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ABSTRACT

Research into repeat event memory in children is mixed as to whether one particular experience is retrievable in memory. While the application of script theory predictions would suggest an inability to keep memory for particular instances together, fuzzy trace theory (FTT) would advocate the continued separation of memory traces representing each instance. These two theoretical conceptions led to divergent predictions in terms of the pattern of children’s memory errors and the organization of variable details. Part 1 of the present research investigated the pattern of children’s memory errors to determine whether children intrude from one particular dominant non-target instance, consistent with FTT, or randomly across all non-target instances, consistent with script theory. Part 2 examined the organization of details that varied across repeated stories using a computerized recognition memory task that cued responses based on detail categories or stories. Overall, results support a script theory conception of event memory in children.

Keywords: Children; Repeated Event Memory; Script Theory; Fuzzy-Trace Theory; Variable Details; Memory Errors
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INTRODUCTION

According to the World Health Organization, an estimated 40 million children fall victim to some form of abuse each year (2001). A more recent 2003 Stats Canada survey on child and youth victimization reported that children and youth accounted for 61% of all reported sexual assault cases, and 21% of all physical assault charges (AuCoin, 2003). Sadly, these estimates may only reflect the handful of cases that are actually reported to authorities. In fact, after coding police and hospital records involving child sexual abuse allegations in an Illinois county, Martone et al. (1996) found that only 30% of the 451 original allegations resulted in criminal charges.

Up until the mid 1980’s, Canadian courts were extremely resistant to rely solely on the uncorroborated evidence of an unsworn child (Bala, 1999). Because the child is often the only witness in cases involving child sexual abuse, prosecutors ran into incredible difficulties securing convictions. Relatively recently, stringent legal rules that first prohibited then discouraged reliance on the uncorroborated evidence of a child have been discarded (Connolly & Read, 2003; Bala, 1999) and more efforts have been made to support child witnesses in the courtroom. From admittance of videotaped interviews and out of court statements, to more appropriate evaluations of competence to testify, the justice system has advanced in addressing these shortcomings in cases involving children (Bala, 1999; McNichol, Shute, & Tucker, 1999).

The nature of child abuse is such that many allegations involve abuse that had occurred repeatedly (i.e. more than one time) (Powell et al., 1999). For the allegations
that actually result in legal proceedings, often the child is required to provide a detailed statement of the abuse (Roberts & Powell, 2001). This obligation is in accord with the specificity principle (see R. v. B(G), 1990; Guadagno, Powell, & Wrigth, 2006), which may require a specific and detailed account of a particular instance(s) of repeated abuse. While this legal principle offers defendants the opportunity to distance themselves from the allegation, the task proves to be especially challenging for children, increasing the opportunity for seemingly inaccurate or inconsistent statements.

Before beginning, I will define some terms used throughout this thesis. The term event, as it is used throughout the current research means the entire sequence in a series of similar instances. Conversely, the term instance represents one particular episode from this series of events. For the sake of minimizing repetition, occurrence, instance and episode will be used interchangeably. Also, when discussing event details the current research is discussing particular elements of an instance that may be different or the same across other experiences with the event. The various types of event details will be discussed with greater specificity when discussing their differential effect on memory strength.

The study of repeat event memory in children is an area of research that not only informs forensic interviewing protocols, but advances our theoretical understanding of memory development in children. The purpose of the current research is to address an underlying assumption found within the existing repeat event literature, and ultimately the current standards guiding forensic interviews with children. The assumption that memory for a particular instance of a repeated event remains, in part, intact underlies research on attempts to optimize accurate retrieval of episodes. However, it may be the
case that these memories do not in fact remain intact, and thus children are simply unable to accurately reproduce a particular occurrence of a repeated event in its entirety. In order to fully understand event memory in children and to optimize current interviewing techniques, this underlying question addressing memory for an instance must be answered.

To date, script theory has been the dominant theoretical approach found within most repeat event literature. Script theory language and framework is often employed to explain emerging themes and empirical findings in much of the existing research. However, another theoretical approach, fuzzy-trace theory (FTT), has proliferated into the repeated event literature, providing a slightly different interpretation and leading to a novel set of predictions. While it has yet to make explicit predictions in terms of memory for an instance of a repeated event, it has been used to explain related phenomena, such as false memory in children for details of an experienced event (see Brainerd & Reyna, 1998), and thus specific predictions can be inferred.

The purpose of the current research is to examine both script theory and FTT in terms of their ability to explain memory for a particular instance of a repeated event. Memory organization will be examined using two different techniques. The first involves the coding of errors in past interview transcripts with repeat event children and the other entails the reading of stories and a memory test on a computer. This computerized memory task gauges both the speed (RT) and accuracy of responses in hopes of providing new insight and improved understanding of event memory organization. Reaction time studies have been successfully applied in the examination of script memory in adults (Bellezza & Bower, 1981; Galambos & Rips, 1982), thus the current study hopes to
extend this application to research with children. Because both script and fuzzy trace
theory provide slightly different interpretations of memory for repeated events, greater
consistency with one particular set of theoretical predictions may shed light on event
memory organization in children. Following a brief overview of past literature on the
differing theoretical perspectives, memory for particular details of an event will be
discussed in hopes of highlighting gaps in current knowledge and providing a theoretical
foundation for the current set of hypotheses.

Theoretical Overview

Script Theory

Script theory offers a schema-based framework specifically designed to explain
repeat-event memory organization (Adams & Worden, 1986). Originally proposed by
Schank and Abelson (1977), script theory proposes that script memory is a sequentially
organized, goal-oriented, general representation of what is most likely to occur in any
given experience with an event (Nelson & Gruendel, 1986). Script theory posits that
when children experience a novel event, they extract the typical features and develop a
dynamic set of expectations which help them to understand and predict future encounters
(Fivush, 1984; Connolly & Price, 2006).

In one of the first studies to explore script theory application in children, Fivush
(1984) examined the development of a school-day script in a group of kindergarten
children. Fivush found that after just one experience with a school day routine, children
were able to form a general event representation. This emerging script was evident in
their verbal responses to both general and specific recall questions, with responses often
presented in the correct sequential order, using timeless present tense, and with a high
degree of abstractness in their language. Nelson & Gruendel (1986) found that children as young as 3 years structure commonly experienced routines according to a general representation. Their reports were typically goal-directed, highly organized, and discussed in generalized terms.

Script theory makes strong claims for the negative effect of a generalized script on memory for any one particular instance. When children attempt to recall episode specific information, often the result is a mixture of general, script-based information with specific episodic details (Hudson & Nelson, 1983). Even when certain script-consistent aspects, aspects seen as typical of the particular event in question, are missing their presence will often be inferred based on the overwhelming strength of the general representation (Erskine, Markham, & Howie, 2001). Overall, research has consistently shown the strong effect of general event scripts, and the resulting loss of or confusion between details associated with specific instances (e.g. Fivush, 1984; Farrar & Goodman, 1992; Farrar & Boyer-Pennington, 1999; Hudson, 1990). While early script theorists suggested a loss of information related to particular instances and pointed to the overpowering effect of the general event script, later research eluded to the possibility of persistent instance memory. For example, research grounded in script theory has found heightened ability to recall particular occurrences of a repeated event when item-specific retrieval cues are used (Fivush, 1984; Pearse, Powell, & Thomson, 2003). This would suggest an ability to retrieve complete instances from memory. However, the theory does not do well in explaining how these instances may be differentially stored apart from the general script. Nelson (1986, p.232) stated that the inherent strength of the general representation may or may not negate the possibility of an episodic representation, clearly
displaying the uncertainty within the field when it comes to memory for instances. Thus what is certain within this theoretical understanding is that after some period of time, confusion often arises between target and non-target instances and that this confusion can be explained by the reliance on a generalized event script.

The purpose of the current study is to examine this notion of instance memory inaccessibility. If it is the case that memory for an instance is quickly lost, it should not be possible to retrieve an instance in its entirety.

**Fuzzy Trace Theory**

FTT arose in part to explain research results pointing to a disassociation between memory for different aspects of the same stimulus, more specifically memory for meaning and memory for surface structure (Reyna & Brainerd, 1995). The theory proposes the parallel encoding and storage of two distinct representational units. Thus, each new experience with an event lays two separate memory traces, one for the exact surface form of the experience, the verbatim trace, and another for the underlying meaning, the gist trace. Brainerd & Reyna (2004) conceptualize these two representational structures in terms of an actual experience (verbatim trace) versus an understanding of that experience (gist trace).

FTT is commonly explained according to 5 basic principles. The first, parallel storage, posits that the verbatim and gist traces are encoded in parallel. Rather than one informing the other, they independently process incoming information (Brainerd & Reyna, 2004). The second principle, dissociated retrieval, presupposes independent retrieval of the two traces. With some cues activating the retrieval of the verbatim traces, and others acting as retrieval cues for the gist trace. Of particular importance to the
current research, the third principle involves the differential survival rates of the two memory traces. Verbatim traces, which contain the exact surface form of the event, become inaccessible at a faster rate than gist traces (Brainerd & Reyna, 1998). FTT does not however suggest a complete loss in the verbatim information, instead merely implies its inaccessibility as the trace begins to disintegrate (Brainerd & Reyna, 1998; Reyna, 2000). This process of disintegration eventually does lead to the loss of the original verbatim trace, however fragments may later be restored and reintegrated depending upon the strength of retrieval cue (Reyna, 2000). The fourth theoretical principle involves the nature of explicit recollections, with gist traces recalled based on a sense of familiarity with the presented stimulus, and verbatim traces recalled based on item-specific retrieval cues. Susceptibility to false, but gist-consistent information is more likely to occur in the absence of a strong verbatim trace (Brainerd & Reyna, 2004; Holliday, Reyna, & Brainerd, 2008). The fifth and final principle involves the developmental variability between verbatim and gist trace acquisition, with younger children generally more reliant on verbatim traces due to their underdeveloped ability to extract common meanings from a set of related events (Brainerd & Reyna, 2004).

While FTT has yet to provide an explicit prediction in terms of memory for an instance of a repeated event, one can be inferred on the basis of the aforementioned principles and related findings. Each time an event is experienced, a new verbatim trace will form and the gist trace will be activated. The number of experiences with an event will therefore dictate the number of verbatim traces stored within memory, and the strength of the related gist trace. Providing insight into the effects of repeated experience, Holliday, Reyna and Brainerd (2008) examined wordlist repetition and susceptibility to
false gist-consistent lures. Results indicated that repetition of the same word list strengthened the associated verbatim traces, and thus encouraged verbatim trace retrieval at recognition. Thus repeated experience with an event seemed to strengthen memory for an instance, so long as the instances were presented in identical ways each time.

When children are responding to questions regarding one particular instance of an event that differed every time, it is essential that they retrieve the target verbatim trace. This verbatim trace will hold all the details specific to that target occurrence. Difficulty in accessing this trace may arise as a result of various factors, one of which being the speed at which verbatim traces disintegrate. Reyna and Kiernan (1994) were only able to consistently access the correct information from the verbatim trace when providing the recall tasks immediately following encoding. If the recall task was provided following a delay, confusion between instances ensued. This confusion may arise when the child is left relying on their gist trace, or on a non-target verbatim trace.

Rather than reliance on the gist trace being explained solely by the disintegration of the verbatim trace, research has actually shown that repeated experience with an event creates a gist trace that is stronger than any one particular verbatim trace. This is because repeated experience with an event may lead to a continual reactivation of the same gist trace. Thus, when an event is experienced multiple times, the gist trace may become stranger than any one of the individual verbatim traces, and comes to overshadow responding (Connolly & Price, 2006).

Attempts to retrieve an instance of a repeated experience may also lead to the retrieval of a non-target verbatim trace simply due to the increased number of available and relevant verbatim traces. With a number of related verbatim traces closely associated
due to a similar gist trace, it is possible that the child may simply activate the wrong trace at retrieval, leading to errors if the verbatim traces are not all the same (Reyna & Lloyd, 1997; Tuckey & Brewer, 2003).

The purpose of the current research is to examine this notion of memory organization for an instance. If it is the case that memory for details of a specific occurrence are held together within a distinct and separate verbatim trace, then theoretically it is in fact possible to accurately retrieve memory for an instance in its entirety, so long as it has not yet disintegrated.

In sum, research has consistently found that the more experience one has with an event, the less able one is to accurately distinguish between particular instances (e.g. Hudson, 1990; Farrar & Goodman, 1992). Script theory would attribute this phenomenon to the overwhelming strength of general event scripts and the lack of tight associations of details to their experienced instances. Conversely, FTT may suggest that confusion between instances is due to either incorrect reliance on a gist trace when the verbatim trace is needed, or simply the retrieval of the wrong verbatim trace. While script theory posits an inability to keep memory for details of one particular instance together, especially after a delay, FTT implies continued separation of event details within memory, with details being stored within differential verbatim traces representing each experience with an event.

**Event Details**

Events consist of a set of related details. The organization of these details can have a major effect on the recall of any one particular instance. These event details can be classified as either fixed (unchanging across experiences), or variable. Further, details
that change across occurrences can either be predictable or unpredictable variation. Predictable variation can be defined as expected variability in event details, whereas unpredictable variation involves unanticipated change in the instantiation of event item(s). According to script theory, all of these detail classifications play an important role in memory strength for particular instances of a repeated event.

Details that are fixed across occurrences are remembered extremely well by children experiencing an event multiple times (McNichol et al., 1999). Research has consistently shown that children are highly resistant to any type of suggestion regarding this type of event detail (Connolly & Lindsay, 2001; Powell, Roberts, Ceci, & Hembrooke, 1999). When a child reports a fixed detail from an instance of a repeated event it cannot be determined which instance the child has retrieved. Thus, reports of fixed details provide little to no insight into episode specific memory.

While unpredictable variation is not the primary focus in the current study, research has shown its utility in understanding a child’s ability to remember an instance. Hudson and Nelson (1983) suggest that particular episodes of a repeated event are marked by their distinctiveness from the general event pattern. Research into memory for a deviant instance has often found that memory is stronger than memory for a typical occurrence (Farrar & Goodman, 1992; Fivush, Hudson, & Nelson, 1984; Hudson & Fivush, 1991). Farrar and Goodman (1992) found this to be especially true for older children, who seemed better able to form separate memories for both the routine and the deviation. Hudson and Fivush (1991) found that children were able to remember specific aspects of a class trip to an archaeology museum after a 6 year delay, with the details most commonly recalled being those that made the event distinctive from other routine
museum trips. Most of the existing research on deviations has focused on memory for the deviant part of the instance rather than memory for the routine details within the instance that was deviant. Thus it may not be the case that the entire episode is better remembered, but merely the aspects of the episode that differ from expectation. In fact, more recent research suggests that a deviant episode may only lead to heightened memory if it affected how the entire episode was experienced (Cox & Connolly, 2009).

The aforementioned deviations involve the presentation of atypical event details. These atypical details are a form of unpredictable variation, and involve unexpected items presented within a typical instance. Script theorists have argued that these atypical details are not in fact absorbed into the general representation, but rather stored separately and simply tagged to the event script (Adams & Worden, 1986; Graesser, Woll, Kowalski, & Smith, 1980; Hudson, 1988). While initially memory for these atypical details may be stronger than memory for typical details, they are also likely to be quickly forgotten (Graesser et al., 1980). Further research has shown that atypical details that are disruptive to the goal of the event (Hudson, 1988), or implausible within the context of the event (Davidson & Hoe, 1993) are retained in memory longer than irrelevant unpredictable details.

While script theory can account for the increased strength of memory for atypical details, and can be seen throughout most if not all the existing literature on unpredictable variation, FTT may have a more difficult time explaining how deviant episodes may make some verbatim traces more accessible than others. Because details, both typical and atypical are similarly stored within the verbatim trace for the particular instance, it is unclear how memory could be stronger for the unpredictable variation within an instance.
Of particular interest to the current research is predictable variation in event details. An example of this type of event detail in a typical school day could be a toy played with at recess or in class. While the particular toy may differ across days, the act of playing with a toy will not. Predictable variation in event details has been shown to cause children a great deal of confusion when attempting to remember a particular instance. While children of all ages come to expect this element of variability (Kuebli & Fivush, 1994), they often have a difficult time attributing the details to the correct instance. Research has consistently shown that children are able to retain the content of these details for longer than they are able to retain their source, with the source providing the much needed link to the occurrence in which the detail took place (Powell & Thomson, 1997; Powell & Thomson, 2003).

Script theory conceptualizes organization of these variable details as a series of lists associated with the general event script. With each detail associated with a list-like structure containing other details from different occurrences that share the same function within the event (Lucariello & Nelson, 1985; Slackman & Nelson, 1984). For example, every time the child visits the magician, he wears a different colour of cape. Thus within the general script for the magic show, a child may have an open-slot category for the varying colours of the cape, with each experienced colour forming a different instantiation within the list of alternatives. This list of experienced options provide children with a set of expectations about how that details will be experienced in the future. In sum, according to script theory, fixed details become permanent fixtures within the general event script while variable details simply resemble an open space that can be filled by any one of the items within the list of previously experienced alternatives.
While FTT has yet to explicitly state predictions in terms of variable detail organization, the application of its theoretical constructs would lead to a different interpretation from that of script theory. FTT may suggest that each particular instantiation of a variable detail is simply stored along with the appropriate verbatim trace for that particular instance. Because the source of the detail is said to be encoded and represented within the verbatim trace, confusion between details could be conceptualized as the result of failed verbatim retrieval, or the retrieval of a non-target verbatim trace (Roberts, 2002).

**Memory Errors**

The errors in recall resulting from variable details within a repeated event provide a great deal of insight into the organization of event memory in children. In terms of script theory, research has shown that the lists of item alternatives cause children a great deal of confusion. As the lists of slot-fillers begins to form, the details themselves lose their connection to the original source (i.e. the instance in which it originally occurred). Thus, memory for the detail itself (content memory) and memory for the original location of the detail (source memory), seem to become disassociated. Conversely, fuzzy-trace theorists suggest that both content and source memory are stored within the same verbatim trace, with source memory simply disintegrating at a faster rate.

This disassociation between memory for content and memory for source can be seen in the nature of children’s memory errors. Repeat event children are highly prone to internal intrusion errors from non-target occurrences of an event. That is, they often include a detail from a different instantiation when attempting to remember details specific to one occurrence (Connolly & Price, 2006; Farrar & Goodman, 1992; Hudson,
Such errors suggest that memory for the content may remain longer than memory for source. Powell and Thomson (1997) closely examined internal intrusions of variable details to independently evaluate memory for content and memory for source. Children experienced six occurrences of a repeated event, and were tested either one week or six weeks after the final occurrence. Powell and Thomson measured the proximal distance of internal intrusions to the target occurrence, and found that intrusions were mostly one or two instances away from the target after the one week delay, but became randomly distributed across all occurrences after the six week delay period. The researchers concluded that source and content memory decay independently, with source memory fading more rapidly. This result has also been shown in studies where children are able to accurately list all of the particular instantiations across occurrences, yet are unable to connect these instantiations to the instance in which they were presented (Powell & Thomson, 1997; Powell, Thomson, & Ceci, 2003). Internal intrusion errors attributable to a loss of source information can be understood according to both script theory and FTT. However, the particular processes responsible for such errors are differentially explained by these two theoretical perspectives.

As previously discussed, script theory would account for these internal intrusion errors as retrieval of the wrong detail from the associated list of experienced details. The slot-filler lists merely store the content of the experienced detail without corresponding retention of any source information (Powell et al., 1999). Therefore, the reproduction of any one particular instance in its entirety may simply involve a random combination of variable details across occurrences.
FTT on the other hand would assume that both the content and source of details are stored with the verbatim trace for the particular occurrence. Because source information fades more quickly than memory for content (Reyna & Lloyd, 1997), when trying to retrieve one particular trace on the basis of when it occurred may lead to the activation of a related verbatim trace, or the reliance on the gist trace for the experienced event. If it is the case that confusion arises from the inaccurate retrieval of a non-target verbatim trace, one would expect that all or most memory errors involving non-target details would be from the same verbatim trace, not from a random assortment across various non-target instances. Absent from any FTT literature is the suggestion that details within a verbatim trace for an instance disassociate and re-associate with related details from other verbatim traces.

In Part 1 of the current study these two conceptualizations of internal intrusion errors were examined. Support for script theory would be found should internal intrusion errors show a more randomized pattern of distribution among non-target instances. Conversely, FTT predictions would be demonstrated should any sort of tendency towards one particular non-target instance be found.

**Delay and Memory for Details**

Research has consistently demonstrated the detrimental effect of delay on memory for the variable details of a particular instance (Hudson, 1988; Hudson, 1990; Powell & Thomson, 1996; Powell & Thomson, 1997). An early study by Slackman and Nelson (1984) investigated children’s recall of particular details from similar stories, and found that immediately after presentation they were able to report specific story items, but after a delay they began reporting more generalized details. In terms of error rates,
delay to test consistently increases the rate of internal intrusions (Hudson, 1990). Powell and Thomson (1996; 1997) found that both the rate and distance to target of internal intrusions significantly increased as a function of delay.

Script theory suggests a quick transition from what immediately may involve specific memory for an instance, to a generalized script organization. This transition results in a reconstructive memory process, in which recall becomes a mixture of script-based inferences and random allocation of variable details. Erskine et al. (2001) examined the number of script-consistent inferences made when script central details were omitted from a slideshow presentation depicting a typical visit to McDonalds. They found that after a one week delay, children across age groups tended to make more script-based inferences than those tested immediately after the presentation. Because a delay increases reliance on the general event script, it can be expected that children’s organization of variable details quickly becomes list-like. The details across occurrences that share the same function within the script will become increasingly disassociated with their original source as they come together to form the list of potential fillers. Therefore, while children may immediately keep details organized by episode, after any sort of delay, memory should transition to a general event script with a categorical organization of variable details.

FTT, on the other hand, doesn’t necessarily predict a change in organization with time, but rather an inaccessibility of the required information. Delays decrease the likelihood that the target verbatim trace will be accessible within memory. There is a disintegration of verbatim details, but these details do not forge into a new organization, in fact, in certain circumstances these details can become re-associated within the original
verbatim context (Reyna & Lloyd, 1997). Therefore, according to FTT, memory for an instance and the organization of variable details doesn’t necessarily change over time, all that changes in the accessibility of the target verbatim trace.

The purpose of the present research was to examine organization following a brief delay in hopes of determining which theory may provide a more accurate account. If it is the case that organization quickly becomes more categorically based, as predicted by script theory, then providing children with category cues should lead to faster, more accurate recognition. Conversely, if it is the case that organization is instance based, than memory should be faster and more accurate for instance based cues. Because both theories would tend to predict that memory for instances remain intact immediately following presentation, theoretical differences were only expected following a brief delay.

**Reaction Time (RT)**

The current research offers a novel approach to a question much in need of addressing regarding memory organization for an instance of a repeated event. While reaction time (RT) paradigms have consistently provided useful information in terms of memory organization, they had yet to be explicitly applied in research on repeat event memory in children. A perfect example of the utility of RT methodology in understanding memory organization can be found in a study by Galambos and Rips (1982). The researchers examined memory for routines in an undergraduate population in hopes of determining the better predictor of event memory organization, sequential ordering or centrality of episode details. One of their four experiments involved a membership judgement task in which participants were simultaneously given a particular
activity paired with a header, and asked to judge whether the activity was a component of the header’s routine. For instance, for the header “Change a tire”, participants would have to decide whether “take off the hubcap” was part of the associated routine. They postulated that should event memory be organized based on sequential ordering, reaction times should be faster for earlier activities within the routine. Conversely, should organization be based on the centrality of the activity within the routine, reaction time should be faster for central activities. Results across the four similar reaction time studies found that subjects were faster at confirming activities that were central to the routine (Galambos & Rips, 1982). This successful application of a RT paradigm to the study of event memory organization lends support to the methodology used within the current research. Although this study utilized an adult population, RT paradigms have been successfully used with children across a wide variety of subject areas (e.g. Fry & Hale, 1996; Montgomery, Magimairaj, & O’Malley, 2008; Montgomery & Windsor, 2007; Ellis, Ellis, & Hosie, 1993).

Current Research

The purpose of the present research was to investigate memory organization for an instance of a repeated event in children. By employing a two part study and examining two different theoretical models, it was hoped that the current study would help address the question of whether an instance composed of details that vary can in fact remain retrievable in its entirety.

In Part 1, interview transcripts from a past repeat event study were re-coded to examine the pattern of internal intrusions for each participant. A more random dispersion across instances would support script theory literature, while a preferential trend towards
one particular non-target instance would strengthen fuzzy trace perspectives. Based on the few studies that have previously examined this form of memory error (e.g. Powell & Thompson, 1996; 1997), it was expected that children’s errors would be more random, especially after any sort of delay.

Part 2 involved the presentation of repeated stories and a computerized memory test gauging children’s response time (RT) and accuracy. Previous research into repeat event memory has either relied on existing scripts within children’s memory (e.g. Fivush, 1984; Slackman & Nelson, 1984) or has experimentally created memory for a new routine (e.g. Price & Goodman, 1990; Connolly & Price, 2006). Based on the approach by Slackman and Nelson (1984), the 2nd part of the present study attempted to tap into a familiar routine through a series of stories. Children listened to six consecutive stories dealing with a commonly experienced routine, visiting a friend. Each story contained twelve critical details, with each serving as an exemplar for an overarching detail category. Within each story, a different instantiation from each of the twelve detail categories was presented, thus each story involved a different, but related set of critical details.

Approximately three hours following the presentation of the final story, children were asked to complete a timed recognition task on a laptop computer. The children were presented with recognition cues ordered by detail categories (category cue condition), or according to the original story order presentation (story cue condition). Because the effectiveness of a memory cue depends upon its ability to tap into information as it is naturally stored (Tulving & Thomson, 1973), it was hoped that differential rates of
responding and overall accuracy between the two cue conditions would provide evidence for the nature of memory organization.

A reliable way to assess accuracy in this type of recognition task is through the application of Signal Detection Theory's sensitivity index \((d')\), which represents the ability to discern signal from noise. While E-prime computes an overall accuracy index for each participant simply based on the number of correct responses, Signal Detection Theory provides a means of quantifying decision making made in the face of uncertainty. Thus its use within the current study allowed for a better examination of responses across the two conditions. A sensitivity index \((d')\) was computed for each participant using their hit and false alarm rates. These individual \(d'\) values were averaged within each condition to establish a sensitivity index for each condition. Higher \(d'\) values denoted heightened discriminability between the critical details (the signal) and the foils (the noise). Signal Detection theory also allows for the separation of this response sensitivity from any sort of responding bias (Stanislaw & Todorov, 1999). Therefore, response bias, \(Criterion\ C\), was quantified, which allowed for the examination of the propensity to respond based on a strategy rather than memory (Gee & Pipe, 1995). Thus faster responding, higher accuracy and elevated \(d'\) values were qualified through the examination of response biases.

If it is the case that children come to store information according to script theory, with variable details represented as a list of possibilities associated with a particular function within the script, memory tasks ordered according to the detail categories should lead to faster recognition and higher overall accuracy and \(d'\) values than tasks ordered according to the particular stories. However, if it is the case that children store each
individual instance in a separate verbatim trace, with variable details from an instance hanging together, than story ordered memory tasks should lead to faster recognition and higher overall accuracy and $d'$ values than category ordered tasks.

In accordance with script theory research, it was hypothesized that reaction times, overall accuracy and $d'$ values would be higher in the category cue condition than the story cue condition. It was expected that children would come to organize their experiences according to detail categories rather than through the continued separation of each particular story.
PART 1: PATTERN OF CHILDREN’S MEMORY ERRORS

Method

Participants

Interview transcripts from thirty-two 1st and 2nd grade children were used for the analyses. Original consent for the memory interviews was obtained from both the relevant school board and parents prior to participation.

Materials

The internal intrusion coding relied on transcripts from a memory interview conducted in Spring 2007 by Connolly and Gordon. The transcripts of interest for the present coding were those in which the child experienced similar instantiations of the event in question a total of six times. Children were asked to describe the last instance only. These interview transcripts and their corresponding counterbalancing sheets were used to examine the total number of internal intrusions per child and from which non-target instance the intrusions originated. New coding sheets were created to allow the research assistants responsible for coding to easily indicate the instance from which each intrusion originated (see Appendix A for an example of the coding sheet).

Procedure

The purpose of the original study was to examine children’s memory for personally experienced events versus memory for stories. The event in question was a magic show, with some children participating in the live event and others listening to
stories. Children were exposed to the magic show or stories either once, four times, or a total of six times. For the purpose of the present study, only the interviews of children exposed to either the story or live event six times were utilized. The memory interview was conducted one week following the final experience (the target experience) with the event or story. These interviews involved a series of general, instance-specific, and cued questions. Responses to the specific and cued questions were used for the present study, as internal intrusions are not possible when children are merely asked when generally happens when they experience the event in question and so the coding of such response was not necessary.

Coding

One undergraduate research assistant coded all thirty-two transcripts. Her task was to locate all details within each interview transcript that had originally been coded as an internal intrusion. Once these details were located, the coder had to find each detail on the master counterbalancing sheet to determine in which instance it had actually occurred. Once the instance of origin was located, the coder would place a check mark on the coding sheet in the relevant instance column. The total number of internal intrusions per transcript was also recorded for each participant.

To ensure the accuracy of the aforementioned coding, a separate research assistant coded a set of 7 transcripts (approximately 20%). Inter-coder agreement was computed as (agreements / agreements + disagreements) x 100 (i.e. percentage agreement). Disagreements between coders arose when marking the instance of origin or tallying the total number of intrusions per transcript. Overall, inter-coder agreement was 95%.
Results

To better understand how far internal intrusions were from the target instance, a series of distance scores were computed for each internal intrusion and a mean distance score was computed for each child. Distance scores were computed by subtracting the instance from which the intrusion originated from the instance number that represented the target occurrence. This target occurrence was always the sixth and final event experienced, thus all distance scores would involve a subtraction from six. The maximum distance score that could be achieved in this calculation was five, with this figure representing the distance from the first non-target experience to the final, target occurrence. Overall, children’s internal intrusions were 2.5 instances ($SD = .78$) away from the target instance. This indicates that most internal intrusions did not come directly from non-target instances close to the target.

In the current analysis I was interested in discovering whether the internal intrusion pattern for each child was random or involved one particular dominant instance. It would have been uninformative to compute chi-square statistics across participants. To do so would reveal an overall intrusion pattern only if children’s intrusions tend to come from the same dominant instance. However, it is possible that the particular instance from which children’s intrusions derive is idiosyncratic. If so, an average may mask the presence of dominant instances for individual children. Thus a series of individual chi-square analyses were conducted.

To examine whether internal intrusions were dispersed randomly across non-target instances or predominantly from one particular non-target instance, a series of chi-square goodness of fit tests were conducted for each child. The expected values used for
these computations were the total number of internal intrusions for a particular participant divided by five, with five representing the total number of non-target instances from which the internal intrusion could arise. Thus each instance had an expected value equal to 20% of the total number of intrusions. The error rate for this set of analyses was set at \( p = .1 \). While this heightened p-value increased our chances of a Type I error, it simultaneously decreased the possibility of a Type II error. Given the small \( n \) and subsequently low statistical power, it was important to increase our chances of finding significant differences between instances should they exist. Even with a liberal criterion, significant chi-square values were only found for five of the thirty-two children, indicating a random pattern of internal intrusions across all non-target instances for a majority of children. Table 1 presents a list of internal intrusion patterns and chi-square values for each participant.

Because of the low statistical power in the aforementioned chi-square analyses, further computations were conducted on each child’s pattern of internal intrusions. The proportion of internal intrusions from each instance was calculated for every child (see Table 2 for these proportion values). If the proportion for one particular instance was above a pre-determined cut-off value, that child’s proportion score for that one instance was used in the calculation of an average proportion score across participants who reported from a dominant instance. The cut-off value employed was 50% to ensure that at least half of all intrusions came from the same non-target occurrence, indicating the presence of a dominant non-target instance. Overall, nine of the thirty-two children met this criteria for having a dominant instance (five of the nine had significant chi-square values in the calculation mentioned above). The average proportion across these nine
children was 61.92% ($SD = 10.27$), indicating that, among children who reported from a dominant instance, only about two thirds of all internal intrusions came from the dominant instance.

A chi-square analysis was conducted to determine whether one of the five non-target instances was more consistently dominant. For those participants whose proportion scores revealed a dominant instance, the number pertaining to the dominant non-target instance was recorded. A chi-square analysis compared these numbers across participants to see if one particular instance was more likely to be dominant. Results of this analysis revealed a significant difference between instances, with the fifth instance, the one closest to the target, significantly more likely to be the dominant instance than the other non-target occurrences ($\chi^2 (4, N = 9) = 8.14, p < .1$).

**Discussion**

The aim of Part 1 of the current study was to determine which theoretical conception had more power to explain internal intrusions in memory reports of children who repeatedly experienced an event involving predictable variation. Script-theory posits that predictable variation is organized as a list-like storage of details (e.g. Lucariello & Nelson, 1985). Because variable details are not closely linked to particular instances, retrieval of particular detail from the list is expected to be unsystematic *vis a vis* instances. Therefore, dispersion of the intrusions from across the instances is expected to be relatively random. While FTT has not explicitly attempted to explain this type of memory error, predictions can be implied from their conception of memory organization. FTT may explain this form of error as resulting from the inaccurate retrieval of a non-target verbatim trace. Because memory for each instance is said to be organized within
separate and distinct verbatim traces, retrieval of one particular detail is dependent upon which verbatim trace has been accessed. It is unlikely that a different verbatim trace would be accessed each time a question is asked about a variable detail of a target instance. Therefore, internal intrusions would tend to result from the one non-target experience that was incorrectly retrieved. Consistent with the current hypothesis, the overall pattern of internal intrusions across children was mostly random. While a small minority of children did appear to intrude from one particular dominant instance, most did not. Thus support was ultimately found for script-theory's understanding of memory errors in children who have experienced an event multiple times.

The results of the present study are consistent with past research examining repeat event memory in children. In their review of the literature, Hudson, Fivush and Kuebli (1992) explained that children experiencing an event multiple times are often confused as to the temporal location of specific variable details. As stated by Powell and Thomson (1997) their errors are generally random and seem to reflect the arbitrary retrieval of details from a list of similar details sharing the same function within the general event script. Powell and Thomson found that children seemed to be able to report experienced instantiations of a particular variable detail but do not appear to be able to attribute details to particular instances. While all studies examining repeat event memory in children note the prevalence of internal intrusion errors in their results, few actually examine the patterns of internal intrusions to expand understanding of how these details may be stored in memory. In fact, only one past study examined this phenomenon as a way of better understanding event memory organization (see Powell and Thomson, 1997). Powell and Thomson were interested in understanding the differential organization of memory for
source and memory for content. To do so, the researchers compared the proximity of internal intrusions to the target occurrence after a one week delay and a six week delay. Overall, children's internal intrusions clustered around the target occurrence following the one week delay but became more random after a six week delay. Powell and Thomson speculated that this change in internal intrusions indicates a more rapid loss of source information, a loss that was independent of memory for content. The current research included an analysis of this type of memory error in hopes of supplementing past findings and informing predictions for Part 2 of the present study. Overall, the results of the current research support a script theory organization of event memory in children.

An interesting finding from the present analyses was the difference between non-target instances in the likelihood of being dominant; the fifth non-target occurrence was significantly more likely to be reported by children who reported from a dominant instance. One explanation for this significant difference between non-target instances can be found in the research by Powell and Thomson (1997). As previously stated, Powell and Thomson found that internal intrusions become more random with time. Following a week long delay between final experience with the event to the memory interview, children's internal intrusions were close in proximity to the target instance. However, after a six week delay, these errors were more random. In fact, they were fairly evenly distributed across all non-target occurrences. Therefore, because children in the current research were tested after only a one-week delay, it could be reasoned that some degree of clustering around the target instance may still prevail for some children. This is consistent with the current finding that, when there was a dominant instance, it was most often the non-target instance closest in proximity to the target occurrence. Results from
Powell and Thomson would also explain why a dominant instance for some children exists at all given the more random pattern found in the majority of children. It can be expected that provided with a slightly longer delay, all children would show a more randomized pattern of intrusions across all non-target instances.

A potential challenge to the current conclusion is the possible misinterpretation of FTT and the resultant failure to accurately postulate predictions. Because fuzzy trace theorists have yet to explicitly state hypotheses for the organization of variable details from a repeatedly experienced event, the predictions articulated within the present research could be mistaken. While past research into memory for repeated word lists have suggested separate and distinct verbatim traces for each list (Holliday et al., 2008), perhaps the presentation of an event relevant cue primes all verbatim traces at once. Thus the expectation that internal intrusions should come from a single instance could be false. If all verbatim traces are simultaneously retrieved, intrusions could be a random selection from across all instances without challenging FTT as a theoretical model. Part 2 was designed to further investigate the relative efficacy of Script theory and FTT to explain memory organization for instances of repeated events. While predictions for FTT may have been mistaken in Part 1, it was hoped that results obtained from Part 2 could less easily be refuted on the basis of inaccurate assumptions.

Part 2 of the current research involved the presentation of repeated stories that contained 12 critical details that varied across story presentation. For each critical detail, the different instantiations came from the same categories (e.g., all animals). A recognition test of all experienced details and foils was used to measure children’s response time (RT) and accuracy. The memory test differed between children, half were
presented with words in order of detail category (category cue) and others were presented with words according to the original story order presentation (story cue condition). If children come to store information according to script theory, with variable details represented as a list of possibilities associated with a particular function within the script, memory tasks ordered according to the detail categories should lead to faster recognition and higher accuracy. However, if it is the case that children store each individual instance in a separate verbatim trace, with variable details from an instance organized together, then story ordered memory tasks should lead to faster recognition and higher accuracy. Even if all verbatim traces are primed at the same time, leading to a random distribution of internal intrusions, FTT would still fail to predict a categorical organization of variable details. Even increased reliance on the gist trace would not account for this type of organization, for variable details are said to be exclusively stored within verbatim traces. Therefore, even if the articulation of predictions for FTT in the present research was not entirely sound, the theory would still have difficulty accounting for the categorical organization of details from across experiences.
PART 2: ORGANIZATION OF VARIABLE DETAILS

Method

Participants

One-hundred and twenty-two children were recruited from two public schools from the Vancouver School Board. The ages of children ranged from 9 to 11 ($M = 9.84$, $SD = .80$), with fifty 9 year olds, forty-one 10 year olds and thirty-one 11 year olds. There were 63 males and 59 females in the study. Participants were randomly assigned to a story order presentation and condition, with an almost equal distribution of participants to orders (range from 28 in Order 3 to 34 in Order 1) and exactly equal distribution of participants to the category and story cue condition (61 in both conditions). All participants were asked which hand they most often used when writing prior to the completion of the memory test, with 112 reporting their right hand and 10 reporting their left. Consent for participation in the study was obtained via consent forms sent home with parents (see Appendix B for a copy of this form). These forms were distributed and collected by teachers. Assent was obtained from the children before the study began.

Materials

Six script-based stories were created, with each story containing twelve critical details that varied across narratives. Based on the script stories utilized by Slackman and Fivush (1984), each story involved a "visit-a-friend" narrative, in which the underlying theme involved a commonly experienced childhood event, a visit with a friend. Each of
the 12 critical details varied across stories; with each offering a new instantiation from
the same overall detail categories (see Appendix C for a list of story details). The detail
categories and exemplars used to create the stories were taken from Price and Connolly
(2006). While only 6 exemplars for each category were needed to generate a set of six
stories, 12 were in fact used in order to properly counterbalance across story orders and
generate an equal number of related yet non-presented foils for the memory task.

A total of 24 stories were created, six for each of the four story order
presentations. The purpose of the different story orders was to minimize potential item
effects arising from heightened familiarity for specific exemplars (see Bjorklund &
Bjorklund, 1985), as well as reduce position effects resulting from repeatedly presenting
the same set of items in precisely the same order each time (see Lippman, 1974). Each
detail category exemplar served as a presented detail exactly twice and as a foil in the
recognition task exactly twice (see Appendix D for a detailed counterbalancing form).

All stories were printed and bound using presentation folders with translucent
covers. Coloured animations were used on each page to increase the salience of the
critical detail mentioned on the particular page and to make the task more engaging for
the children. To further increase the salience of the critical details, on each page the
details was bolded and written in a slightly larger font. The stories were named according
to the days of the week. With each day (except Sunday) depicting a different visit the
main character “Sue” had with her friend (see Appendix E for an example of the stories
used).

E Prime software was used to digitally present the memory stimuli to participants
and subsequently record their response times and accuracy. The program was loaded onto
3 Dell laptops, each with slightly variant screen sizes and a previously loaded E-prime run license. The computer response keys selected for the task were 'b' and 'n', with 'b' representing a Yes response to the stimuli and 'n' representing a No response to the given stimuli. These keys were used due to their proximity on the keyboard and the close association 'n' would have with No. A small piece of paper was taped to each keyboard with a reminder of which key represents which response option.

Two separate experimental files were created using E-Prime, one for the category cue condition and the other for the story cue condition. For both files, each of the four orders was entered, with selection at test based on computerized counterbalancing by participant number. This was done to ensure each participant was tested in accordance with the particular story order they received, for targets and foils did vary between orders. The presentation of targets in the story cue condition involved the presentation of all details from one particular story together with the random insertion of foils. Both the order in which the stories were presented at test and the selection of foils from a master list were completely randomized in this condition. Conversely, in the category cue condition, targets and foils from the same detail categories were presented together. The order in which the categories were tested was randomized, however due to the need for detail category consistency in targets and foils at test, the presentation of foils was not completely random. Using a random sequence generator, the places in which the foils appeared within the test was in fact randomized, however the foils that were selected and placed into the particular slots were not. Overall, 144 stimuli (72 targets and 72 foils) were presented to participants in both the story cue condition and the category cue condition.
A set of very brief instructions was created on E-prime and displayed on the monitors. A practice session was also created using E-prime software in order to fully orient the children to the repeated pressing of the ‘b’ and ‘n’ keys. The practice session involved the random presentation of the words *Yes* and *No* on the computer screen and required the corresponding response keys to be selected in order for the next word to appear. Practice sessions are generally advisable when working with children due to their potentially limited experience with this type of computer task (e.g. Nakamura et al., 2006) and to ensure thorough understanding of the procedure to be used at test.

All test stimuli were shown in the center of the screen in 22 pt. font. A black background with purple writing was used for the instructions and a white background with black font was used at practice and test. The test was programmed so that each stimulus would remain on the screen until a response key was selected. The lag between stimulus onset and response key selection served as the reaction time measurement produced by E-prime.

**Procedure**

Children were taken from class in groups of four to seven, depending on the number of consent forms received, in order to complete the first portion of the study. The researcher conducted brief rapport building with each group prior to the commencement of the study in order to ease their apprehension and increase their overall comfort within the study environment. This first portion involved the reading of stories. This portion generally took between 30 to 35 minutes to complete. Upon arrival to the designated reading area, children were told that they would be listening to a series of stories depicting a visit Sue had with her best friend. They were told to pay close attention to the
stories and pictures because their memory for the stories would be tested later that day (see Appendix F for these verbal instructions). Between each story, the children would engage in some form of distracter task to ensure their continued interest and to minimize the possibility of the stories sounding like word lists. The distracter tasks involved either brief exercises, such as jumping jacks, or a very quick game of Simon Says.

Approximately 3 hours after having heard the stories, children were again removed from class to complete the memory test portion of the study. The memory test portion of the study took between 10 to 15 minutes to complete. Because only 3 laptops were available, children were removed in groups of two or three. At this stage, participants were randomly assigned to a condition and given an official participant number to be used when setting up their memory test on E-prime. Participant numbers assignment was not chronological or random, but rather based upon the story order presentation the particular child received.

Before children were assigned to a laptop station, they were asked a few basic demographic questions pertaining to their age, primary language spoken at home, hand in which they use to write and whether they had any major vision problems. Past RT studies have asked similar questions in order to test their effects on variables of interests and ensure they are not responsible for differences within the data (e.g. Nakamura et al, 2006).

Participants were then assigned to a workstation with a laptop. While slightly different depending on the particular day and school arrangement, each laptop station involved a desk and chair placed in the corner of a room against a wall, largely out of sight from the other participant(s) also completing the task. All participants were given
the same set of verbal instructions before they began their test (see Appendix G for these instructions). As an important part of these instructions, all were told the importance of responding both as quickly as and as accurately as possible (see Montgomery & Windsor, 2007) in hopes of reducing the potential for a speed-accuracy trade-off (see Reed, 1973). Children were also reminded of the key to press when they thought they heard the particular word in the stories earlier that day and conversely, the key to press when they didn’t think they heard the particular word in the stories. Brief written instructions were also on their screen reinforcing the response buttons to be used during the test (see Appendix H for these instructions).

Before the official memory test began, children were instructed to complete the practice session. In order to start the practice session, they were to press the space bar. Following the practice session, the written set of instructions reappeared on the screen. Children were instructed to wait until all others had completed the practice session before beginning their memory test. This was done to ensure that all participants started the memory test at the same time. An additional set of verbal instructions (see Appendix G for these additional instructions) were provided to participants before beginning the memory test and all children were given the opportunity to pose any additional questions. Once all participants in the small group had completed the test, they were thanked for their time and rewarded with a Child Memory Lab Certificate and a brand new pen or pencil of their choice.
Results

Data Preparation

Based on the outlier removal practices and cut-off selection criteria of most RT studies (e.g. Montgomery & Windsor, 2007; Montgomery, Magimairaj & O'Malley, 2008), all RT values falling ±2 SD from a child’s own mean RT were labelled as outliers and subsequently removed. On average, approximately 10 of the 144 total values (SD = 3.47) were eliminated per child following a careful scan of all raw RT scores and the application of the cut-off scores outlined above. This trimming procedure was done across all RT scores and did not differentially affect RT scores for hits, false alarms, correct rejections and misses. In order to re-establish a complete data set following the removal of the aforementioned outliers, the pre-trimmed mean RT for each child replaced all eliminated values (see Montgomery & Windsor, 2007). This complete trimmed data set was used for all statistical analyses described below.

Also, to ensure differences in the variables of interest (RT, accuracy and $d'$) were not associated with particular demographics of the sample, one-way ANOVA’s and independent sample t-tests were conducted. No significant differences were found as a result of age, sex, handedness, location of testing, vision impairments, or story order presentation.

Reaction Time

To determine whether the speed of responding differed across cue condition, an independent-samples $t$-test was computed on trimmed mean RT scores. Results of this analysis revealed that participants in the category cue condition were significantly faster at responding than those in the story cue condition ($t(120) = -4.150, p < .001$). The effect
size for this relationship was medium-to-large, *Cohen's d = .75*. Refer to Figure 1 for a depiction of these results. More specifically, participants in the category cue condition were significantly faster at responding to targets and foils than those in the story cue condition (*t*(120) = -4.36, *p* < .001; *t*(120) = -3.67, *p* < .001). Further, participants in the category cue condition were significantly faster at both correct and incorrect responses compared to those in the story cue condition (*t*(120) = -4.12, *p* < .001; *t*(120) = -2.60, *p* < .01; see Table 3 for a reporting of all mean RT scores).

**Accuracy**

An analysis function in E-prime DataAid provided a mean overall accuracy score for each participant based on the proportion of correct responses, including the correct acceptance of targets and the correct rejection of foils. An independent-samples *t*-test was computed on overall accuracy scores. Results showed significantly higher overall mean accuracy for those in the category cue condition than the story cue condition (*t*(120) = 4.14, *p* < .001; see Table 3 for a reporting of mean proportions). There was a medium effect size for this relationship, *Cohen's d = .52*. Similarly, the mean accuracy values for targets was significantly higher in the category cue condition (*M* = .87, *SD* = .07) than the story cue condition (*M* = .81, *SD* = .09; *t*(120) = 3.68, *p* < .001). Finally, the mean accuracy values for foils was significantly higher in the category cue condition (*M* = .92, *SD* = .07) condition than the story cue condition (*M* = .88, *SD* = .07; *t*(120) = 2.881, *p* = .005). Thus overall, accuracy in terms of the proportion of correct responses was significantly higher when children were cued according to detail category rather than story.
Sensitivity (d')

Discriminability was assessed through the application of signal detection analysis and the calculation of a sensitivity index (d') for each participant. This sensitivity index ranges from 0 to infinity (e.g. Stanislaw & Todorov, 1999). In practice strong discriminability, (i.e. minimal overlap between the signal distribution and noise distribution) will fall around 3 (see Heeger, 1998). Overall, higher d' scores are indicative of better discrimination between targets and foils. In order to calculate the d' values, the number of hits and false alarms for each participant were obtained via E-prime and subsequently entered into a computerized rejection sensitivity program. The values utilized for this computation can be found in Table 3. Once a d' score was obtained for each participants, an independent-samples t-test was performed to determine whether differences existed between conditions. Results of this analysis revealed significantly higher d' scores for those in the category cue condition than the story cue condition (t(120) = 4.10, p < .001), indicating better overall discriminability between signal and noise in those who were cued by category rather than by story. The effect size of this relationship was medium-to-large, Cohen's d = .74.

A response bias score, criterion C, was also calculated for each participant. Values less than zero indicate a bias towards a 'yes' response and values greater than zero indicate a bias towards a 'no' response. An independent-samples t-test revealed no significant differences between the category cue condition and the story cue condition in terms of response bias (t(120) = -.14, p = .89). Participants in both conditions were both slightly biased towards 'no' responses (as can be seen in Table 3), but similar scores in past studies have been noted as barely deviating from a non-biased, neutral response.
tendency (e.g. Coleshill et al., 2004). Because group differences in criterion $C$ were not found, the differences in $d'$ scores and overall accuracy between conditions cannot simply be explained by an increased response biases in one particular condition. Table 3 provides the mean $d'$ and criterion $C$ scores for both cue conditions.
GENERAL DISCUSSION

The two theories used to examine memory organization for a repeated event composed of variable details are script theory and FTT. Script theory conceptualizes memory organization for this type of event as a general event script with an open space for each detail that varies. This open space is associated with a list of potential fillers, most of which are instantiations from experienced instances and lead to expectations about the general characteristics of future instantiations of a particular event detail (Lucariello & Nelson, 1985; Slackman & Nelson, 1984; Powell et al., 1999). Instantiation are not closely linked to the instance of origin, thus children often retrieve a non-target instantiation from the list of potential alternatives when responding to questions regarding a particular target occurrence. Memory errors result from the reliance on this list of experienced options and expectations that derive from it (Connolly & Price, 2006).

Conversely, FTT suggests that memory for this type of event is organized according to a series of distinct verbatim traces. Details that vary across instances are stored along with the appropriate verbatim trace for that particular experience. It is assumed that confusion between instances and subsequent errors on memory tasks arise due to the inaccurate retrieval of another non-target verbatim trace or the reliance on the underlying gist trace.

Overall, the results of the current research favour a script theory explanation of repeat event memory in children. In these particular circumstances, FTT failed to appropriately account for the pattern of results. In Part 1 of the present research, it was
found that most children who experienced an event multiple times show a relatively random pattern of internal intrusions. This result is consistent with script theory predictions for memory errors and has been shown in past literature applying a similar paradigm. Powell and Thomson (1997) conducted six separate play sessions with a group of children and subsequently tested their memory either one week or six weeks after the final event for the details that varied each time. Children were asked to describe the particular instantiations experienced on the final, target occurrence. As previously discussed, internal intrusions were clustered around the target occurrence after a one week delay, but were random across non-target occurrences after a six-week delay. Overall, children’s memory for the source (instance in which the detail was experienced) of a particular instantiation quickly faded while memory for the content (the detail itself) did not. Powell and Thomson highlighted the differential speed with which memory for content and memory for source may be lost. The random nature of children’s errors is also consistent with the notion that memory for details that vary are organized as a series of lists, within which content is retained longer than any connection to a particular source. The current set of results from Part 1 support this script-theory based conclusion by further demonstrating the random and inaccurate retrieval of variable details from across all non-target instances.

To further examine the predictions of script theory and FTT in terms of memory for an event containing variable details, Part 2 examined the response time and recognition accuracy of children exposed to multiple stories. The results revealed a significant difference between those tested with categories cues and those tested with story cues. Overall, children were faster, more accurate and better discriminators between
targets and foils when cued with categories rather than stories. This result is consistent with script theory predictions and reaffirms past findings into the organization of repeat event memory in children. As previously mentioned in the discussion for Part 1, FTT would have difficulty accounting for this result. Even if all verbatim traces are simultaneously primed, variable details would not be reorganized according to category. If recognition involved reliance on the gist trace, it could be expected that children would have a greater awareness of detail categories. However, reliance on the gist trace would also lead to a greater proclivity to incorrectly recognize related yet non-presented foils and the current pattern of results found few such false alarm errors ($M = 7.23, SD = 5.18$, out of a possible 72 per child). Overall, the findings from both Part 1 and Part 2 are consistent with a script theory conception of repeat event memory organization. Below is a brief description of studies, all employing different methodologies with findings consistent with the current set of results.

**Past Research**

Slackman and Nelson (1984) drew the same conclusion when they examined children's memory for a set of repeated stories. Children heard three stories depicting a visit with a friend and one story depicting a trip to a restaurant. By comparing immediate with delayed recall, the researchers observed a relatively quick transformation in memory organization. Following a one day delay, instantiations serving the same function within the stories were easily confused. No confusion arose between the visit a friend story and the restaurant story, indicating the differential storage of memory for the story heard multiple times and for the story heard once. Overall, Slackman and Nelson concluded that children tended to schematically organize details they experienced across similar events;
children quickly formed a general representation of the repeatedly experienced event which was used when answering specific questions about one particular experience. The influence of this general representation when retrieving particular experiences from memory led to a greater proclivity to err due to the loss of or confusion between similar instances for episode-specific information. This result is consistent with the suggestion that episode-specific information may be stored according to lists within the general event representation.

Using slightly different methodology to the aforementioned research, Hudson (1990) had children participate in a series of live events. Children participated in either one or four creative workshops and completed a memory interview either immediately or four weeks after the final experience. Overall, Hudson found that children who had experienced multiple workshops were more confused when it came to details that varied with each experience compared to details that remained the same. Hudson viewed this as evidence for the constructive processes of memory. When recalling a particular episode, children simply reconstructed an experience based on their general event representation and some instance specific information that may or may not have been experienced during the target instance. This is consistent with the notion that when dealing with details that varied, children accessed the lists of potential alternatives that were associated with this general event framework.

Finally, data reported by Connolly and Lindsay (2001), Powell, Roberts, and Thomson (2007) and Connolly and Price (2006) are also consistent with a list-like organization of variable details. While support was not uniquely found for script theory conceptions over alternative explanations, this research does address script theory's
ability to predict/explain their specific pattern of results. Connolly and Lindsay found the children who had experienced an event multiple times were more susceptible to suggestions regarding variable details when the suggested detail fit with the overall function of an associated slot-filler list. For instance, one of the details that consistently varied was the type of toy brought to school by the play session leader, therefore children were susceptible to incorrectly recognizing names of toys that may not have been presented but easily fit within the same detail category as the experienced instantiations. Similarly, Powell and Roberts found that children were increasingly susceptible to suggestions about a target occurrence of a repeat event if the suggested detail had in fact been experienced in a non-target occurrence. Further, Connolly and Price (2006) found support for the notion that heightened suggestibility is a result of the degree of association between the variable details. When depicting script theory’s explanation for their significant pattern of results, the researchers stated that novel details that are consistent with the category of previously experienced details are easily confused with experienced details and can quickly become part of a list in the general event script. This finding is consistent with the notion of categorical organization of variable details in memory.

In sum, results from both Part 1 and Part 2 are consistent with past research and tend to support a script theory conception of event memory organization in children. Both the pattern seen in children’s memory errors and their organization of variable details reflect script theory explanations and predictions. Moreover, predictions resulting from FTT were not supported in these data. Children did not demonstrate the tendency to
intrude from one particular non-target instance nor did they display an organization of variable details according to separate verbatim traces.

**Event Composition**

When children experience an event multiple times, their memory for the event is shaped in part by the type of event details. Events can involve details that never change across experiences (fixed details) or details that change across occurrences (predictable or unpredictable variation). Research has shown differences in memory for an instance of a repeated event based on whether fixed or variable details were tested (see Connolly & Lindsay, 2001; Powell & Thomson, 1996). Fixed details are often remembered well as memory is continually strengthened each time the particular detail is experienced (McNichol et al., 1999; Powell & Roberts, 2002; Powell et al., 1999). Conversely, variable details often pose more memory problems for repeat-event children (see Connolly & Lindsay, 2001). However, this confusion depends upon the nature of variable details.

Details that change across experiences can be either predictable or unpredictable variation. Predictable variation is change that one comes to expect, while unpredictable variation is unanticipated change in one or a small proportion of instances of a repeated event. In general, research in unpredictable variation has typically examined memory for one experience that was different from a sequence of instances that were otherwise the same. In such research, children first acquire a script for the routine event and then experience the deviant instance (e.g. Farrar & Goodman, 1992). Generally, it has been concluded that memory for this deviant instance is as strong as or stronger than memory for the more frequently experienced routine instances (Hudson & Nelson, 1983; Farrar &
Goodman, 1992; Hudson & Fivush, 1991; Fivush, Hudson & Nelson, 1984). Hudson and Nelson (1983) suggest that deviant episodes of a repeated event are marked by their distinctiveness from the general event pattern. However, as discussed below, memory for deviations that involve a brief changed in part of one instance, may not actually improve memory for the routine details of the event (e.g. Cox & Connolly, 2009). Furthermore, the purpose of the present research was not to explicitly determine whether an instance is retrievable, but rather examine memory organization for a particular type of event detail. By investigating this type of event detail, predictable variation, the present research speaks only to events involving a series of variable details.

The current results imply the inability, in most ordinary circumstances, for children to accurately retrieve a complete instance of a repeated event that contains predictable variation. However, some past researchers have concluded the opposite, that children in fact are able to retrieve a complete instance of a repeated event. In a seminal study on children’s memory for real-life experiences, Hudson and Fivush (1991) found surprisingly strong memory in children for a class trip to an archaeology museum six years after it had been experienced. The researchers speculated that the distinctiveness of the archaeological museum trip from other trips to museums is what explained children’s ability to retain and retrieve the archaeological instance from memory. However, Hudson and Fivush (1981) only examined memory for the deviant aspects of this trip to the archaeology museum.

Similarly, Farrar and Boyer-Pennington (1999) reported accurate recall of a deviant episode of a repeated event following a one-week delay. In this research, children experienced 1, 3 or 5 events, with one episode for those children who experienced the
event multiple times deviating from the general event pattern. The event that deviated, the episodic event, included both typical (i.e. predictable) and atypical (i.e. unpredictable) changes from the standard routine. More specifically, the predictable variation fit with the general theme of the standard event, a magic show, while the unpredictable variation involved atypical details that deviated from this common theme. Overall, both older and younger children were able to recall the atypical deviations from the episodic event. However, the predictable variation details were not correctly recalled, with children often confused between episodes. Therefore Farrar and Boyer-Pennington only found improvements in memory for the atypical changes. In sum, both aforementioned studies uncovered memory improvements for unpredictable variation (i.e. unanticipated changes in the instantiation of event details). However, the entire instance is not necessarily retrievable, only the particular components that deviated unexpectedly from the general routine.

Other research has similarly found heightened memory for atypical details presented within a routine event (e.g. Adams & Worden, 1986; Davidson & Hoe, 1993; Hudson, 1988). For instance, Davidson and Hoe presented children with two stories, one depicting a trip to the grocery store and another depicting a trip to the movies. Within both stories were three typical, script-consistent sentences (i.e. sentences depicting elements that are likely to occur within the given event) and three atypical, script-inconsistent sentences (i.e. sentences depicting elements that are unlikely to occur within the given event). Children were asked immediately following each story to recall as much as possible. The next day, children were asked to complete both a recall memory test (Experiment 1) and a recognition memory test (Experiment 2). Overall, results showed
stronger memory for atypical event sentences than typical sentences. When completing the recognition task, children were quick to determine which atypical actions they had previously heard. However, they were increasingly susceptible to incorrectly recognize script-typical actions that were not in fact presented in the story. This heightened memory for and retrieval of the atypical elements of a particular instance does not necessarily indicate the retrieval of the entire instance. The unpredictable changes in event details may be the only aspects of the particular instance that are retrieved with higher accuracy. Consequently, the aforementioned research cannot necessarily be seen as proof of the ability to in fact retrieve an instance from memory.

Recent research by Cox and Connolly (2009) suggested that the nature of the deviation is important in predicting whether the entire instance may be better remembered when unpredictable variation occurs. In this study, adult participants were presented with five repeated stories depicting a magic show. Some participants received a deviant third story, with half receiving a discrete deviation and the others receiving a continuous deviation. The discrete deviation occurred at the beginning of the story and temporarily disrupted the regular progression of the story (magician woke up late and had to help another magician with a trick). Conversely, the continuous deviation occurred at the beginning but continued to disrupt the regular progression of the story (same as above but magician also continued to make mistakes throughout the day). Overall, there was no improvement in memory for the third story when a discrete deviation occurred, but significantly more accurate memory when a continuous deviation occurred. While not the focus of the current study, this research by Cox and Connolly (2009) does raise doubt as
to whether unpredictable variation in general can lead to improved memory for an entire instance, unless it changes how routine details are experienced.

Overall, in my view the current results do not contradict past findings on memory for unpredictable variation. By utilizing a different type of event detail from these aforementioned studies, the present study was exclusively interested in investigating events composed of predictable variation. The stories in the present research involved highly related details that varied with each experience. Because of this difference in the construction of events, dissimilar results are not in fact a contradiction. Differences are in fact expected considering memory organization and strength differs for unpredictable and predictable variation. Thus, research investigating one type cannot be used to inform the other. The intention of the present research was to simply explain how memory for predictable variation may be stored and to subsequently draw conclusions solely with respect to this particular type of event sequence.

Limitations and Future Research

The current results could be challenged on the grounds that the stories read to children were more akin to a series of word lists than repeatedly experienced events. The stories were created by embedding a pre-determined set of critical details into a cohesive narrative. The result was a story that sounded a bit disconnected. Further, each story was constructed in the exact same way. All that changed between stories were the particular instantiations of the variable details. The repetition of the same story framework a total of six times may have led some children to discontinue attending to the story and merely focus on the details that changed. This would be consistent with schema-confirmation deployment hypothesis which predicts selective attention to details based on their
discrepancy from past experiences. Once children have formed a general representation for an event, they will selectively attend to details that change rather than focus on aspects they’ve already heard (see Farrar & Goodman, 1990; 1992). This focus on details that change each time could have created an encoding context that was more akin to a list of words than to a series of stories. Past research on children’s memory for items on a word list has consistently shown a tendency towards a categorical organization of stimuli and a clustering of related items at recall (e.g. Halperin, 1974). Even if related items aren’t presented in order, it is likely they will be recalled together. This discrepancy between presentation and recall is indicative of the implicit tendency to categorically organize words (Schuell, 1969). Consistent with the notion of categorical organization, Johns (1985) found that RT was significantly faster when a particular stimulus on a recognition task came from the same taxonomic category as its predecessor than when the words were presented in a random arbitrary order.

The stimulus stories also utilized category exemplars for targets and foils that had been previously rated by children in past research as highly related (Price & Connolly, 2006). Thus all the items have a high degree of association with the particular category. This may have further encouraged retention of variable details as word lists. Research into categorical clustering of word list items has shown that the presentation of high-frequency exemplars will further facilitate categorical clustering of words (Schuell, 1969). Therefore, the choice of category exemplars could have led to the increased propensity to cluster details according to their corresponding category.

Unlike the other challenge discussed, the possibility of word list retention cannot be reasonably explained. While it may not cast doubt on results from Part 1, this
challenge does lead to uncertainty in the applicability of Part 2 to the literature on repeat event memory in children. The only way in which this alternative explanation can be eliminated is through future research employing a different set of stimulus stories. Despite this challenge, the current research was able to support a variety of past findings while using an entirely novel methodological approach. The potential strength of such a paradigm was clearly demonstrated and future research should be encouraged to continue its use within this field of literature.

Another limitation of the current research involves the selection of variable details. A confound exists between the functional, categorical and temporal relationship of variable details. Each instantiation from a critical detail group served the same function within the story, was from the same taxonomic category, and was placed in the same temporal location as all other similar details from across stories. Thus there is no way of knowing which of these three relations led to better performance in the category-cue condition relative to the story-cue condition. Some research has suggested that functional substitutability is what connects details from across occurrences (e.g. Lucariello & Nelson, 1985), while others have suggested that the temporal sequencing (e.g. Fivush, Kuebli & Clubb, 1992) or category membership (e.g. Nelson, as cited in Krackow & Gordon, 1998) explains the relationship between the variable details. Past research has explicitly manipulated these variables as a means of investigating their differential effects (e.g. Lucariello & Nelson, 1985). While script theory research posits a functional substitutability in the relationship among slot-fillers, the present results cannot with certainty isolate this explanation from the other two potential factors. Research by Krackow and Gordon (1998) has suggested that the improved memory of children on
functionally related items is largely dependent on their typicality and the degree of association between instantiations. Therefore, all three factors may have had an effect on the organization displayed within the current set of results. Future research may seek to eliminate this confound in the relationship between variable details. Attempts should be made to differentially examine the power of shared function, taxonomic category and temporal sequencing on the organization of variable details. Overall, the combining of all three factors within the same set of details detracts from the ability to accurately explain the given relationship.

Future research may also wish to examine age differences using the current methodology. While not necessarily a limitation, only children aged 7 to 9 participated in the present study. As a result of not examining age differences, nothing can be said for the potential discrepancies in the way younger or older children may have organized their memory for variable details from the current set of stories. Past research has found that age affects the speed at which a general event script is formed (e.g. Slackman & Nelson, 1984). Farrar and Goodman (1992) found that younger children simply take longer to develop a general representation for an event. Therefore, it may be the case that younger children would not in fact be faster and more accurate when cued according to detail category, especially given such a short delay between the event and the memory test. In order to better understand how this type of organization differs between ages, future research may wish to examine a wider range of children.

The current study only included a single delay to test and so the conclusions apply only when there is a relatively short delay between the final instance and test. It will be important to study the organization of variable details with an immediate testing
condition and possibly a longer delay. It is possible that immediate testing would have lead to improved memory in the story-cue condition relative to the category-cue condition. Both script theory and FTT would imply the immediate storage of details according to instances. According to script theorists, categorical organization may only occur following a brief delay. Slackman and Nelson (1984) investigated children’s recall for story details and found that children could accurately report particular details from specific stories immediately after presentation. However, this ability was quickly lost as the general script for the event quickly developed and dominated retrieval. Because both theories would posit immediate storage of details according to instances, differences between their predictive strength could not have been found through the inclusion of an immediate test condition. Furthermore, in real-world settings there will almost always be a delay between experience and subsequent reporting. Thus results denoting immediate memory organization would not facilitate understanding for potential forensic applications.

Another limitation with the current research deals with the failure to counterbalance the buttons on the keyboard representing Yes and No. Past research has highlighted the importance of fully counterbalancing the button location to avoid potential biases artificially creating differences between conditions (e.g. Ellis et al., 1993). While counterbalancing would have been advisable, the current research did ask each child which hand they used when writing. This allowed for a quick statistical analysis to ensure that no differences existed in RT and accuracy based on handedness. Also, only approximately 8% of children reported dominant use of their left hand, with 2 children in the category condition and 8 in the story condition. Despite the minimal
consequences resulting from this limitation in the current research, future studies may seek to eliminate it altogether by counterbalancing the appropriate response keys.

An RT paradigm had not been used to study repeat event memory in children prior to the current research. Its apparent success at differentiating between competing theories should encourage future studies to employ a similar framework. Because the current results only depict memory organization for an event composed entirely of variable details, future research utilizing this methodology should examine alternative forms of events. More specifically, future research should examine memory for live events and events composed of different types of event details, such as unpredictable variation, using this computerized recognition task. Because real-life events may not in fact differ every time, our ability to further understand the organization of other types of events is quite valuable. Due to the exploratory nature of the current research, replication of the current findings with different stimuli will also be important. This replication will hopefully allow for the dismissal of challenges pertaining to word list organization.

Implications

Results of the current research contribute to our theoretical understanding of event memory in children. The current research provides evidence of the explanatory strength of script theory over FTT when it comes to organization of variable details. Fuzzy trace theorists may seek to re-establish their conceptions and predictions in hopes of incorporating this new evidence. Conversely, script theorists may wish to continue this line of research into the basic organization of event memory. Much of the existing literature attempts to uncover a means of retrieving a complete instance from memory. While this is often done by researchers positing script theory framework, the actual
application of this theory would suggest that such retrieval is not in fact possible when dealing with an event involving details that continually change, unless this change is in the form of a continuous, unpredictable deviation. Thus the focus of future research may need to depart from attempts at retrieval and instead continue investigating the basic processes underlying the natural organization.

The methodology employed in the current study demonstrates a novel way of investigating the natural organization of this type of event memory in children. While RT studies are often used to understand other facets of memory and perceptual processing, they had yet to be applied within this particular field. Thus, results obtained from its use may serve to supplement existing research using more traditional approaches. It is hoped that with multiple ways of investigating a problem, the better the chances of uncovering a solution.

Not only does the current research have theoretical implications, but it has practical worth in terms of a forensic setting. Because many child abuse allegations involve abuse that has occurred multiple times, it is important for those investigating such allegations to understand how children organize these experiences in their memory. Interviewers are often concerned with eliciting episode specific information from children (Orbach & Lamb, 2007). In fact, variable details are of particular interest within a forensic setting given that it is highly unlikely that each episode of abuse is conducted the same way each time (Price & Connolly, 2008). While describing the various facets of the structured NICHD (National Institute of Child Health and Human Development) interview as it is used with children, Lamb and colleagues (1998) suggested that children are in fact capable of describing specific incidents so long as questions are posed in a
specific manner. In fact, they suggested time or location cues as effective mechanisms for eliciting accurate information about a particular experience (Lamb et al., 1998).

Unfortunately, the value of these interview tactics was not necessarily supported within the current research. The current results would suggest that children are often unable to reproduce details specific to one instance, but rather report details from a combination of instances in response to episode specific questioning. Therefore inconsistencies in reported details should be expected when such instance specific probing is used (Price & Connolly, 2008).

Inconsistencies in children’s reports that result from current interviewing techniques could potentially have detrimental effects on evaluations of their credibility (Connolly et al., 2008). Often these inconsistencies are interpreted as self-contradictions by those responsible for adjudication in the courtroom (Cronch, Viljeon & Hansen, 2006). From what is known about repeat event memory in children, these statements may be contradictory but are not necessarily incorrect. In fact, the evidence deemed contradictory may well be details or element of another instance from the same general event. Children who experience an event multiple times rarely report details that never actually happened (Connolly & Price, 2006). They simply report details from other occurrences. Thus it is not in fact false information; it is simply information from another experience. To negatively evaluate credibility based on an unavoidable flaw involving the way in which event memory is naturally organized could lead to potentially disastrous consequences in terms of just adjudication.

Results from the current study should be used in conjunction with similarly focused literature to better inform current interviewing procedures and legal expectations.
While legal professionals have become increasingly forgiving of inconsistencies in children's reports, true understanding into what children are capable of reporting has clearly not been established. Once the limitations of children's repeat event memory are fully understood and acknowledged, research can begin developing techniques that are more in line with memory's natural organization.
REFERENCES


*R. v. B(G), [1990] 2 S.C.R. 30.*


### TABLES AND FIGURES

Table 1: Pattern of Internal Intrusion Errors and Chi-Square Values for all Participants

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Note: * = p<.1
### Table 2: Proportion of Internal Intrusions Errors Across Instances for all Participants

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</table>

*Note: * = proportion greater than cut-off value of 50%*
Table 3  Mean RT Scores for the Category and Story Cue Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Overall RT</th>
<th>RT for Targets</th>
<th>RT for Foils</th>
<th>RT for Correct Responses</th>
<th>RT for Incorrect Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
<td>1318.37</td>
<td>1260.95</td>
<td>1415.15</td>
<td>1332.36</td>
<td>1397.11</td>
</tr>
<tr>
<td>Cue</td>
<td>(289.39)</td>
<td>(253.35)</td>
<td>(273.72)</td>
<td>(246.06)</td>
<td>(341.71)</td>
</tr>
<tr>
<td>Story Cue</td>
<td>1513.37</td>
<td>1432.65</td>
<td>1594.08</td>
<td>1507.62</td>
<td>1544.15</td>
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<tr>
<td></td>
<td>(225.62)</td>
<td>(198.54)</td>
<td>(264.81)</td>
<td>(223.33)</td>
<td>(279.51)</td>
</tr>
</tbody>
</table>
Table 4  Mean Accuracy and Discriminability Scores for the Category and Story Cue Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Overall Proportion Correct</th>
<th>Hits</th>
<th>Misses</th>
<th>Correct Rejections</th>
<th>False Alarms</th>
<th>$d'$</th>
<th>Criterion $C$</th>
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</thead>
<tbody>
<tr>
<td>Category Cue</td>
<td>.89 (.06)</td>
<td>.87</td>
<td>.13</td>
<td>.92 (.07)</td>
<td>.08 (.07)</td>
<td>2.68</td>
<td>.16 (.21)</td>
</tr>
<tr>
<td>Story Cue</td>
<td>.85 (.09)</td>
<td>.81</td>
<td>.18</td>
<td>.88 (.07)</td>
<td>.12 (.07)</td>
<td>2.22</td>
<td>.16 (.25)</td>
</tr>
</tbody>
</table>
Figure 1  Mean Reaction Times for Category and Story Cue Conditions
## APPENDIX A: INTERNAL INTRUSION CODING SHEET

**Coder:** ___________________________  **Date:** ___________________________

**6 RE children:**

<table>
<thead>
<tr>
<th>Participant #</th>
<th>Order of questions</th>
<th>Total number of ii</th>
<th>Instances in which ii’s occurred:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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APPENDIX B: PARENTAL CONSENT FORM

Dear Parent/Guardian,

This letter requests permission to invite your child to participate in a fun research project, approved by the Vancouver School Board. The goal of this project is to understand children's memory for events.

With permission from you and your child, your child will be removed from class on __________ for approximately 30 minutes and read 6 stories about a visit with a friend. Each story will have the same basic framework, but will involve slightly different details. Your child will then be asked to participate in a memory task later that same day, which should take no longer than 10 minutes. The recognition task will be performed on the computer so that the time it takes each child to respond will be recorded. Both the time and accuracy of your child's responses will be used for later analyses. Results of the current study will be used in hopes of improving our understanding of children's ability to remember an instance of a repeated event.

If you decide not to allow your child to join us, your decision will not have any impact on his/her grade or evaluation within their classroom. We will maintain strict standards of confidentiality permitted by the law. Your child will be identified with a number and all personal information will be stored in a secure location at Simon Fraser University. More specifically, the data will be stored on a computer locked within a secure on campus research lab. Any identifying information for your child will not be kept with the data, thus in no way will performance on the timed recognition task be associated with the child's identifying information. Also, only group results will be reported. The data will be kept for a two year period, and will be destroyed in December 2011.

Approval for this research has been obtained from the Vancouver School Board, granting permission to enter individual schools and contact parents. Should you have any questions of concerns, you may direct contact the Director of Research Ethics, Hal Weinberg (hweinber@sfu.ca; 778-782-6593).

Thank you for your interest in this project. I hope you agree the issues being studied in this research are important and worthy of the participation I am requesting.

Sincerely,

Emily Slinger, MA Candidate, BAH
Deborah Connolly, PhD, LLB
PERMISSION FORM

PART 1
Having read the enclosed materials (check one):
(a) ____ Allow my child to participate
(b) ____ Do not allow my child to participate

Child Name: _____________________________
Date of birth: _____________
Parent/Guardian Name: _____________________________

Signature: _____________________________
Date: ________________

PART 2
If you would like to receive a summary of results please provide your name and address

___________________________
___________________________
___________________________
___________________________
___________________________

PART 3
Would you be willing to have us contact you at a later time for related research?

___ Yes
___ No

If yes, please provide us with your name, phone number, or email (if not supplied above)

___________________________
___________________________

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APPENDIX C: STORY DETAIL LIST

Detail categories: See Price & Connolly (2006)

1) Favourite piece of clothing
   a. t-shirt
   b. socks
   c. sweater
   d. hat
   e. dress
   f. jacket
   g. skirt
   h. jeans
   i. sweatshirt
   j. tank top
   k. sweatpants
   l. shorts

2) Colour of sneakers
   a. Blue
   b. Red
   c. Green
   d. Yellow
   e. Orange
   f. Purple
   g. Pink
   h. brown
   i. violet
   j. white
   k. black
   l. grey

3) Vehicle taken
   a. truck
   b. van
   c. motorcycle
   d. airplane
   e. bus
   f. Bike
   g. train
   h. boat
   i. helicopter
   j. convertible
k. scooter
l. wagon

4) Friend’s new toy
a. playmobile
b. lego
c. bouncy ball
d. superman
e. stuffed animal
f. building blocks
g. gameboy
h. puzzle
i. transformer
j. firetruck
k. colouring book
l. slinky

5) Insect seen outside
a. ant
b. ladybug
c. spider
d. butterfly
e. bee
f. fly
g. caterpillar
h. beetle
i. grasshopper
j. mosquito
k. worm
l. dragonfly

6) Candy they ate
a. chocolate bar
b. lollipop
c. gum ball
d. cotton candy
e. candy cane
f. smartie
g. liquorice
h. sour keys
i. jelly beans
j. gummy bears
k. skittles
l. jujube

7) Sport they played
a. soccer  
b. basketball  
c. ball hockey  
d. baseball  
e. football  
f. tennis  
g. swim  
h. volleyball  
i. badminton  
j. gymnastics  
k. golf  
l. rollerblading  

8) **Beverage** they drank  
a. Chocolate milk  
b. orange juice  
c. coke  
d. lemonade  
e. root beer  
f. apple juice  
g. iced tea  
h. kool-aid  
i. 7-up  
j. grape juice  
k. Sprite  
l. cream soda  

9) **Musical instrument** friend’s brother played  
a. guitar  
b. drum  
c. flute  
d. piano  
e. violin  
f. trumpet  
g. recorder  
h. trombone  
i. clarinet  
j. tuba  
k. saxophone  
l. xylophone

10) **Fruit** Sue’s friend’s mom gave them to eat  
a. banana  
b. pear  
c. peach  
d. strawberry
e. watermelon  
f. plum  
g. pineapple  
h. blueberry  
i. lemon  
j. kiwi  
k. cherry  
l. raspberry

11) Animals puppet they made  
   a. tiger  
   b. lion  
   c. dog  
   d. cat  
   e. giraffe  
   f. elephant  
   g. bird  
   h. bear  
   i. fish  
   j. horse  
   k. zebra  
   l. monkey

12) Shape they used  
   a. triangle  
   b. square  
   c. circle  
   d. rectangle  
   e. octagon  
   f. oval  
   g. diamond  
   h. hexagon  
   i. cube  
   j. star  
   k. heart  
   l. pentagon
APPENDIX D: DETAIL COUNTERBALANCING FORM

Story Order 1

<table>
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<tr>
<th></th>
<th>Story 1</th>
<th>Story 2</th>
<th>Story 3</th>
<th>Story 4</th>
<th>Story 5</th>
<th>Story 6</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Hat</td>
<td>Socks</td>
<td>Skirt</td>
<td>Sweatpants</td>
<td>Tank top</td>
<td>Jeans</td>
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<tr>
<td>Colour</td>
<td>Blue</td>
<td>Pink</td>
<td>Black</td>
<td>Green</td>
<td>Grey</td>
<td>Violet</td>
</tr>
<tr>
<td>Vehicle</td>
<td>Bike</td>
<td>Convertible</td>
<td>Van</td>
<td>Boat</td>
<td>Wagon</td>
<td>Airplane</td>
</tr>
<tr>
<td>Toy</td>
<td>Gameboy</td>
<td>Playmobil</td>
<td>Bouncy ball</td>
<td>Transformer</td>
<td>Stuffed</td>
<td>Colouring book</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>animal</td>
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</tr>
<tr>
<td>Insect</td>
<td>Butterfly</td>
<td>Ant</td>
<td>Beetle</td>
<td>Mosquito</td>
<td>Worm</td>
<td>Spider</td>
</tr>
<tr>
<td>Candy</td>
<td>Lollipop</td>
<td>Skittles</td>
<td>Cotton candy</td>
<td>Gum ball</td>
<td>Jelly beans</td>
<td>Candy cane</td>
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<tr>
<td>Sport</td>
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<td>Baseball</td>
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<td>Swim</td>
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<tr>
<td>Beverage</td>
<td>Grape juice</td>
<td>Lemonade</td>
<td>Root beer</td>
<td>Chocolate milk</td>
<td>Kool-aid</td>
<td>Iced tea</td>
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<td>Violin</td>
<td>Flute</td>
<td>Saxophone</td>
<td>Trombone</td>
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<td>Blueberry</td>
<td>Lemon</td>
<td>Strawberry</td>
<td>Cherry</td>
<td>Pear</td>
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<tr>
<td>Animal</td>
<td>Elephant</td>
<td>Lion</td>
<td>Bear</td>
<td>Dog</td>
<td>Zebra</td>
<td>Fish</td>
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<tr>
<td>Shape</td>
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<td>Square</td>
<td>Hexagon</td>
<td>Circle</td>
<td>Cube</td>
<td>Diamond</td>
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</table>

Foils:
- **clothing**: t-shirt, sweater, dress, jacket, sweatshirt, shorts
- **colour**: red, yellow, purple, brown, white, orange
- **vehicle**: truck, motorcycle, bus, train, helicopter, scooter
- **toy**: lego, superman, building blocks, puzzle, fire truck, slinky
- **insect**: ladybug, bee, caterpillar, grasshopper, fly, dragonfly
- **candy**: chocolate bar, smarties, liquorice, sour keys, gummy bears, jujube
- **sport**: basketball, field hockey, football, badminton, gymnastics, golf
- **beverage**: orange juice, coke, apple juice, 7-up, sprite, cream soda
- **musical instrument**: drum, piano, trumpet, recorder, tuba, xylophone
- **fruit**: banana, peach, plum, pineapple, kiwi, raspberry
- **animal**: tiger, cat, giraffe, bird, horse, monkey
- **shape**: triangle, rectangle, octagon, oval, heart, pentagon
### Story Order 2

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<tr>
<th></th>
<th>Story 1</th>
<th>Story 2</th>
<th>Story 3</th>
<th>Story 4</th>
<th>Story 5</th>
<th>Story 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clothing</td>
<td>t-shirt</td>
<td>Socks</td>
<td>Sweater</td>
<td>Dress</td>
<td>Tank top</td>
<td>Sweatpants</td>
</tr>
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<td>White</td>
<td>Purple</td>
<td>Green</td>
<td>Orange</td>
<td>Brown</td>
</tr>
<tr>
<td>Vehicle</td>
<td>Motorcycle</td>
<td>Train</td>
<td>Convertible</td>
<td>Boat</td>
<td>Truck</td>
<td>Helicopter</td>
</tr>
<tr>
<td>Toy</td>
<td>Superman</td>
<td>Fire truck</td>
<td>Stuffed</td>
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<td>Slinky</td>
<td>Transformer</td>
</tr>
<tr>
<td>Insect</td>
<td>Fly</td>
<td>Ladybug</td>
<td>Mosquito</td>
<td>Spider</td>
<td>Dragonfly</td>
<td>Bee</td>
</tr>
<tr>
<td>Candy</td>
<td>Sour keys</td>
<td>Chocolate</td>
<td>Skittles</td>
<td>liquorice</td>
<td>Gum ball</td>
<td>Jelly Beans</td>
</tr>
<tr>
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<td>Badminton</td>
<td>Swim</td>
<td>field</td>
<td>tennis</td>
<td>golf</td>
<td>football</td>
</tr>
<tr>
<td>Beverage</td>
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<td>Kool-aid</td>
<td>Orange</td>
<td>Sprite</td>
<td>Root beer</td>
</tr>
<tr>
<td>Instrument</td>
<td>Piano</td>
<td>Recorder</td>
<td>Drum</td>
<td>xylophone</td>
<td>flute</td>
<td>tuba</td>
</tr>
<tr>
<td>Fruit</td>
<td>Peach</td>
<td>lemon</td>
<td>Pineapple</td>
<td>Banana</td>
<td>kiwi</td>
<td>watermelon</td>
</tr>
<tr>
<td>Animal</td>
<td>Horse</td>
<td>Dog</td>
<td>Monkey</td>
<td>Bird</td>
<td>Tiger</td>
<td>Giraffe</td>
</tr>
<tr>
<td>Shape</td>
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<td>Cube</td>
<td>Pentagon</td>
<td>Oval</td>
<td>Heart</td>
<td>Octagon</td>
</tr>
</tbody>
</table>

**Foils:**
- **clothing:** hat, jacket, skirt, jeans, sweatshirt, shorts
- **colour:** blue, red, pink, violet, black, grey
- **vehicle:** van, airplane, bus, bike, scooter, wagon
- **toy:** playmobil, bouncy ball, building blocks, gameboy, puzzle, colouring book
- **insect:** ant, butterfly, caterpillar, beetle, grasshopper, worm
- **candy:** lollipop, cotton candy, smarties, gummy bears, jujube, candy cane
- **sport:** soccer, basketball, baseball, volleyball, gymnastics, rollerblading
- **beverage:** chocolate milk, lemonade, iced tea, 7-up, grape juice, cream soda
- **musical instrument:** guitar, violin, trumpet, trombone, clarinet, saxophone
- **fruit:** pear, strawberry, plum, blueberry, cherry, raspberry
- **animal:** lion, cat, elephant, bear, fish, zebra
- **shape:** square, triangle, circle, diamond, hexagon, star
## Story Order 3

<table>
<thead>
<tr>
<th></th>
<th>Story 1</th>
<th>Story 2</th>
<th>Story 3</th>
<th>Story 4</th>
<th>Story 5</th>
<th>Story 6</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Jacket</td>
<td>t-shirt</td>
<td>Jeans</td>
<td>Skirt</td>
<td>Sweatshirt</td>
</tr>
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<td>Pink</td>
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<tr>
<td><strong>Transportation</strong></td>
<td>Scooter</td>
<td>Bus</td>
<td>Airplane</td>
<td>Bike</td>
<td>Van</td>
<td>Motorcycle</td>
</tr>
<tr>
<td><strong>Toy</strong></td>
<td>Puzzle</td>
<td>Playmobile</td>
<td>Building Blocks</td>
<td>Gameboy</td>
<td>Colouring Book</td>
<td>Lego</td>
</tr>
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<td><strong>Insect</strong></td>
<td>Caterpillar</td>
<td>Fly</td>
<td>Bee</td>
<td>Grasshopper</td>
<td>Ant</td>
<td>Worm</td>
</tr>
<tr>
<td><strong>Candy</strong></td>
<td>Gummy Bears</td>
<td>Liquorice</td>
<td>Smarties</td>
<td>Chocolate bar</td>
<td>Jujube</td>
<td>Cotton Candy</td>
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<tr>
<td><strong>Sport</strong></td>
<td>baseball</td>
<td>Gymnastics</td>
<td>soccer</td>
<td>rollerblading</td>
<td>basketball</td>
<td>field hockey</td>
</tr>
<tr>
<td><strong>Beverage</strong></td>
<td>Sprite</td>
<td>Orange juice</td>
<td>Chocolate milk</td>
<td>7-up</td>
<td>Grape juice</td>
<td>Cream soda</td>
</tr>
<tr>
<td><strong>Instrument</strong></td>
<td>Trombone</td>
<td>saxophone</td>
<td>guitar</td>
<td>piano</td>
<td>trumpet</td>
<td>xylophone</td>
</tr>
<tr>
<td><strong>Fruit</strong></td>
<td>Blueberry</td>
<td>Banana</td>
<td>Raspberry</td>
<td>Plum</td>
<td>Pear</td>
<td>kiwi</td>
</tr>
<tr>
<td><strong>Animal</strong></td>
<td>Cat</td>
<td>Fish</td>
<td>Zebra</td>
<td>Bear</td>
<td>Lion</td>
<td>Monkey</td>
</tr>
<tr>
<td><strong>Shape</strong></td>
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<td>Star</td>
<td>Circle</td>
<td>Pentagon</td>
<td>Square</td>
<td>Diamond</td>
</tr>
</tbody>
</table>

### Foils:
- **clothing**: socks, sweater, hat, dress, tank-top, sweatpants
- **colour**: green, yellow, orange, brown, violet, black
- **vehicle**: truck, train, boat, helicopter, convertible, wagon
- **toy**: bouncy ball, superman, stuffed animal, transformer, fire truck, slinky
- **insect**: ladybug, spider, butterfly, beetle, mosquito, dragonfly
- **candy**: lollipop, gum ball, candy cane, sour keys, jelly bean, skittles
- **sport**: football, tennis, swimming, volleyball, badminton, golf
- **beverage**: coke, lemonade, root beer, apple juice, iced tea, kool aid
- **musical instrument**: drum, flute, violin, recorder, clarinet, tuba
- **fruit**: peach, strawberry, watermelon, pineapple, lemon, cherry
- **animal**: tiger, dog, giraffe, elephant, bird, horse
- **shape**: triangle, rectangle, octagon, oval, cube, heart
### Story Order 4

<table>
<thead>
<tr>
<th></th>
<th>Story 1</th>
<th>Story 2</th>
<th>Story 3</th>
<th>Story 4</th>
<th>Story 5</th>
<th>Story 6</th>
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<tbody>
<tr>
<td>Clothing</td>
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<td>Hat</td>
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<td>Orange</td>
<td>Red</td>
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<td>Truck</td>
<td>Wagon</td>
<td>Train</td>
<td>Helicopter</td>
<td>Scooter</td>
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<tr>
<td>Toy</td>
<td>Bouncy Ball</td>
<td>Fire truck</td>
<td>Superman</td>
<td>Puzzle</td>
<td>Building Blocks</td>
<td>Slinky</td>
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<tr>
<td>Insect</td>
<td>Grasshopper</td>
<td>Beetle</td>
<td>Ladybug</td>
<td>Butterfly</td>
<td>Dragonfly</td>
<td>Caterpillar</td>
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<td>Candy</td>
<td>Candy Cane</td>
<td>Lollipop</td>
<td>Sour keys</td>
<td>Jujube</td>
<td>Smarties</td>
<td>Gummy bears</td>
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<td>badminton</td>
<td>gymnastics</td>
<td>football</td>
<td>volleyball</td>
<td>golf</td>
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<td>Beverage</td>
<td>7-up</td>
<td>Iced tea</td>
<td>Lemonade</td>
<td>Coke</td>
<td>Apple juice</td>
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<td>clarinet</td>
<td>trumpet</td>
<td>drum</td>
<td>recorder</td>
<td>tuba</td>
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<tr>
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<td>Strawberry</td>
<td>Cherry</td>
<td>Plum</td>
<td>Pineapple</td>
<td>Raspberry</td>
</tr>
<tr>
<td>Animal</td>
<td>Bird</td>
<td>Tiger</td>
<td>Elephant</td>
<td>Horse</td>
<td>Giraffe</td>
<td>Cat</td>
</tr>
<tr>
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<td>Rectangle</td>
<td>Octagon</td>
<td>Triangle</td>
<td>Heart</td>
<td>Oval</td>
<td>Diamond</td>
</tr>
</tbody>
</table>

Foils:
- **clothing**: t-shirt, socks, skirt, jeans, sweatpants, tank top
- **colour**: blue, green, purple, pink, white, grey
- **vehicle**: van, motorcycle, airplane, bike, boat, convertible
- **toy**: playmobile, lego, stuffed animal, gameboy, transformer, colouring book
- **insect**: ant, spider, bee, fly, mosquito, worm
- **candy**: chocolate bars, gum ball, cotton candy, liquorice, jelly beans, skittles
- **sport**: soccer, field hockey, baseball, tennis, swim, rollerblading
- **beverage**: chocolate milk, orange juice, root beer, kool-aid, grape juice, sprite
- **musical instrument**: guitar, flute, piano, trombone, saxophone, xylophone
- **fruit**: pear, banana, watermelon, blueberry, lemon, kiwi
- **animal**: lion, dog, bear, fish, zebra, monkey
- **shape**: square, circle, hexagon, cube, star, pentagon
APPENDIX E: EXAMPLE STORY (STORY 1, ORDER 1)

Sue loves to play with her friends. In fact, she likes to play with friends so much that she went to visit her very best friend every day for an entire week! Sue had so much fun with her friend that she wanted to tell us about each and every day they played together. Maybe this way we can have as much fun as Sue! This is a story about the Monday visit Sue had with her best friend. Let’s pay really close attention to all of the fun things Sue did on Monday with her best friend so that we too can have just as much fun as Sue did that day!

This is the story of....

Monday's totally awesome play day!
Sue woke up in the morning excited for the day of fun ahead of her. She pulled herself out of bed and began searching in her closet for the perfect thing to wear. After having gone through almost all of her clothes, Sue just couldn’t seem to find anything to wear. All of a sudden Sue remembered one of her favourite articles of clothing, her *Hat*! Sue rifled through her drawer until she came across the *Hat* at the very bottom of her drawer. She put it on and continued getting ready for her very special day.
After having dressed, Sue wanted to find the perfect colour of sneakers to match. Sue owned lots and lots of different sneakers in lots and lots of different colours, but today she decided that the Blue sneakers would match the best. She ran to the closet where her mom kept all the shoes and pulled out the Blue pair. After getting all ready to go, Sue tied up the laces and headed out the door.
Even though Sue put on comfortable shoes, Sue’s friend lived far too far away for Sue to walk. So Sue had to decide how she was going to get all the way to her friend’s house on this day. There were many different ways Sue could get to her best friend’s house. But today she decided the fastest way to get there on this day would be to take a Bike. She often likes to take a Bike to get places because she always has so much fun on the trip to wherever she is going.
Once Sue had arrived, she walked up to her best friend’s front door. She rang the door bell and patiently waited for someone to let her inside. Just then, her best friend threw open the door and nearly toppled Sue over with excitement over one of her many new toys. Sue’s best friend was jumping up and down holding one of her new toys, a *Gameboy*. Sue was delighted at her friend’s excitement, as she too was looking forward to playing with this new *Gameboy*. 
Sue and her best friend always went outside to the backyard to play. Once they were outside on this day, Sue noticed something in the grass beside them. She crouched down to get a closer look and realized it was an insect, a *Butterfly* to be exact. Sue just loved *Butterflies*, so she tried to catch the little creature in the palm of her hand. The insect must have known Sue wanted to keep it, for it quickly fled into the bushes lining the yard.
Sue was disappointed that she couldn’t find her insect friend, so her best friend brought her inside to show her a special treat her grandmother had dropped off earlier that day. Knowing that her best friend’s grandmother usually brought over candy, Sue was excited to see what she’d gotten. Sitting right on the kitchen table was a delicious Lollipop. The two devoured the Lollipop as quickly as they could so they could get back to playing outside.
After having finished their treat, like usual, Sue and her best friend were filled with energy. They thought that the best possible way to use up this energy would be to play one of their favourite sports. Today Sue suggested that they play *Volleyball*. Her best friend quickly agreed, and the two returned outside to set up their game of *Volleyball*. 
All this running around really made Sue thirsty, so she asked her best friend if they could go inside to grab a quick drink and cool off. Her best friend agreed and took Sue inside to the kitchen where they looked inside the refrigerator to pick a yummy drink. The refrigerator was filled with all kinds of different beverages, but today Sue had her eye on the bottle of Grape Juice. Sue pulled the Grape Juice from the fridge and poured herself a large glass.
While they were in the kitchen, the two heard music coming from the basement. Remembering that her best friend's brother played many different musical instruments, Sue and her best friend went to explore which one he might be playing today. They came upon Sue's best friend's older brother practicing his Guitar. Sue watched in amazement as the brother continued to play the Guitar, wishing that one day she too might be able to play many musical instruments.
On their way back upstairs the two came upon Sue’s best friend’s mother preparing food in the kitchen. Thinking that the two might be hungry, the mother offered Sue and her best friend a snack. She reminded the two of the importance of eating nutritious snacks, and told them to select a piece of fresh fruit. Sue and her best friend discussed which fruit looked the tastiest that day, and selected a Watermelon. The two washed their Watermelon, in the sink and thanked the mother for the delicious snack.
After finishing their yummy snack, Sue suggested they finish their visit like they usually do by making a craft. Because Sue loved animals so much, she decided it might be fun to make an animal puppet out of construction paper. Sue's best friend suggested that the animal they select today be an *Elephant*, because it is one of her many favourite animals. Sue agreed, and the two went off to find supplies for their *Elephant* puppets.
After searching for things to make their puppets with, Sue’s best friend realized that their craft supplies were running out. Apparently all she could find on this day were pieces of paper in the shape of a Star. Sue laughed at how silly it would be to make puppets out of Stars, but decided that it could still be done. The two began working away at their special craft.
After having finished their crafts, Sue looked at the time and realized that her mother had specifically told her to be home for dinner. She thanked her friend for the wonderful visit, and told her she'd be back at the same time tomorrow to have another fun filled day. She waved goodbye, and hurried out the door making her way home for dinner.

This brings us to the end of Sue's story about *Monday’s totally awesome play day*!

We hoped you had as much fun as Sue did!

Goodbye!
APPENDIX F: VERBAL INSTRUCTIONS TO PARTICIPANTS BEFORE STORY PRESENTATION

Script for Participants:

**Morning:**

*rappor building*

This morning we are going to read 6 stories together. All of these stories are about the visits a girl named Sue has had with her best friend. Sue visited her friend everyday for six days and wrote us a story about each one of those days. I need you guys to pay REALLY close attention to the details of each story because later this afternoon you’ll be asked to remember these details when completing a memory test on the computer. So will you guys pay really close attention to each story for me? Great! Okay...

*After each story, complete a short exercise (jumping jacks, running on the spot, wiggling our finger, touch our toes, jumping up and down) You guys have been great listeners! I'm going to take you back to class now, but remember, this afternoon each of you will be asked to remember the best you can the details from the stories you just heard. And after you're all done that, I'll give you guys a special prize for helping me out
APPENDIX G: VERBAL INSTRUCTIONS TO PARTICIPANTS BEFORE MEMORY TEST

Afternoon:

Do you guys remember the stories we read together this morning? Yeah? Okay good. I’m going to have each of you sit at a different computer to test your memory for these stories.

You’re going to be shown a bunch of different words on the screen. Some words will have been from the stories you heard this morning, others won’t be. What I want you to do is press the “b” key whenever you think you remember a that appears on the screen from one of the stories this morning. So “b” means YES you do remember seeing the word this morning in the stories. If you don’t remember the word on the screen from the stories this morning, I want you to press the “n” key. So “n” means NO you do not remember hearing the word in the stories this morning.

So, let’s practice. What do you press when a word from the stories comes onto the screen? And what do you press when a word that wasn’t from the stories comes onto the screen? Awesome! You guys are so smart!

Okay, so on the screen you are going to see instructions telling you that the b key means yes and the n key means no. These instructions are also on your keyboard. Can you see them? Great! Remember you can look at them if you forget which key to press. At first you will see yes’s and no’s appearing on the screen, and all I want you to do is practice what we just talked about. Hitting b when you see yes, and n when you see no. After that, you’ll see another set of instructions on the screen. When you see those I want you to raise your hand. Can you do that for me? Great.

Okay, now for the fun part! A bunch of words are going to come onto your screen, and I want you to do exactly what we just practices. I want you to press “b” when you think you remember the word from the stories, and the “n” button when you can’t remember the word from the stories. When you get to the end, I want you to raise your hand in the air, without talking, and I’ll come over and give you your special prize. While it is important to answer as quickly as you can, I also want you guys to get as many right as you can. So try really hard to be actually press the buttons based on your memory for the stories. And don’t get distracted by your friends!

**when they raise their hand, quietly come over and bring them into the hall (if the others are still completing the task)

– give them a certificate with their name and sticker on it and give them their choice of pencil
APPENDIX H: INSTRUCTIONS POSTED ON SCREEN

Get ready!!
When you see a word appear on the screen, you must decide whether you remember hearing it in one of the stories.
Press “b” for yes
Press “n” for no

Good Luck!

Press the space bar whenever you are ready to go!