gave significantly more "don't know" responses than the control (M = 1.95, SE = 1.97) for the fourth day, $F(1, 85) = 6.204$, $p = .015$, $\eta^2_p = .068$. Another 2 (age; 5-6 years old, 7-8 years old) x 2 (condition: control, different) ANOVA, this time with number of "don't know" responses from the last day, also revealed a significant main effect of condition with the different condition (M = 3.34, SE = 3.37) reporting more than the control, (M = 2.17, SE = 2.05), $F(1, 85) = 4.295$, $p = .041$, $\eta^2_p = .048$.

Both age groups reported approximately the same frequencies of "don't know" responses for the fourth day; however, 5-6 year olds (M = 2.38, SE = 2.28) reported slightly less than the 7-8 year olds (M = 2.80, SE = 2.63). The ANOVAs conducted above showed no main effect of age for the fourth day, $F(1, 85) = .303$, $p = .584$, $\eta^2_p = .004$. For the last day, the two age groups were approximately the same as well with no significant main effect of age, $F(1, 85) = .145$, $p = .704$, $\eta^2_p = .002$. The means show the 5-6-year-olds reported slightly more (M = 2.85, SE = 3.19) than the 7-8-year-olds, (M = 2.74, SE = 2.63).

Deviation Recognition. Twenty-two of the 46 children (47.8% of children) - (31.8% were 5-6-year-olds, and 68.1% were 7-8-year-olds)- in the different condition spontaneously identified that there was a different day (or a 'deviation') in the Laurier Activities in response to the question, "tell me about a different time at the Laurier Activities." They were provided additional clarification if needed, there were up to 4 more "probes" which became more specific as they went on. Those who were not able to identify right away that there was a deviation, on average, needed three more probes. Despite the probes, eight children actually stated that a different day never occurred at the Laurier Activities. Of these eight children, five were in the 7-8-year-old

condition and three were in the 5-6-year-old condition. It is important to note these children were still included in the main analyses as spontaneous deviation recognition was part of the exploratory analysis.

For the control condition, their fourth day was a usual scripted day which was labeled with a necklace. This group was asked, "Tell me about the day you wore the necklace." All except two children in this condition were able to discuss the day with the necklace.

Discussion

The purpose of the present study was to evaluate condition and age differences in source-monitoring ability, and specifically, to identify how a deviation within a script may serve as an aid for children to better recall isolated events. The results regarding these questions are discussed first, followed by findings from exploratory analyses. Implications, limitations, future directions, and contributions are then discussed.

Number of Details. Hypothesis one focused on conditional differences comparing the control group, which engaged in five scripted events, and a "different" condition, which had the same scripted events except the fourth event was a "deviation" from the usual script. Studies focusing on deviations found that compared to typical details, atypical details (i.e., deviations or "differences") were better recalled (Farrar & Boyer-Pennington, 1999; Davidson & Jergovic, 1996). The present study, however, did not find the "different" group to give more details (i.e., better recalling of atypical details) than the control group. In fact, during free-recall of the fourth event, children in the control condition (with all typical details) reported significantly more items than the different condition. These results suggest that perhaps the reliance on a script aided the control condition to recall more items (recall that "items" are generic features of the event).

Thus, in some situations, scripts may actually help children give more generic information (in this study amount of information was measured by number of details listed) compared to relying on deviations.

Source Monitoring Improved Based on Deviations? It was also predicted that the "different" condition would be more accurate compared to the control condition in the details provided. In line with this prediction, there was a significant main effect of condition on accuracy of the details given during the free-recall portion of the interview, but not for the focus questions. This prediction of condition differences was based on script research in which studies show when children rely on scripts, the information tends to be accurate, although lacks specificity (Hudson & Mayhew, 2009; Schank & Abelson 1977). Thus, if children are discussing atypical details from one event, they are more likely to be accurate based on episodic leads and the fact that these details are unique. Additionally, children were also given generic free-recall interviews first asking "breadth" type questions which are general (e.g., "tell me what *usually* happens at the Laurier Activities") and then were asked about a specific day (e.g., "tell me about the *different day"*) which has been shown to help children later give more information, but also more accurate information about a particular event (Brubacher et al, 2011). Thus, in combination with the generic interview and focusing on atypical details, or deviations, it was predicted children in the different condition would be more accurate in which the present study supports for free-recall; however, deviations do not seem to aid accuracy of focus questions.

Difficulties in the ability to monitor source have been documented across the literature illustrating that although children tend to know a lot of accurate information, it lacks specific detail. For example, in the present study, children tend to list a lot of items that did indeed occur

at the Laurier Activities, the real challenge comes when they are asked to monitor source for these details and fully reason about one specific event (in this case the fourth event). The ability to monitor source for one event means the child can tie all the details together to form one single event. As described in the introduction, this ability to successfully trace the origin of details to their source (e.g., knowing if the lizard puzzle occurred in event 4 or event 5), is known as source monitoring (Johnson et al., 1993). In everyday life, the ability to accurately monitor source may not be crucial; however, in instances such as child eyewitness testimonies, children must be able to give specific details of one event in order to be credible (S.v.R, 1989). It is clear then, although the ability to articulate number of details that occurred during an event is important, it is mostly the accuracy, or the ability to monitor source successfully that is crucial to being a credible witness.

With the importance of the ability to monitor source in mind, the investigation of internal errors also revealed the benefits of focusing on deviations within repeated events. Specifically, it was found that for both free-recall and the focus questions about the fourth day, those in the different condition who experienced a deviation actually reported significantly less internal errors than those in the control condition who experienced no deviation. Clearly, the deviation is serving as a type of episodic tool for children to be able to tie details together for one event. This improvement in the ability to monitor source is demonstrated through the higher levels of accuracy and lower levels of internal errors among the "different" condition compared to the control. It is important to note, however, that only significant effects of condition accuracy were revealed for free-recall and not focus questions. Thus, it is unclear if deviations aid in accuracy of focus questions (or forced-choice types).

Lastly, fuzzy-trace theory posits that children are unable to identify specific details of an

event when later asked due to verbatim traces of memory decaying more quickly than "gist" memory which instead of specific details, just allows children to give generic recall of what happened when asked about a specific event (i.e., relying on scripts) (Brainerd & Reyna, 1990). The limitation of script theory is that it is unable to identify how children are able to after periods of delay, identify atypical details from specific events (which are indeed specific details and not just generic information). The present study confirms there is indeed another mechanism that may contribute to the ability to source monitor specific details, and specifically, for all ages as well.

Together, these results clearly indicate a huge effect in an increase in the ability to monitor source if a deviation took place (i.e., higher accuracy for details given during free-recall and lower internal errors when asked about the "different" day in both free-recall and focus questions).

Does Age Influence Ability to Identify Deviations? Hypothesis two targeted age differences in that older children (7-8 year olds old) would give more details and be more accurate in these details (higher source monitoring accuracy) compared to younger children (5-6 year olds old) based on many replicated findings in the literature that source-monitoring ability improves with age, and in particular between ages 3 and8 years old (Roberts, 2002). Results from the study did not fully support this finding as there was no main effect of age for number of details (items and instantiations) for both parts of the free-recall interview. However, there was one main effect of age for number of items given during the target-phase interview, which suggests that older children are better able to give more details about the "gist" of what happens during a specific incident compared to specific details (i.e., instantiations) and compared to younger children.

There was also no main effect of age for the accuracy of details given. Roberts and Powell (2001), however, discuss how children as young as 3 years old are able to develop sophisticated scripts in which they are able to recall many components of the events that do not change very much across events. In the present study, especially with five events, children have the opportunity to develop strong scripts. Thus, this could be an explanation for no age differences in the present study for number of details given.

Additionally, results from the deviation recognition analyses could explain the lack of age differences among number of details given as well as accuracy. Referring back to the confirmation-deployment-model by Farrar and Goodman (1992), it is suggested that older children are better able to identify deviations because they form scripts quicker than younger children. While younger children are still using all of their mental capacity to learn the formation of the script, they lose the ability to identify any differences or deviations in the script, unlike older children who identify these more accurately. In the present study, the confirmation-deployment model was used to predict why there would be age differences. However, the present study shows that scripts can actually be quite robust and form quickly for children who experience them repeatedly. In the different condition, about half of the children (47.8%) knew spontaneously on their own that indeed a deviation occurred within their script (the "different" day at the Laurier Activities). Of these 48%, only .08% never identified a different day. Additionally, with respect to the age differences, 68.1% were in the 7-8-year-old group and 31.8% were in the 5-6-year-old group. It is clear then, that just under one third of the children who were able to identify a deviation were five or six years old, which may explain why no age differences were revealed. Clearly, the use of deviations is beneficial for improving accuracy during free-recall, reducing internal errors in both free-recall and focus questions, and, even

better, is shown to be effective in all ages, even with children as young as five years old.

It was also predicted that children in both conditions – different and control - would perform equally well on the last day. As well, there were some exploratory predictions in hypothesis 3 in that the different condition would have higher source-monitoring accuracy on the fourth day compared to the last in that the deviation of the fourth event would help children better monitor-source on that day above and beyond the last day. First, looking at the last day, asking children about the last day has shown to help children elicit higher accuracy of this day compared to other times in between due to a recency effect (Powell & McMeeken, 1998) and our current results supported this finding as both the control and different condition performed equally well on focus questions asked about the last day. However, when asked about the fourth day, the different condition did not have higher accuracy compared to when they were asked about the last day. Asking children to speak about the last time is therefore still an effective tool. It is important to note as well, having the deviation present within the script did not interrupt script maintenance (as shown with the accuracy of the last day).

As well, with respect to influences from outside the research at the Laurier Activities, children may have experienced either similar events or, been influenced by teachers or parents if they had discussed the activities with the children. For example, Roberts and Powell (2001) discuss how children who experience similar events to the one in question (in this case, perhaps the children engage in similar puzzles or games at home as they did at the Laurier Activities), this could strengthen their memories of these events and later have a positive influence on their source-monitoring of free-recall. However, if the children had conversations about what happened at the Laurier Activities with friends, parents, or teachers in which these outside sources discuss contradictory information (e.g., “you get to colour at the Laurier Activities, don’t

you?"), then the children's accuracy could later be influenced at the interview if they repeatedly face contradictory information. These outside contaminations could potentially explain variability in the data, even though it is speculative.

Lastly, investigating focus questions further, it was predicted older children would be more accurate in both sets of focus questions due to their natural progression to better monitor source with age, but also because of their ability to understand temporal knowledge. In the present study, the focus questions were about two different events that were temporally beside each other - the fourth day and the last day (fifth event). Although research has shown older children to be better at understanding the temporal order of events (Powel & McMeeken, 1998) it is even more challenging for all children to answer questions that are not presented in the same order that they occurred. In the present study, this would be true when children are asked about the last day before they are asked about the fourth day, (Natsopoulos & Abadzi, 1986; Poole & Lamb, 1998 as cited in Roberts, Brubacher, Drohan-Jennings, Glisic, Powell & Friedman, 2015). Thus, age differences may not have existed due to temporal order of questions as well as lack of temporal knowledge across both age conditions.

Exploratory Findings

Exploratory analyses found some interesting results. First, distance index results demonstrate that children regardless of condition tend to recall details (instantiations and items) from events 1-2 away from the targeted event in question, due to their distance scores averaging around 1.5. Thus, if the targeted event was the fourth day, children were on average recalling details from the second or third event, or even the fifth event (which are 1-2 events away from the targeted event, in this case the fourth event).

In addition, there were significant condition differences in terms of internal intrusion errors for the fourth day's focus questions as well as free-recall. Condition differences for focus questions about the last day were close to reaching significance. More specifically, these results showed that children in the control condition reporting more internal errors than those in the "different" condition, which could suggest that the "deviation" aids in reducing internal errors in a very drastic way. Trying to gather details from a scripted day elicits 50% of the total responses to be made of internal errors, whereas, when a deviation is present, only 19% of the total responses are internal errors. Even more interestingly, the deviation could help in reducing internal errors in *both* types of interview techniques used here, free-recall and focus questions (forced-choice questions). External intrusions were also examined, revealing the control condition to also give significantly more errors than the "different" condition when asked about the last day. Means were also in the same direction for the fourth day; however, these did not reach significance. Younger children reported significantly more external errors than older children on the fourth day, but this same pattern was not found for the last day. These results suggest that on average, children make more external errors (i.e., 'making up' information) during forced-choice questions compared to free-recall. As well, younger children overall tend to list more external errors than older children in both types of questions.

Summary. The present study found that having a deviation in the middle of a series of scripted repeated events aids children's source monitoring scores (accuracy) of the information provided during free-recall. Similarly, intrusion errors are significantly reduced in response to both free-recall and focus questions when remembering a deviation compared to a usual, scripted day. No significant age differences arose from any of the analyses regarding accuracy or internal errors

suggesting that both young children, and older children are able to build scripts quickly and use deviations to their advantage when source monitoring. As well, for those tests such as accuracy of focus questions that did not reveal these same condition differences or internal error differences, having a deviation in the script was not detrimental to the accuracy. In other words, although accuracy was not improved and internal errors were not reduced, they were also not significantly jeopardized or less accurate due to the deviation. Thus, it seems deviations overall can be used in both free-recall and focus questions for all ages to improve source-monitoring scores.

Practical Implications and Directions for Future Research

The present study is one of the first to focus on deviations within repeated events in order to help children better source monitor. First, as shown from the results of the study, there are some mixed results both supporting and not supporting the three main hypotheses. First, since there were no significant differences among conditions in number of details given (except for number of items in which the different condition reported more items than the control), deviations perhaps do not necessarily aid children in recalling more amounts of information (number of details), although the deviation does not seem to be detrimental for one group compared to the other. With regards to accuracy, deviations do seem to aid in improving accuracy scores for free-recall as well as focus questions in which a deviation also occurs. Studying internal errors has also illustrated the benefits of focusing on deviations in which by doing so, showed to be effective in reducing internal errors (i.e., improving source-monitoring scores). In other words, it seems if children are able to identify a deviation, or a "different day", they demonstrate fewer errors by not confusing as many details from other days compared to

children who only experienced scripted or "usual" days. These results indicate that future repeated event research and forensic interviewers could implement a component of the interview with instructions for children to focus on a time that was "different." This could be effective in reducing the amount of errors children make and improving source-monitoring accuracy which overall create higher source-monitoring scores and thus, more credibility in the court system (S.v.R, 1989).

When deciding what types of questions to ask children, the present study supported past research that forced-choice questions yield more external errors than free-recall (see Brubacher et al, 2014 for a review). It seems beneficial then to use free-recall questions which are open-ended in nature as much as possible compared to forced-choice questions. Future research should try and gather as much information from free-recall first with a generic phase (e.g., "tell me everything that *usually* happens") and then another free-recall question narrowing down on one isolated event ("tell me all about the necklace time at the Laurier Activities, or tell me all about the time at grandma's house") in which this first generic phase has shown to later help children give more details of an isolated event (Brubacher et al. 2011). As well, the present study, in line with past research, found the forced-choice questions to be lower in accuracy than free-recall due to the implicit and explicit reasoning required (Roberts & Blades, 2000).

The present study did not look at the salient differences among items as it was unclear whether some items were better recalled than others due to their perceptual properties (e.g., colour) in which some items may 'stand-out' more to children and therefore, are better recalled. Future research could separately study each item's instantiations to ensure consistency across each item and each of its instantiations so that one event is not better recalled due to its instantiation being more memorable on that particular day. Although the present study insisted

on ensuring all items were equal in their appearance and experience, some could have been more exciting to the children than others. Thus, it seems there could be "deviations" not just as an event in its entirety, but also at the item and instantiation level. Counterbalancing did take place for the event theme; however, future research could vary which instantiations happen on particular days. In other words, even instantiations could be counterbalanced in future research. For example, the issue of *source similarity* could be relevant here in that source-monitoring judgements are particularly difficult if the properties among the various items and instantiations are very similar (Roberts, 2002). Thus, in the Laurier Activities, these items and instantiations were created by the principal investigator but were not tested statistically if some are better recalled than others just based on their perceptual properties. For example, on the "different" day and the "necklace day" the children sat on garbage bags. During the interview many children were quickly able to identify this instantiation compared to other days (in which children sat on more "typical" instantiations such as carpets or mats). Future research could study "deviations" at this item and instantiation level to test which items are best recalled and if perhaps they are serving as "deviations". Brubacher, Glisic, Roberts, and Powell (2011) demonstrated that children of all ages were more likely to confuse items that vary each time (instantiations) when source monitoring compared to new details that were introduced one time. It is clear then, there is some evidence to suggest that within actual details of an event, some are better recalled than others based on their frequency such as new (occurred once), high (occurred every time), or low (occurred only a couple of times).

Another area of future research could focus on is trying to better understand the mental processes children are undertaking when making source monitoring decisions. Since the use of deviations in repeated events is relatively new in the field of source monitoring, it would be

beneficial to understand how children are reasoning so that interview protocols can be adjusted to fit these criteria. For example, a *think aloud procedure* could be implemented during both free-recall and focus questions to understand not just how children are reasoning, but also during both types of interview styles. As well, this would shed light on the age differences among children's ability to monitor source of deviations.

Similarly, future studies could include adult participants to create a clear understanding of the developmental trajectory of deviations and their influence on source monitoring. Using the *think aloud* procedure in combination with adults could allow researchers to learn more about the internal reasoning skills that take place (as adults may better articulate this than children). From here, changes could be made to the overall methodology (e.g., perhaps making the different day *more* different if adults suggest this wasn't clear enough) which then may influence how younger children are able to use deviations to their advantage in source monitoring.

Finally, future research could replicate the current study by altering the delay period between the final event and the interview. The present study interviewed children anywhere from three to seven days afterwards; however, future research could begin to extend the delay to understand how robust deviations are in source monitoring judgements. The longer delay would also better align with real-life scenarios in which the abuse isn't discussed in a forensic interview until much later after it has occurred. Based on the present study, it would be expected that deviations would be remembered just as well even after a longer delay. Support for this prediction comes from the large effect size in the reduction of internal errors among those who experienced a deviation compared to the children who did not. As well, the lack of age differences shows that even younger children are able to identify deviations even after only three scripted events.

Limitations

There are various types of limitations in the present study. First, like many empirical studies, there is a limitation to the generalizability of the results since the study was conducted in a lab so the results may not be applicable or generalizable to all aspects of real-life. Precautions were taken to try and mimic real-life situations (e.g., variable details in each event, spreading the events out over a span of weeks); however, in everyday life there will be other influences from peers, the environment, and the events that take place. Similarly, the activities children engage in and are later interviewed about at the 'Laurier Activities' are positive in nature and within a group setting. It is hoped that this research can be used for creating interview protocols for children who have been abused and thus, are very much the opposite from the fun and positive environment this research was conducted in. Thus, it is important to apply the results with caution when interpreting the implications. For example, memory may be influenced and retrieved differently under high-stress conditions compared to positive settings such as the Laurier Activities.

Although random assignment and counterbalancing procedures were carried out, we still used a convenience sample that does not represent all populations. Children in the present study represent children from upper-class neighbourhoods all relatively close to one another and, therefore, likely share many characteristics such as ethnicity and socio-economic status that are not attune to random-assignment.

There was also some language or labelling that was confusing for children in the "different" condition. For example, during the target phase of the free-recall interview where children were asked, "tell me about a time that was *different* at the Laurier Activities" some children needed further explanation as to what exactly the interviewer meant by "different." For

example, some children stated a day was “different” because their friend wasn’t there that day, or one day was “different” because the event leader had her hair down instead of having it up the way she usually does. Thus, some children who were listed as not knowing the different day may have actually remembered it, but just weren’t exactly sure about what the interviewer meant by “different.” However, it could also be possible that children are indeed recalling deviations (friend was away when he/she usually is not), but this was not one of the scripted items and therefore the child does not receive credit if they don’t recall a deviation specific to the Laurier Activities. This could be another area for future research to keep track of the different types of deviations children list, even if they are not specific to the Laurier Activities.

In terms of methodology, there are various possible limitations that could help explain why there were no age differences found and in some cases, no condition differences found. Perhaps the delay for all children should remain the exact same as the range from three-seven days could be considered a large amount of time, especially if this time spans over the course of a child’s weekend. It could be that these children had additional distractions and more information influencing their ability to later source monitor compared to children who experienced their last event on a Tuesday, for example, and had their final interview on the Friday.

In terms of focusing on event themes, in this case, one theme was all about animals and one was about the human body. Although preliminary analyses showed event theme to be a non-significant predictor of accuracy and amount of information given, there could still be influence in that children preferred animals over the human body events or vice versa. Perhaps children, especially younger children, are just more familiar with animals compared to learning about the human body and therefore, better recall information about these events. In other words, some

children may have a better knowledge base about one theme than the other.

Repeated events studies tend to have a high level of attrition due to sickness, school trips, assemblies, etc. Thus, every effort was made to try and have the child make it to all five events and the final interview. There was a lot of stress on the research team to ensure someone was always available to interview who is trained. Thus, another limitation of the study is that just based on availability, interviewers could have been distributed more evenly (based on experienced and inexperienced interviewers) as we did not have the resources to do so. This is a limitation because some interviewers build a stronger rapport with children than others which may influence the amount of information children elicit to the interviewer. This limitation could explain why there were no age effects or condition differences.

Lastly, no cognitive measures were taken from children, which would give baseline measures for children's ability to source-monitor. Thus, there was no way to identify if some children had deficits of any sort that may explain some differences among ability to source-monitor such as lower IQ scores. For example, measures of theory of mind or inhibitory control could influence ability to source monitor, especially in younger children (Gerrie & Garry, 2007 as cited in Earhart & Roberts, 2014; Premack & Woodruff, 1978).

Conclusion

The present study predicted that children who had a "deviation" in one of many repeated events would have higher source-monitoring scores compared to children who were asked about a "usual" scripted day. Much script research has shown children remember atypical details (deviations) better than typical details from events. It was also theorized that older children would not only have better source-monitoring scores on this "different" day but also recall a higher number of details than younger children. First, results from number of details provided by

children did not show the group with a deviation to provide significantly more compared to the control. However, when investigating accuracy, the present study found those in the "different" condition did indeed show higher accuracy scores during-free-recall compared to the control condition. Additional analyses also revealed that across all portions of the interview, both free-recall and focus questions, those who were asked about the "different" day reported significantly less internal errors than those asked about a usual scripted day. There were no age differences in accuracy scores or internal errors suggesting that perhaps focusing on deviations works equally well for all ages. Deviation recognition scores support this notion as all ages of children were able to spontaneously identify the "different" day on their own. In summary, deviations do help improve overall accuracy in free-recall as well as reduce the number of source-monitoring errors that children make. Focusing on deviations could therefore be used strategically to aid children in serious situations such as child eyewitness testimony to become more credible. Implications from these research findings provide a knowledge base for how children's errors could potentially be reduced regarding the information they reveal about repeated events in their lives. These findings are significant in the field of forensic interviewing and could be utilized in creating interview protocols.

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Table 1

Condition, by Accuracy Proportions

Condition	N	Free Recall	Focus Questions Last Day	Focus Questions Fourth Day
Control	39	*35.11%	22.61%	20.03%
Different	50	*52.53%	20.47%	21.82%

Note: Significant main effects are * using a one-tailed test. All numbers are total proportions.

Table 2

Number of Interviews Conducted by Experienced and Inexperienced Interviewers

Interviewer	Control	Different	5-6	7-8	Total N
Experienced	24	36	28	32	60
Inexperienced	18	11	11	18	29

Table 3

Condition, by Number of Internal Errors

Interview Type	Condition	N	Mean	Standard Deviation
Free-Recall	Control	42	1.48*	1.67
	Different	47	.52*	1.05
Focus Questions Last Day	Control	42	6.93	2.34
	Different	47	5.90	2.74
Focus Questions Fourth Day	Control	42	7.70*	2.33
	Different	47	5.44	2.54

Note: Significant main effects are * with p< .05

Table 4

Age, by Number of Internal Errors

Interview Type	Age	N	Mean	Standard Deviation
Free-Recall	5-6	39	.95	1.67
	7-8	50	1.05	1.05
Focus Questions Last Day	5-6	39	6.01	2.34
	7-8	50	5.90	2.74
Focus Questions Fourth Day	5-6	39	7.70*	2.33
	7-8	50	5.44	2.54

Note: Significant main effects are * with p< .05

Table 5

Condition and Age, by Number of Internal Errors

Condition	Age Group	N	Free Recall	Focus Questions Last Day	Focus Questions Fourth Day
Control	5-6	21	1.57	6.42	7.67
Control	7-8	21	1.38	7.43	7.71
Different	5-6	18	1.57	5.72	5.00
Different	7-8	29	1.38	6.07	5.72

Table 6

Condition, by Number of External Errors

Interview Type	Condition	N	Mean	Standard Deviation
Free-Recall	Control	42	.76	1.44
	Different	47	1.41	1.72
Focus Questions Last Day	Control	42	2.67*	1.68
	Different	47	1.79*	1.52
Focus Questions Fourth Day	Control	42	2.40	1.58
	Different	47	1.94	1.81

Note: Significant main effects are * with p< .05

Table 7

Age, by Number of External Errors

Interview Type	Age	N	Mean	Standard Deviation
Free-Recall	5-6	39	.95	1.64
	7-8	50	1.18	1.62
Focus Questions Last Day	5-6	39	2.50	1.78
	7-8	50	2.00	1.52
Focus Questions Fourth Day	5-6	39	2.64*	1.84
	7-8	50	1.79*	1.52

Note: Significant main effects are * with p< .05

Table 8

Condition and Age, by Number of External Errors

Condition	Age Group	N	Free Recall	Focus Questions Last Day	Focus Questions Fourth Day
Control	5-6	21	.76	3.10	2.76
Control	7-8	21	.67	2.24	2.05
Different	5-6	18	1.17	1.78	2.50
Different	7-8	29	1.57	1.79	1.59

Events (5)

1. Mon, Wed, Fri, Mon, Wed
2. Tues, Thurs, Tues, Thurs, Tuesday
3. Tues, Thurs, Mon, Wed, Fri

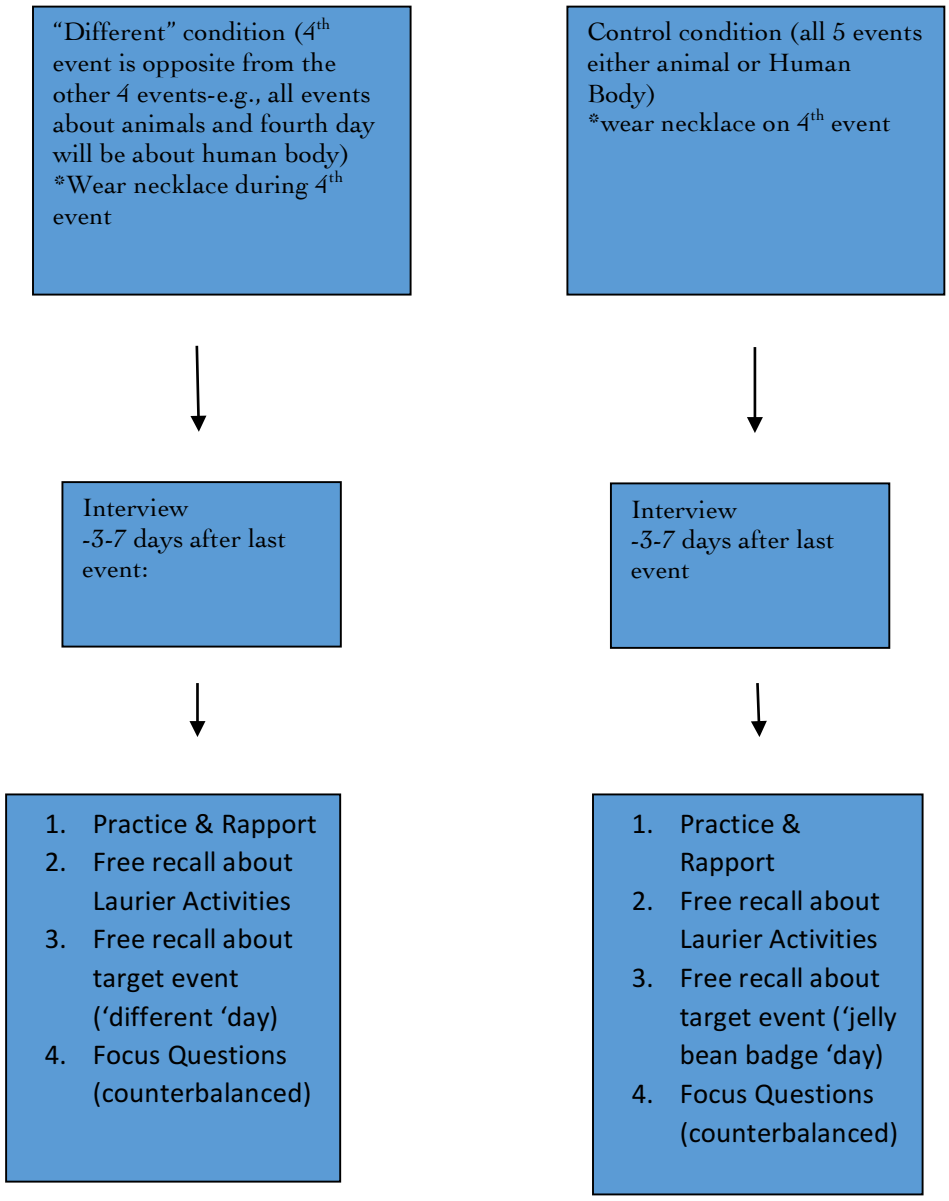

Figure 1. Design summary for events and interview timeline

Appendix A

Item #	Activity (item) HUMAN BODY	Event 1	Event 2	Event 3	Event 4 (wear necklace in both conditions)	Event 5
.	RA puts on laboratory coat (w) assigned human body print out	Lab coat Brain images	Lab coat Lung images	Lab coat Bone images	Lab coat Nose images	Lab coat Eye images
.	Warm-up activity (exercise)	Jumping Jacks (10 secs)	Lunges (10 secs)	Dance on the spot (10 secs)	Touch your toes while standing up (10 secs)	Jogging on the spot (10 secs)
.	Sit down on…	Green Sponge mats	Blue carpets	Number Mats	Garbage Bags	Face cloth
.	Story	Eating & Excreting	Breathing	Bones & Muscles	Brain Power	The Senses
.	Bookmark	Orange circles	Pink Hearts	Happy Faces	Blue Squares	Green triangles
.	Puzzle	Hand	Mouth	Brain	Foot	Eye
.	Hangman/Guess the word?	L U N G	E Y E S	H E A R T	E A R S	B R A I N _
.	I like ___ because	Eyes	Hands	Nose	Teeth	Ears
.	Relaxation	Legs	Neck	Arms	Eyes	Stomach
0.	Getting Refreshed	Hand Sanitizer	Fans (2 small motorized fans to share)	Water	Baby Wipes	Mist bottle
1.	Safety/Health Task	Helmet	Sunglasses	Running	Flashlight	911 sign
2.	Connect the Dots	Tooth	Eyeball	Ear	Hand	Nose
3.	Hide the drawings under	Pillow Case	Baby Blanket	Sweater	Umbrealla	White Garbage Bag
4.	Put the drawings away	Lunch Box	Pencil Case (I have one)	Plastic Bag	Bucket (have one)	Box
5.	Where RA is going after	Going to teach a science class!	Going to teach a gym class!	Going to teach a music class!	Going to teach an art class!	Going to teach a math class!

Appendix B

Item #	Activity(item) ANIMAL	Event 1	Event 2	Event 3	Event 4 (wear necklace in both conditions)	Event 5
.	RA puts on lab coat (w) assigned animal print out	Lab coat Frog images	Lab coat Caterpillar images	Lab coat Turtle images	Lab coat Pig images	Lab coat Fish images
.	Warm-up activity (exercise)	10 horse gallops	10 kangaroo hops	10 frog hops	Slither like a snake 10 X (using hands)	10 crab walks
.	Sit down on…	Green sponge mat	Blue carpets	Number Mats	Garbage bags	Face cloth
.	Story	Spiders (National geographic)	Sharks (National geographic)	Tigers (National geographic)	Frogs (national geographic)	Wolves (National geographic)
.	Bookmark	Orange circles	Pink Hearts	Happy Faces	Blue Squares	Green triangles
.	Puzzle	Octopus	Fish	Dinosaur	Lizard	caterpillar
.	Hangman/Guess the word?	L I O N	B E A R	F I S H	B U G S	G O A T
.	I like ____ because….(printout)	Penguin	Dolphin	Koala	Frog	Fish
.	Relaxation-laying down	Legs	Neck	Arms	Eyes	Stomach
0.	Getting Refreshed	Hand sanitizer	Fans (2 small motorized fans to share)	Water (bring jug and dixie cups)	Baby Wipes	Mist bottle
1.	Safety/Health Task	Water/food for animals (dog dish)	Dog Leash	Dog brush	Animal Exercising ball	Animal Dental care (bought dental dog sticks)
2.	Connect the dots	Duck	Turtle	Rooster	Fish	Seal
3.	Hide the drawings under	Pillow Case	Baby Blanket	Sweater	Umbrella	White Garbage Bag
4.	Put the drawings away	Lunch Box	Pencil Case	Plastic Bag	Bucket	Box
5.	Where RA is going after	Taking Dog for walk	Take my dog to vet	Going to park with my dog	Going to take dog to beach	Taking dog to doggie daycare

Appendix C

Item #	Activity (item) HUMAN BODY DIFFERENT	Event 1	Event 2	Event 3	Event 4 (wear necklace in both conditions)	Event 5
.	RA puts on laboratory coat (w) assigned human body print out	Lab coat Brain images	Lab coat Lung images	Lab coat Bone images	Lab coat Frog images	Lab coat Eye images
.	Warm-up activity (exercise)	Jumping Jacks (10 secs)	Lunges (10 secs)	Dance on the spot (10 secs)	Horse gallops	Jogging on the spot (10 secs)
.	Sit down on…	Green Sponge mats	Blue carpets	Number Mats	Garbage Bags	Face cloth
.	Story	Eating & Excreting	Breathing	Bones & Muscles	Spiders	The Senses
.	Bookmark	Orange circles	Pink Hearts	Happy Faces	Blue Squares	Green triangles
.	Puzzle	Hand	Mouth	Brain	Octopus	Eye
.	Hangman/Guess the word?	L U N G	E Y E S	H E A R T	L I O N	B R A I N _
.	I like ___ because	Eyes	Hands	Nose	Penguin	Ears
.	Relaxation	Legs	Neck	Arms	Eyes	Stomach
0.	Getting Refreshed	Hand Sanitizer	Fans (2 small motorized fans to share)	Water	Baby Wipes	Mist bottle
1.	Safety/Health Task	Helmet	Sunglasses	Running	Water dish	911 sign
2.	Connect the Dots	Tooth	Eyeball	Ear	Duck	Nose
3.	Hide the drawings under	Pillow Case	Baby Blanket	Sweater	Umbrella	White Garbage Bag
4.	Put the drawings away	Lunch Box	Pencil Case (I have one)	Plastic Bag	Bucket (have one)	Box
5.	Where RA is going after	Going to teach a science class!	Going to teach a gym class!	Going to teach a music class!	Take dog for walk	Going to teach a math class!

Appendix D-Control Condition script example

Control Condition-Animal- Event 1

Preparing the children for the Laurier Activities

- Gather the children.
- Say "Hi my name is _____. Who knows the first letter of my name? "That's right. My name is _____and the first letter of my name is '___'."
- Tell them the following: "I've brought you together to do something special with me now. We're going to do the Laurier Activities. Can you say that word for me again?"..... (Children repeat "Laurier Activities").
- Put up the '**L for Laurier'** Poster on the wall just behind you so that the children can see it during the activities. The rules for the Laurier Activities are that when I'm talking you are listening. If you want to say something please raise your hand until I say your name.
- Say "Okay, the first thing we're going to do today for the Laurier Activities is sit down on ***sponge mats***. Place the **sponge *mats*** and instruct children to sit on them. Say "sit on the mat and face me."
- Put on the ***frog*** lab coat. Tell children "There's only one Laurier lab coat and I get to wear it because I'm the leader of the Laurier Activities. I get to tell you what to do".

2. Pre-story (count to 10, then quiet)

- Give the following instructions: "Before we do the story we are going to get warmed-up. I'd like you to stand up and *do* ***horse gallops*** while I count to 10. When I've said 10, I want you to sit down and make sure your mouths are closed tightly, ready for the story."

3. Introduce story and read it out loud

- Say "Today's story is about **Animals**
- Say 'I really like using bookmarks, so I'm going to use this bookmark with big ***Orange circles.***'
- Read a story about animals, it`s all about ***spiders!***

4. Puzzle

- Say "Now we are going to make a **puzzle** together
- Hand out one piece to each child. "Okay, now as a team we will make the puzzle together
- Please raise your hand if you can tell me what our puzzle made today! That's right, an ***octopus.***

5. Game Time-Hangman

- "Okay, so let's play a couple of small games. The first is a guessing game called **hangman**!" "Do you know how to play hangman?" (the word today is **LION**)
- Write the word on the scrap paper _ _ _ _
- Let the children guess a few letters by raising their hands. If after a few minutes the word has not been discovered tell them what it is by filling in the letters to speed up the timing.
- Okay, so what does our word spell? That's right, today's hangman word is ***Lion***

6. Another Game: `Ì like___because…` (<u>Penguin)</u>

- Okay we are going to play another game where you get to say why you like a certain animal.
- Hold up the ***penguin*** card and go to each child so they can say why they like this animal

7. Relaxation activity (Legs)

- "It's now time to do the resting part of the Laurier Activities". TODAY we will be resting our **LEGS**
- Say "I'd like you all to lie down on your backs (legs stretched out straight) and close your eyes - keep them closed and just listen to me."
- "Stretch your **legs** out nice and long across the mat" (wait a few seconds)
- "Okay and now make sure you keep your eyes closed"
- Read the following very slowly and calmly making sure that the children have their eyes closed and are quiet:

"I'd like you to keep your eyes closed and remain very calm and quiet now while we all rest. While we rest I'd like you all to pretend that you are running really fast. As you are resting, think about what it would be like to be run forever and ever and how tired your legs would be. Think about both of your ***legs***… think about how relaxed your legs feel when you finish running. As you breathe calmly and slowly, think about how relaxed your legs feel, think about how soft and warm they are.

- Finish by saying "Now keep your eyes closed while I count slowly to three. When I get to three, open your eyes and sit up. One....Two.....Three....."

8. Getting refreshed

- Say "The next thing to do during the Laurier activities is to make sure that you're all refreshed. It's important to feel refreshed after you've had a rest. Today you all get to refresh yourselves with some ***hand sanitizer***." Teacher squirts a small amount into each child's hands and tells them to rub their hands together until it disappears.

9. Safety/Health Task-Hold up the health and safety sign

- Everytime at the Laurier Activities we do a health and safety task (as holding up the sign)
- Today we are looking at this ***plastic water and food dish***… "How does this keep an animal healthy and safe?" (let the children raise their hand and say why)
- Okay, so what was today's health and safety task? (let them say it out loud)

10. Connect the Dots- (Duck)

- Bring out *paper*
- Say " So next I brought some printouts for us to do **connect the dots** but I'm not exactly sure what it is and I need your help"
- ----Hand out the printouts and markers----
- Say "Okay, great job, what did the connect the dots make?..that`s right! A ***duck***. Now I'm going to put the drawings under this ***pillowcase*** that I brought. Then I am going to take some

of your drawings away and I want each of you to guess how many drawings are left under my ***pillowcase***. *(Let the children guess)*.

- Once everyone has had a chance to guess, count the drawings again and say: "Okay, well the Laurier Activities are almost over, so I am going to need your help putting the drawings away in this ***lunchbox*** that I brought.-Can everyone place a drawing in my ***lunchbox*** for me? "

11. Packing up time and going back to classroom area

- Say "Who can remember what my name is?" Let child answer. "That's right; you remembered that my name is "_____."
- Say "Well that's the end of the Laurier Activities for today. Time to pack up." Make sure they are listening to you.
- Say "We have to pack up very quickly because I'm **going to take my dog for a walk!**
- Say "Well, we are all finished for today. I had a lot of fun. I hope you had fun too. Thank you very much for doing the Laurier activities with me today."

Appendix E-'Different day' script example

Different Condition-Human Body- Event 4-Jelly Bean Badge

Preparing the children for the Laurier Activities

- Gather the children.
- Say "Hi my name is _____. Who knows the first letter of my name? "That's right. My name is _____and the first letter of my name is '___'."
- Tell them the following: "I've brought you together to do something special with me now. We're going to do the Laurier Activities. Can you say that word for me again?"..... (Children repeat "Laurier Activities").
- Put up the '**L for Laurier'** Poster on the wall just behind you so that the children can see it during the activities. The rules for the Laurier Activities are that when I'm talking you are listening. If you want to say something please raise your hand until I say your name.
- **Today is going to be a little bit different. I accidentally grabbed the wrong bag today when I was getting ready to come here this morning. We will still be doing the Laurier Activities but the activities won't be about our usual human body stuff. Instead, everything today will be about ANIMALS**
- ***Also, today we are going to wear feather necklaces since it is a different day***
-
- Say "Okay, the first thing we're going to do today for the Laurier Activities is sit down on **garbage bags** Place the **garbage bags** and instruct children to sit on them. Say "sit on the mat and face me."
- Put on the ***frog*** lab coat. Tell children "There's only one Laurier lab coat and I get to wear it because I'm the leader of the Laurier Activities. I get to tell you what to do".

2. Pre-story (count to 10, then quiet)

- Give the following instructions: "Before we do the story we are going to get warmed-up. I'd like you to stand up and *do* ***horse gallops*** while I count to 10. When I've said 10, I want you to sit down and make sure your mouths are closed tightly, ready for the story."

3. Introduce story and read it out loud

- Say "Today's story is about **Animals**
- Say 'I really like using bookmarks, so I'm going to use this bookmark with big ***blue squares.***'
- Read a story about animals, it`s all about ***spiders!***

4. Puzzle

- Say "Now we are going to make a **puzzle** together
- Hand out one piece to each child. "Okay, now as a team we will make the puzzle together
- Please raise your hand if you can tell me what our puzzle made today! That's right, an ***octopus.***

5. Game Time-Hangman

- "Okay, so let's play a couple of small games. The first is a guessing game called **hangman**!" "Do you know how to play hangman?" (the word today is **LION**)
- Write the word on the scrap paper _ _ _ _
- Let the children guess a few letters by raising their hands. If after a few minutes the word has not been discovered tell them what it is by filling in the letters to speed up the timing.
- Okay, so what does our word spell? That's right, today's hangman word is ***Lion***

6. Another Game: `Ì like___because…` (Penguin)

- Okay we are going to play another game where you get to say why you like a certain animal.

- Hold up the ***penguin*** card and go to each child so they can say why they like this animal

7. Relaxation activity (eyes)

- "It's now time to do the resting part of the Laurier Activities". TODAY we will be resting our **eyes**
- Say "I'd like you all to lie down on your backs (legs stretched out straight) and close your eyes - keep them closed and just listen to me."
- "Okay and now make sure you keep your eyes closed"
- Read the following very slowly and calmly making sure that the children have their eyes closed and are quiet:

"I'd like you to keep your eyes closed and remain very calm and quiet now while we all rest. While we rest I'd like you all to think about how your **eyes** help you every day. As you are resting, think about what it would be like to sleep for a very long time and how relaxed your eyes would be. Think about both of your ***eyes***… think about how relaxed your eyes feel when you wake up in the morning. As you breathe calmly and slowly, think about how relaxed your eyes feel.

- Finish by saying "Now keep your eyes closed while I count slowly to three. When I get to three, open your eyes and sit up. One....Two.....Three....."

8. Getting refreshed

- Say "The next thing to do during the Laurier activities is to make sure that you're all refreshed. It's important to feel refreshed after you've had a rest. Today you all get to refresh yourselves with some ***baby wipes***." Teacher squirts a small amount into each child's hands and tells them to rub their hands together until it disappears.

9. Safety/Health Task-Hold up the health and safety sign

- Everytime at the Laurier Activities we do a health and safety task (as holding up the sign)
- Today we are looking at this ***plastic water and food dish***… "How does this keep an animal healthy and safe?" (let the children raise their hand and say why)
- Okay, so what was today's health and safety task? (let them say it out loud)

10. Connect the Dots- (Duck)

- Bring out *paper*
- Say " So next I brought some printouts for us to do **connect the dots** but I'm not exactly sure what it is and I need your help"
- ----Hand out the printouts and markers----
- Say "Okay, great job, what did the connect the dots make?..that`s right! A ***duck***. Now I'm going to put the drawings under this ***umbrella*** that I brought. Then I am going to take some of your drawings away and I want each of you to guess how many drawings are left under my ***umbrella***. *(Let the children guess)*.
- Once everyone has had a chance to guess, count the drawings again and say: "Okay, well the Laurier Activities are almost over, so I am going to need your help putting the drawings away in this ***plastic bucket*** that I brought.-Can everyone place a drawing in my ***plastic bucket*** for me? "

11. Packing up time and going back to classroom area

- Say "Who can remember what my name is?" Let child answer. "That's right; you remembered that my name is "_____."
- Say "Well that's the end of the Laurier Activities for today. Time to pack up." Make sure they are listening to you.

- Say “We have to pack up very quickly because I’m **going to take my dog for a walk!**
- Say “Well, we are all finished for today. I had a lot of fun. I hope you had fun too. Thank you very much for doing the Laurier activities with me today.”

Appendix F

Focus Questions-McKenzie's Study

ID# _____ Interviewer:_____

tem	Child's answer	OCC	ACC
1. What was on the leader's cloak the time that was different?	E.g., "Frogs"		
2. What was the warm up activity the time that was different?	E.g., "Slither like a snake"		
3. What did you sit on the time that was different?			
4. What was the story about the time that was different?			
5. What was the bookmark the time that was different?			
6. What was the puzzle the time that was different?			
7. What was the word in hangman the time that was different?			
8. When you played the "I like game" what was it the time that was different?			
9. What body part did you relax the time that was different?			
10. What did you get refreshed with the time that was different?			
11. What was the health and safety task about the time that was different?			
12. What was the connect the dots picture the time that was different?			
13. What did the leader hide the connect the dots under the time that was different?			
14. What did the leader put the drawings and markers away in the time that was different?			
15. Where was the R.A. going after the time that was different?			

Appendix G

Focus Questions-McKenzie's Study

ID#_____ Interviewer:_____

tem	Child's answer	OCC	ACC
1. What was on the leader's cloak the last time?			
2. What was the warm up activity the last time?			
3. What did you sit on the last time?			
4. What was the story about the last time?			
5. What was the bookmark the last time?			
6. What was the puzzle the last time?			
7. What was the word in hangman the last time?			
8. When you played the "I like game" what was it the last time?			
9. What body part did you relax the last time?			
10. What did you get refreshed with last time?			
11. What was the health and safety task about the last time?			
12. What was the connect the dots picture the last time?			
13. What did the leader hide the connect the dots under the last time?			
14. What did the leader put the drawings and markers away in the last time?			
15. Where was the R.A. going after last time?			

Appendix H

Interview Protocol- CONTROL CONDITION

- Take notes for each phase & staple to the back to go along with the video recording
- Get the child and say we are just going to go into another room for a few minutes and talk about the Laurier Activities.
- Begin with letting them know there are no right or wrong answers, you just want to know everything that happened at the LA because you can't remember everything and need their help/or you weren't there
- Be sure to hold up child's ID & the date in front of the camera before beginning

Phase 1: Rapport & Practice Combined (3-5 mins or less because there may not be much rapport to build since the kids will know you already from the week)

- Say, "I know you participated in the Laurier Activities this week so we are going to talk about that today, but first, I want to get to know you a bit better.
  - Can say, "Tell me about yourself"
  - If they are stuck:
    -Fave colour?
    -Friends they have
    -Siblings
    -What makes them happy?
    -What they like to do for fun
  - Try and ask them about a repeated event they engage in.. swimming or piano lessons for example (maybe use something they mentioned during the rapport building)
  - Say, " So your parents told me you really like going to swimming lessons. Tell me about ONE time at swimming lessons from the beginning to the end, make sure it is just about one time"
    -If they are stuck or have exhausted everything can try and ask:
    -"What happened after that?"
    -"Tell me more about that"

Phase 2: Generic Phase(4-5mins)

- Say to the child, "Alright, thank you for telling me all about yourself and swimming. Now it is time to talk about the Laurier Activities OR I can't remember everything that happened at the Laurier Activities and I need your help. "Tell me what USUALLY happens at the Laurier Activities"
- Again, can prompt them with:
  -"What USUALLY happens after that?"
  -"Tell me more about that"

Phase 3: Target Phase(4-5mins)

- Here we want to know all about the 4th event, this is labelled as **the FEATHER NECKLACE TIME**
- Say, "Tell me EVERYTHING that happened during the FEATHER NECKLANCE TIME time at the Laurier Activities. Tell me everything from the beginning to the very end during the jelly bean badge time.
- Again, can prompt them with:
  -"What happened after that?"
  -"Tell me more about that"
- Once the child has exhausted everything then ask them the focus questions

Appendix I

Interview Protocol -DIFFERENT CONDITION

- Take notes for each phase & staple to the back to go along with the video recording
- Begin with letting them know there are no right or wrong answers, you just want to know everything that happened at the LA because you can't remember everything and need their help/or you weren't there

Phase 1: Rapport & Practice Combined (4-5mins) Say, "I know you participated in the Laurier Activities this week so we are going to talk about that today, but first, I want to get to know you a bit better.

- Can say, "Tell me about yourself"
- **If they are stuck:**
  -Fave colour?
  -Friends they have/siblings
  -What makes them happy?
  -What they like to do for fun
- Try and ask them about a repeated event they engage in.. swimming or piano lessons for example (maybe use something they mentioned during the rapport building)
- Say, " So your parents told me you really like going to swimming lessons. Tell me about ONE time at swimming lessons from the beginning to the end, make sure it is just about one time"-**if no repeated event mentioned just ask about ONE day at school**
  - -If they are stuck or have exhausted everything can try and ask:
  - -"What happened after that?"
  - -"Tell me more about that"

Phase 2: Generic Phase(10 mins)

- Say to the child, "Alright, thank you for telling me all about yourself and swimming. Now it is time to talk about the Laurier Activities OR I can't remember everything that happened at the Laurier Activities and I need your help. "**Tell me what USUALLY happens at the Laurier Activities?"**
- Again, can prompt them with:
  -"What USUALLY happens after that?"
  -"Tell me more about that"
  -"What was the first thing that happened?" or "last thing that happened?"

Phase 3: Target Phase(8-10 mins)

(Here we want to know all about the 4th event, which was **different** than the rest0

- Again, can prompt them with:
  -"What happened after that?"
  -"Tell me more about that"

1. “Earlier you told me about ____(soccer for e.g.)…soccer happens more than once and you told me about ONE time, SO now, think about the L.A’s. You also did the L.A’s. more than once. Think about ONE time you did the L.A. that was **DIFFERENT** to all the other times.”
***If confused/say nothing was different proceed with:**
2. Sometimes the Laurier Activities were the same, and sometimes they were different, tell me about a time at the Laurier activities that was different
***If still struggling, can bring in something they brought up from the generic phase:**
3. You mentioned the story was about _____(frogs, or the brain, etc). Was it always about animals/human body on all the days or just one of the days or just one? **(if they did not say specifically what the story was about just move to step 4)**
4. Was there a time the story was about the human body? (or animals…Opposite of what child says) Was the story about the human body on one day or more than one day?
***Here, depending on the child’s answer try and get more info:**
A) If they say it was one time, ask more about that one time
B) If say more than one day, ask same question but about animals/human body (opposite of what they originally said)
5. As a last resort, identify the child’s condition (refer to list) and explicitly say:
A)Tell me all about the day when all the activities were about the human body
B) Tell me all about the day when all the activities were about animals

- Once the child has exhausted everything then ask them the focus questions

Appendix J

Child ID ____________ Age _____ Group ______ Condition __________

	ITEMS			INSTANTIATIONS					
Section	Lines	Items	Type	Lines	Instantiations	Type	AccOcc	Child Occ	Distance