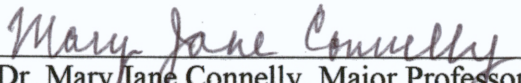


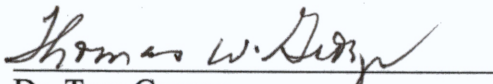
To the Graduate Council:

I am submitting herewith a dissertation written by Daniel D. Williams, Jr. entitled "The Effect of Age on the Propensity for False Memories." I have examined the final paper copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Education.


Dr. Mary Jane Connelly, Major Professor

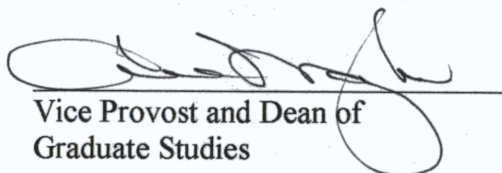
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**The Effect of Age
On the Propensity for False Memories**

**A Dissertation
Presented for the
Doctor of Education
Degree
The University of Tennessee, Knoxville**

Daniel D. Williams, Jr.

May 2002

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Abstract

The purpose of this study was to examine if age has a significant effect on the propensity for false memories. The majority of the current literature asserts that false memories are more prevalent in adults, resulting from their lifetime of experiences, than in children. However, these assertions are predominantly based on the results of research using adults as participants. While replicating past research paradigms from a 1995 study by Roediger and McDermott, the unique aspect of this study was the inclusion of younger participants. This research used second grade students, eighth grade students, and undergraduate students as participants. Memory tasks were administered to gather data in the areas of correct recall, false recall, correct recognition, and false recognition. The hypotheses to be tested were: 1) the older the participant, the more accurate the recall, 2) the older the participant, the greater the number of false recalls, 3) the older the participant, the more accurate the recognition, and 4) the older the participant, the greater the number of false recognitions.

The data from this research supports the conclusion that accurate and false recall and accurate and false recognition scores do increase with age. However, the scores do not necessarily represent a significant increase from one age category to the next, as previously believed. Data in the areas of accurate recall and false recognition indicated a statistically significant increase from second grade participants to eighth grade participants to undergraduate participants. In the area of false recall, the undergraduate participants scored significantly higher than did the other participants but there was no statistically significant difference between the second and eighth grade participants.

False recognition scores indicated that second grade participants scored significantly lower than the other participants. However, there was no statistically significant difference between the eighth grade and undergraduate participants in this area.

The data collected in this study supports the conclusion that it is a more accurate assertion to say that organizational strategies improve with age rather than “memory improves with age.” The more complex the memory task, the longer it takes to develop the necessary strategy to complete the task.

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CHAPTER I

Introduction of the Problem

In recent years, there have been an increasing number of claims, by adults, of childhood sexual abuse. Reportedly too painful to remember, this abuse has been safely locked away in memory only to be unlocked through therapy many years later. As the result of celebrity involvement, the media has bombarded the public with reports of these stars who have just “remembered” that they were sexually abused as children. Elizabeth Loftus (1993) lists several popular magazines carrying shocking tales of well-known individuals who have uncovered repressed memories. These celebrities, as well as numerous other less known adults, supposedly repressed these traumatic events but were now reporting the abuse with amazing clarity and detail.

In an effort to address this growing concern of adult problems supposedly stemming from childhood abuse, many within the mental health profession began practicing repressed memory therapy in the late 1980s. According to Blume (1990), this theory is controversial as a result of its insistence that most American women were molested as children and subsequently repressed these memories. It is believed that the event and subsequent repression are at the root of the patients’ emotional and physical problems.

A relevant question had to be addressed, “What if these ‘memories’ are false?” Many health professionals, such as Dr. Richard Ofshe (1993) conclude, “Even if well-intentioned, the therapists [in this movement] are like the physicians who once bled patients in order to cure them. But unlike those physicians, who were limited by the

primitive state of medical knowledge of their time, the promoters of repressed memory theory ignore reliable research, misuse their authority and techniques, and damage the lives of their clients and their clients' families." Additional research (Loftus, 1993; Roediger & McDermott, 1995) indicates that it is not difficult to create memories. Created memories, or false memories as they are more commonly called, occur when an individual is convinced that he/she "remembers" an event that never happened.

Statement of the Problem

Many, accused and accuser alike, have suffered irreparable harm as a result of the phenomena "false memories." Recent research indicates that repressed memories, without corroborating evidence, might not be accurate. Conclusions from this research state that individuals' memories are influenced by life experiences. These experiences may determine how someone interprets the event. Such interpretations, or misinterpretations, may be seen in immediate recall while others may be viewed following specific lengths of time.

While researchers continue to conduct studies in this area, little if any research is underway using children as participants. It is commonly assumed that children who do not have as many life experiences are, therefore, far less likely to experience false memories. Since the consequences of children's accusations are no less severe, the investigator in this study explored the possibility of false memories occurring with children.

Research Question / Hypotheses

The presented study has attempted to determine if children have the propensity for false memories at the same rate as adults. Based on a paradigm reported by Roediger and McDermott (1995), the investigator used 2nd grade students, 8th grade students, and college students as participants. The recall and recognition scores from these three groups were compared to each other. The question to be answered was, "Does age have any effect on the rate of false memories?"

A review of the related literature led to four hypotheses:

1. The older the child, the more accurate the recall
2. The older the child, the greater the number of false recalls
3. The older the child, the more accurate the recognition and
4. The older the child, the greater the number of false recognitions

Significance of the Study

The early 1990s were filled with prominent print media sources carrying articles telling of famous individuals who reported, typically while in therapy, the return of previously repressed memories. Each person had detailed accounts of being sexually abused as a child – events they had forgotten until many years later. In the forefront was the story of actress Roseanne Barr Arnold who appeared in *People Magazine* (Darnton, 1991) accusing her mother of abusing her from the time she was an infant until she was around 6 or 7 years old. In an earlier article (Darnton, 1991), *People Magazine* had already reported another story of repressed memory where former Miss America Marilyn Van Derbur had suddenly remembered, at 24 years old, that she had been sexually

abused, as a child, by her father. According to Loftus (1993), additional articles reporting similar stories were included in publications such as the *Washington Post* (Oldenberg, 1991), the *Los Angeles Times* (Ritter, 1991), *Seventeen* (Dormen, 1991), *Glamour* (Edmiston, 1990), *Newsweek* (Kantrowitz, 1991) and *Time* (Toufexis, 1991).

This study is not to suggest that childhood sexual abuse does not exist. There is no doubt that such abuse is a very serious social problem. In fact, many individuals who enter therapy were abused as children. The important thing to consider is that the majority of them always remembered that they were abused (Rogers, 1992). However, if the only "evidence" is cloaked in repressed memory, one should at least be cautious. Many psychotherapists have been quick to accept the concept of repressed memories (Bruhn, 1990). Of some concern are those who possibly take their belief in repressed memory to the extreme. Fredrickson (1992) claims that "millions of people have blocked out frightening episodes of abuse, years of their lives, or their entire childhood." She also states that "sexual abuse is particularly susceptible to memory repression."

Not all within the mental health field have been as quick to accept the validity of repressed memories. Some researchers have warned that the very therapies that are being used to recover such memories are inadvertently creating false memories (Loftus, 1993). Recent laboratory research reviewed by Schacter (1999) has demonstrated that memory is "vulnerable to distortion." In addition, it was even discovered that memories could be created.

In 1977, Brown and Kulik coined the term "flashbulb memory" which refers to a specific type of memory that reportedly coincides with a traumatic event. They stated that when one is highly surprised and the event is highly consequential, the memory is

“very much like a photograph that indiscriminately preserves the scene.” However, Shobe and Kihlstrom (1997) disagreed as their research discovered little evidence that such a specialized type of memory existed. They failed to discover any difference in memories of traumatic events when compared to non-traumatic events. Neath (1998) concluded that those subjects involved in flashbulb memory studies commonly added information that simply did not exist. He added that memory is not a permanent entity but rather something that is continually constructed and reconstructed depending on the particular schema that is active at the specific time of recollection. Neath explained that the subject’s “memory” may depend on that individual’s knowledge, experience, and expectations about any given subject. He noted that Weaver (1993) listed two characteristics of a flashbulb memory: the subject had elevated confidence in the accuracy of the memory and the subject seemed compelled to remember the event.

Although the concept of repressed memory remains controversial, the state of Washington apparently chose to accept its validity when they enacted legislation (Washington, 1989) that allowed individuals to sue those accused of childhood sexual abuse, disregarding the previously held statute of limitations. Using the delayed discovery doctrine, the Washington legislature ruled that since the evidence in repressed memory cases was newly discovered, the alleged victim had three years from the time of “remembering” the event to file suit. Following the precedence set by Washington, 18 other states passed similar legislation within three years of Washington’s action (Loftus, 1993). One might assume that strong evidence is available to support the existence of repressed memory if so many states were willing to enact legislation based on a belief in

it existence. However, upon close examination, supporting scientific evidence is weak at best.

Research by Nelson, McKinney, Gee, and Janczura (1998) has demonstrated that memory, even for recent events, depends on encoding operation. Much of what is “remembered” depends on what one previously knew about the event to be remembered. This knowledge typically is a result of a lifetime of learning. They summed up their findings by stating that “memory for a recent experience reflects an interaction between the nature of the encoding, the nature of the retention test, and the hundreds of previous experiences that people have had with the materials.” Even with this evidence, how does previous experience and varying interpretations of events during the encoding process get one from slight misrepresentation of facts to a complete “false memory?” There have been several researchers who have attempted to answer that question.

Studies have been conducted concerning false memories, discovering that words have strong associates in memory. These findings suggest that such associations are a result of language used in everyday life (Anderson, 1983; Collins & Loftus, 1975). A 1998 study (Nelson, McKinney, Gee, and Janczura) concurred that words develop associations with one another as life experiences place them in varying contexts. Underwood (1965, 1983) explained that this association is responsible for false recognition that may occur when specific words are presented and subsequently bring to mind their associates. More recently, Roediger and McDermott (2000) also found that specific words presented to subjects can infer associated words and result in a false “remembering.”

Even after the original event has occurred, memory can change to accommodate new information (Spiro, 1980). Studies indicate that “the chance of such changes occurring increases with time, the confidence the subject has that the memory is accurate will be as high or higher than for ‘accurate’ memories, and there is no way to distinguish inaccurate memories from accurate memories without some objective external evidence.” Roediger and McDermott (2000) concluded that over a period of time, individuals cannot remember what actually happened to them but are far more likely to remember events that did not occur. They found that subjects continued to “recall, recognize, and remember events that never actually happened, even under conditions that stress accurate responding.”

Neath (1998) quoted Loftus and Hoffman (1989) when they said, “Give us a dozen healthy memories, well-formed, and our own specified world to handle them in. And we’ll guarantee to take any one at random and train it to become any type of memory that we might select – hammer, screwdriver, wrench, stop sign, yield sign, Indian chief – regardless of its origin or the brain that holds it.” Loftus and Hoffman suggested that not only do individuals have a propensity to “remember” events that did not occur but can even be led to believe such events occurred under the direction of another, whether purposely or incidentally.

The current body of knowledge would indicate that memory is not simply a list of facts that are stored awaiting retrieval. Rather, memory appears to be a constant work in progress as our encoding processes and retrieval cues effect what is remembered. “Facts” may be a compilation of life experiences that determine how the event is viewed, interpreted, and remembered. As such life experiences continue, even the original

recollections are subject to change. Research has shown that false memories are not only possible but are even probable.

The significance of this study centers on the fact that the ever-growing research in this area continues to use adults as participants. Neath (1998) stated that, "As children age, they acquire more knowledge. There is a large literature showing that the amount recalled is positively related to the amount known about the subject matter." Since we are to accept that false memories are the result of word associations and personal experiences which include biases and prejudices, one would assume that the younger the participant, the less likely he/she would be to experience false memories since the life experiences are not as involved and detailed. However, few if any studies have sought to verify this assumption. The researcher of this study has examined the relationship between age and both accurate and false memories.

Based on the Roediger and McDermott paradigm (1995), participants were presented a list of associated words and then asked to recall as many as possible. Following three successive lists, participants were presented with a randomly assorted list of words including the three presented lists, words from lists not originally presented to the participants, and target words suggested by the original three lists. The participants were asked to recognize and label each word as either an "old" word from the original three lists or a "new" word that was being presented for the first time.

Limitations

Limitations in the proposed study are as follows:

1. Of the 2nd and 8th grade participants, only those who returned a permission form signed by a parent or legal guardian were included in the study.
2. If a proposed participant was absent from school the day of the assessment, he/she was not included in the sample group.
3. The fact that this is cross-sectional research can be limiting by such differences as education level and the fact that college students are more experienced taking tests and following arbitrary instructions.
4. Quasi-experimental research can limit the attribution of causality.

Delimitations

The following delimitations will be considered:

1. The population of eighth grade participants was limited to those from LaFayette Middle School, LaFayette, Georgia.
2. The population of second grade participants was limited to those from Gilbert Elementary School, LaFayette, Georgia.
3. The population of college students serving as participants was limited to those volunteers from undergraduate psychology classes at the University of Tennessee at Chattanooga.

Assumptions

The study will make the following assumptions:

1. Students were tested in their typical classroom environment, but free from possible outside distractions (i.e., visitors and/or intercom).
2. The Deese-Roediger-McDermott word-association list, which was adapted for use with all participants, was assumed to be a valid measure of false memory. A review of the literature demonstrates the replicability of this finding (Roediger & McDermott, 1995; Schacter, Verfaellie, & Pradere, 1996; Norman & Schacter, 1997; and Clancy, Schacter, McNally, & Pitman, 2000). This study used similar word lists and procedures as those adopted in previous studies.

Definition of Terms

RETRIEVAL – refers to the task of bringing past events into current memory. It is important to understand that the process “reflects an interaction between the nature of the encoding, the nature of the retention test, and the hundreds of previous experiences that people have had with the materials” (Nelson, McKinney, Gee, & Janczura, 1998).

REPRESSED MEMORY – memory following a shocking traumatic event in which the mind pushes the memory of the event into some inaccessible corner of the unconscious (Loftus, 1993).

EVENT MEMORY – refers to memory of a specific, significant event (Bartlett, 1932).

FLASHBULB MEMORY – a particular kind of memory which forms only for highly surprising and highly consequential events. These memories are reportedly similar to a photograph that “indiscriminately preserves the scene” (Brown & Kulik, 1977).

ENCODING – the taking in of information – a recoding of the events as filtered through our own perspectives and biases (Roediger & McDermott, 2000).

FALSE MEMORY – when someone “remembers” something that never occurred (Loftus, 1993; Roediger & McDermott, 1995).

RECALL – refers to the task requested of participants following the presentation of each word list. Participants are asked to recall – or remember and write down – as many of the list words as possible (Roediger & McDermott, 1995).

RECOGNITION – refers to the task requested of participants that follows the recall task. Words, including those from each presented list, words from other lists not shown to the participants, and target words are presented to the participants. Participants are then asked to rate their confidence in recognizing each word (Roediger & McDermott, 1995).

TARGET – for the purpose of this study, “target” is interchangeable with the term “critical” used by Roediger and McDermott. It refers to the word considered to have the highest association to the list words presented to participants in the Deese-Roediger-McDermott paradigm (Roediger & McDermott, 1995).

LURE – another term used interchangeably by some researchers, meaning the same as the “critical word” or “target word” (Roediger & McDermott, 1995). However, a highly associated word can be considered a lure without being the actual target word.

Summary of Chapter I

The first chapter has highlighted the need for investigation into the possibility of false memories in children. A research question is presented in an attempt to determine if

age has any effect on the rate of false memories. Limitations and delimitations are outlined and the definitions of terms used in this study are offered.

Organization of the Study

Chapter I is an introduction to the presented study and describes the intent of the research. The introduction to the problem and significance of the study sections explain the need for the study. The research examined the recall and recognition scores of second and eighth grade participants compared to college students and determined their rate of false recognition. The research question was stated and proposed to determine if age has any effect on the rate of false memories.

Chapter II includes a review of the literature that is related to the study. A brief history of memory is presented followed by an examination of current beliefs. The discussion leads to a look at repressed memory that has gained recent media attention in conjunction with reported childhood sexual abuse. The literature review explains the controversy involved with the theory of repressed memory and examines more recent research involving the concept of false memories.

In Chapter III, the methodology that was used is explained. The specific population of the study is delineated. Design procedures and specific means of implementation are listed. The chapter concludes with a statistical analysis from the research. Chapter IV follows with an explanation of the findings and an analysis of the data.

Chapter V offers a summary and conclusion of the research. Finally, implications for further research are discussed. At the end of the dissertation, there is a list of references, appendixes, and examples of all materials used in the study.

CHAPTER II

Review of Related Literature

Introduction

The purpose of this study was to determine if age has an effect on the rate of false memories – using the Deese-Roediger-McDermott paradigm. This chapter reviews the related literature to demonstrate the relevance and need of the presented study. A brief history of the various views of memory is discussed and a workable definition established. The theory of repressed memories is introduced as current literature discusses the concept in conjunction with the apparent growing numbers of reported childhood sexual abuse cases. This discussion leads to the latest research of the concept of false memories as well as subsequent consequences of the findings. Current studies in this field are reviewed and discussed with the obvious lack of children as participants being noted. The chapter is summarized including an explanation of the relationship between the related literature and the presented study.

History and Definition of Memory

Memory allows one to function in any given situation. The very reading and comprehension of these words requires the memory of the alphabet, how specific letters are grouped to form words, the definition of each word, how words are grouped to form sentences, and how the overall context implies specific meaning. Surely there exists a desire to tap into such a valuable but complex resource as the human memory.

A recurring question for psychologists and educators remains how to best think of memory. Great thinkers such as Aristotle, Plato, Augustine, Bacon, and Descartes expressed their belief in a position called the structural view (Neath, 1998). Although differing somewhat in their specific analogies, they all accepted that memory is a place where information is stored. This theory maintains that individuals witness an event, observe facts and details of the event, and store that information somewhere in the brain. The information is resting in memory until needed, when it will be retrieved and brought to consciousness. One may speak of forgetting something or losing his/her memory. The structural view is, however, that memory is not lost but rather the proper retrieval cues have not been discovered. Once the appropriate cues are used, the information will come back intact, in its entirety.

In a differing opinion, Weschsler (1963), expressing the proceduralist view, stated that "memories are no more stored in the brain than melodies in the keys of the piano." In 1993, Crowder explained that this proceduralist view "...emphasizes the processes that create and re-create the memory, rather than the structure or location in which a memory might be stored." Subsequently, Neath (1998) offered a working definition of memory when he stated that "...it is the ability to use or revive information that was previously encoded or processed."

Historically, theorists accepted the idea that our memory has a limited capacity. This is the belief that an individual has only the ability to deal with a limited amount of information at any given time. More recently, this assumption has been challenged. Even as far back as 1968, Atkinson and Shrifin expressed their belief in a multistore memory in which information from the external world was stored and passed on to our

short-term memory. If nothing is done with the information soon after it has been stored in short-term memory, it will be lost. However, if some type of cognitive operation is applied, the information will be transferred to the long-term memory.

Retrieval Cues

Raaijmakers & Shiffrin (19981) and Gillund & Shiffrin (1984) proposed that information stored in long-term memory is practically unlimited in its capacity and is considered to be permanent. This permanent memory appears to be organized around the relationships between information. Those relationships may be learned by repeated co-occurrence or by coming to understand the meaning. They stated that what one considers forgetfulness is actually a matter of retrieval failure that can be remedied by discovering the appropriate cue. The available research indicates that the stronger the association between words, the more likely the associated word will serve as a successful cue in recalling the associate word. In 1999, McEvoy, Nelson, and Komatsu, discussing research conducted by Deese, Roediger, and McDermott, explained that even though a specific item may not be presented, the likelihood that a subject will incorrectly recall and recognize it increases as a list of connected words are presented. They state that, "...the critical item accrues activation, not from actually being presented but from activation spreading to it from the list words."

There are obviously words that are common associates for the majority of individuals. Although a particular culture may have associates specific to that culture, most people commonly associate such words as table and chair, cat and mouse, etc. Many researchers (e.g., Nelson, McKinney, Gee, & Janczura, 1998; Nelson, Bennet, Gee,

Schreiber, & McKinney, 1993; Cramer, 1968; Anderson, 1983; Collins & Loftus, 1975) have discovered that words become associated or connected to one another as a result of language used in everyday life. The assumption is that the more words are used in varying contexts, the stronger the association. The stronger the association, the more likely a specific word, or group of words, will be successful in serving as a retrieval cue for another word. Could this be what is occurring in the reports of childhood sexual abuse? Was this traumatic event repressed in long-term memory until a specific cue, used in a therapeutic session, revived the memory?

Repressed Memory

According to the theory of repressed memory, when an event happens that is shocking, traumatic, highly significant, and too painful for the person to deal with, memory of the event may be pushed out of the conscious mind and stored somewhere in the unconscious (Loftus, 1993). The memory may remain hidden for many years or even indefinitely. On the other hand, if the appropriate retrieval cue is found, the entire memory will be brought to consciousness.

Some psychotherapists (Schuker, 1979; Rieker & Carmen, 1986; and Williams, 1987) report cases where individuals entered psychotherapy for a particular problem only to "remember" specific episodes of sexual abuse that they endured as young children. These memories were supposedly repressed until associative cues triggered the memories and helped bring them to consciousness. Other psychotherapists have endorsed the theory of repressed memories (Bruhn, 1990 and Fredrickson, 1992). The concept of

repression is often considered to be the very foundation for psychoanalysis (Bower, 1990).

Event and Flashbulb Memory

Although the theory of repressed memory does appear to be what the media is reporting, there is a disturbing fact to consider. Repressed memory, by definition, begins with a traumatic, highly consequential event that is too painful for an individual to endure. In 1977, Brown and Kulik described what they called "flashbulb memory." They stated that when one experiences a highly consequential event, the brain stores this information in memory just as it happened, similar to a camera taking a picture of the event. Reportedly, the facts of the incident are remembered intact due to the importance of the event.

This theory may be new but appears to be not too dissimilar to an earlier theory of "event memory". As far back as 1932, Bartlett explained his theory of event memory that sounded very much like flashbulb memory. He arrived at different conclusions however. He claimed that memory of a specific event, regardless of the importance of that event, is not an exact recall of related facts but rather a recall of the gist of the event, colored by an individual's interpretation of the experience based on previous knowledge. More recently, Roediger and McDermott (2000) concluded that memory was not a recollection of fact but rather a recall of the event as filtered through one's own opinions, experiences, and prejudices. Many people may have vastly different accounts of exactly the same event such as a close ballgame or even the 2000 Presidential election, based on their interpretation stemming from their personal life experiences.

Neath (1998) discovered that current research indicates that memories are really not like photographs and there are not any special memory processes occurring for a specific event regardless of the nature of such an event. Memory for a traumatic event appears to be no more accurate or less accurate than memory for an ordinary event.

Encoding

If memory processes operate the same for all types of events, one must question the accuracy of any remembered event, traumatic or not. Nelson, McKinney, Gee, and Janczura (1998) noted that one factor to be considered was the original encoding of the information. Just as the recall of information may vary depending on one's personal experiences and biases, so also does the initial encoding of information. Collins and Loftus (1975) and Anderson (1983) stated that the associations of words in memory were the result of their connection in one's language experiences in everyday life. That same association and connection can influence the original understanding, interpretation, and encoding of such information. Therefore, one's memory may not be an accurate account of the event but rather an individual interpretation of that event.

False Memories

The research would indicate that specific cues will help revive memories, regardless of the accuracy of those memories, but is it possible that one can be mistaken into believing that an entire event occurred even when it never did? Neath (1998) has stated that "although conventional beliefs about memory are correct, many are not." Current research is showing that such "false memory" is not only possible but may even

be considered common. Extensive research has been conducted in this area but primarily using adults as subjects. Several studies such as those conducted by Roediger and McDermott (2000) are demonstrating that by using the appropriate cues, a subject can mistakenly "remember" that a nonexistent event actually occurred. The conclusion is that these individuals, having a vast amount of information from a lifetime of experiences, are simply allowing the cues to convince them that the event actually occurred to them. Should we therefore assume that children are not as susceptible to false memories since they lack the "lifetime of experiences?" Perhaps they have a few such memories but not to the extent of the adult who has had far more time to experience a vast array of information.

Clancy, Schacter, McNally, and Pitman (2000) explored the topic of false recognition in women who were reporting recovered memories of childhood sexual abuse. They cited two studies by Terr (1991 & 1994) in which the concept of repressed memories was discussed. Terr explained the theory that children who experience sexual trauma learn to cope by forgetting the memory of the event. Although forgotten, these memories continue to influence thoughts and behaviors (Brown, Schefflin, & Hammond, 1998). Terr explained his belief that these memories may return to consciousness many years later with little inaccuracies.

Clancy et al. challenged this theory by acknowledging research by Schacter (1999) that indicated memories were vulnerable to distortion. It was also noted that Shobe and Kihlstrom (1997) discovered that memories of traumatic events did not follow any different psychological laws than those for ordinary events that were subject to

distortion. In 1993, Loftus pointed out the possibility that the very therapies designed to uncover repressed memories may actually be creating false memories.

To conduct an independent investigation, this study (Clancy et al., 2000) included four groups of women: those who reported recovered memories of childhood sexual abuse, those who believed they were abused as a child but had no specific memories, those who were abused as a child and had always remembered it, and those who had not been abused. A variant of the Deese-Roediger-McDermott paradigm was used to investigate false recognition among these four groups of women. It was discovered that those women who reported having recovered memories of childhood sexual abuse were more likely to experience false recognition of semantic associates than were the other participants.

Roediger and McDermott (1995) patterned their paradigm after Deese (1959) who developed a single trial, recall paradigm. Deese created thirty-six lists of twelve words that were associated with a critical or target word that was not included on the list. Participants heard a specific list of words and were then asked to recall as many of those words as possible.

Roediger and McDermott expanded Deese's paradigm by adding a recognition test. They presented a total of six word lists to the participants with the presentation of each individual list followed by a time for the participants to write down as many list words as they could recall. Following the free recall of the sixth and final list, Roediger and McDermott led a brief 2 or 3 minute conversation with the participants. At that point, the participants were given a 42-item recognition test. Included on this list were 12 words that had been included on the original lists. Of the 30 non-studied words, 6 were

the critical or target words, 12 were words not obviously related to any other word on the lists, and 12 words had only weak association to other words on the lists. Participants were asked to write "4" beside a word if they were confident the word had been on one of the lists. They were to write "3" for a word that was probably on the lists, "2" if the word was probably not on the lists, and "1" if the word was definitely not on the lists.

Just as Deese had discovered in 1959, Roediger and McDermott found high levels of false recall. The additional information they gathered showed that false recognition for the target, non-presented words was very high. They acknowledged that some might question the relevancy of their findings since these experiments were conducted in a lab setting. However, they explained that this was a learning experience in an academic setting, with college students, using very short retention intervals. They concluded that, "...we found dramatic evidence of false memories. When less of a premium is placed on accurate remembering, and when people know that their accuracy in recollecting cannot be verified, they may even be more easily led to remember events that never happened than they are in the lab" (Roediger and McDermott, 1995).

Recently, Roediger and McDermott (2000) repeated their earlier experiment but with one noticeable difference. Participants were told that they were about to hear a list of words and would then immediately be asked to recall as many of those words as possible. In addition, the participants were also given strong warnings to be extremely careful to not make errors. They were instructed to not guess but rather leave off any word if they were not confident that it was presented as part of the list.

Each list contained 15 words that were strong associates to a target word that was not presented. The list words were presented at the rate of one word per 1.5 seconds.

The researchers found that participants identified a relatively large percentage of non-presented, target words as being on the list of presented words. The example they cited was a 47% recollection of words from the middle positions on the presented list but a 55% false recognition of the target word.

Upon completion of several lists, participants were given a list of words composed of the words from the original lists, the target words, and words totally unrelated to either the list or target words. It was reported that participants correctly identified list words 79% of the time and incorrectly identified the unrelated words only 16% of the time. The subjects falsely identified the target words as having been on the original list a surprising 81% of the time.

Roediger and McDermott concluded that, "In watching a news program on TV, or reading a book, or listening to a friend's comments, we do not register the events literally as they happen, but interpret them through our own organizational schemes. We carry our own perceptions, thoughts, and reactions into the mix. Therefore, the version of the event that is encoded and later remembered involves our personal reaction as part and parcel of the transaction. We have no literal tape – or video – recording of the events of our past, but rather we retain a recoding of the events as filtered through the lens of our own perspectives and biases."

The study showed that, "Subjects recall, recognize, and remember events that never actually happened, even under conditions that stress accurate responding." Their research "confirms that with age we cannot remember as well what did happen to us, but remember more readily events that did not occur."

Even if one were to accept the findings of Roediger and McDermott and admit that it is relatively easy to demonstrate false recognition of a non-presented word following the presentation of strongly associated words, how is this discovery related to reports from those individuals who claim they were sexually abused as a child? Just because one falsely remembers a specific word listed among associated words, does that mean that someone could just as easily falsely remember an entire event that did not occur? Qin, Goodman, and Barry (1998) conducted research that addressed that very question.

To begin their study, adult participants were asked to remember specific events that happened to them when they were between the ages of one to five years old. The participants were informed of various event topics, asked to recall specifics of the event, and told that the information of the event had been provided to the individual conducting the test by the participant's parents. In actuality, one of the events was constructed by the researchers and verified by the participant's parents to have never happened to the participant. The participants were told to remember as many details as possible of each event. A second interview was scheduled from 2 to 10 days after the initial interview to see if the participants remembered any more details after having more time to consider the presented events.

Following the gathering of this data, participants were then asked to participate in a second experiment. Word lists that had been adapted from the 1995 study by Roediger and McDermott were presented to the participants. Finally, comparisons were made between the false memory scores obtained from the first paradigm and the false recognition scores from the second paradigm.

The researchers concluded that "A strong correlation existed between false childhood memory and false recognition. Specifically, findings indicated that compared to participants who had subjective experiences of false childhood memory, participants who did not have false subjective experiences of childhood memories had higher sensitivity in distinguishing the non-studied associated target words from the studied words" (Qin, Goodman, and Barry, 1998).

Some may question whether or not these findings from a laboratory setting are really applicable in a real world setting. Anderson, Lindsay, and Bushman (1999) state that many scholars accept that "Laboratory studies are good at telling whether or not some manipulation of an independent variable causes changes in the dependent variable," but they may also believe that the results do not generalize into real world situations. In response to the suspicion, Mook (1983) argued that, "The goal of most laboratory research is to discover theoretical relations among conceptual variables that are never sufficiently isolated in the real world to allow precise examination." He continued adding that, "Usually researchers are interested in generalization of theoretical relations among conceptual independent and dependent variables, not the specific instantiations of them."

Anderson et al. (1999) pointed out that the lab setting makes it easier to assure internal validity, without which there can be nothing to generalize. The researchers completed their study by comparing test results from lab studies and field studies. Their conclusions shed a positive light on both methods. They found that, "The psychological laboratory is doing quite well in terms of external validity." Subsequently, they also

concluded that, "Field studies in psychology must be doing a pretty good job when it comes to internal validity."

When studying research of false memories, one glaring fact remains: the participants used are predominantly college age and above. One obvious reason is that it is adults who are claiming instances of childhood sexual abuse that were hidden in repressed memory for years to only recently being brought to consciousness. However, the predominant reasons being offered to explain how such false memories can occur center around the individual's associations, biases, prejudices, and experiences based on a lifetime of experiences. We are left to assume that children may not experience false memories, or at least not at the same rate as do adults, since their experiences have not had as many years to be influenced.

Doris (1991), Ceci & Bruck (1993), and Poole & White (1994) reported their conclusions that indicated that although the results of the research literature were not uniform, several conclusions could be made in regard to children. They determined that young children remembered less information than did older children, particularly in a free recall. They also discovered that although young children rarely recall any incorrect "facts" in free recall, their levels of erroneous recall in response to unbiased cues (that is, questions that ask for more information but do not attempt to bias a subject's answer one way or the other) are higher than for older children. Their research also concluded that both children and adults are influenced by post-event information, with experiences occurring after the event affecting what is later remembered. They found that over extended delays of months or years, young children are more likely to "remember" incorrect information than are older children. Under most but not all conditions, young

children are more susceptible to suggestion, tending to follow the lead of a suggestive question more than older children.

A study was conducted in 1967 (Shepard) in which adult participants were shown numerous photographs. When they returned after a period of one week, they still recognized more than 90% of 600 photographs. Brown and Scott (1971) conducted similar research using children ages 3 to 5. As a result of their young age, participants were only shown 100 photographs. These children displayed equally high percentages of recognition after periods ranging from 1 to 28 days.

Researchers vary in their opinions as to whether or not recognition is influenced by age. Perlmutter and Lange (1978) explain that their research indicates that recognition ability changes very little with development. Others such as Mandler and Stein (1974), Stein and Mandler (1975), and Dirks and Neisser (1977), express their findings by stating that age-related differences are evident if the specific "task requirements are more demanding."

Still other research such as that from Mandler and Robinson (1978) reports that age differences can be found but only under certain conditions. During their research, they showed various pictures to children in grades one, three, and five. Later, they showed these students variants of the original photos. Some of the pictures were identical to the original while others had been changed in some manner. At each grade level, half of these pictures were shown in some type of organized grouping. The other half of the pictures were shown in random groupings. The results were that no age differences were detected for the unorganized group. The performance of each age group was generally poor. Additional findings indicated that performance improved with age

when shown the organized pictures. Mandler and Robinson hypothesized that their findings indicated that for rote memory, young children performed as well as older children. However, they went on to state that the poorer performance of the younger children observing organized pictures indicated that the older the participants, the more he/she recognizes patterns or groupings based on life experiences.

Similarly, Dirks and Neisser (1977) proclaim that age differences are more likely to be observed "...when the information to be remembered is complex, possibly resulting in inadequate encoding of the critical information by young children." Two studies (Hock, Romanski, Galie, and Williams, 1978; Mandler & Robinson, 1978) added that older children perform better than younger children do because they can take advantage of their life experience to assist them in the recognition process. By drawing from this added experience, recognition performance increases as this knowledge is applied to the task at hand.

The literature suggests that memory improves with age. Whether the reason be as simple as the ability to recognize the meaning of a specific word, or as complex as mastering organizational strategies, researchers believe that the older child "remembers" more accurately than a younger child does on a free recall or recognition task. It is also believed that the older the child, the more likely he/she is to demonstrate "false memory." Some researchers explain this conclusion by stating that the younger child simply has not had the life experiences that lead to strong word associations which, in turn, may trigger a false recall. It is believed that the younger child's memory, whether at the encoding, processing, storage, or retrieval level, has not developed organizational strategies as

sophisticated as those of an older child. Therefore, the younger child will also not be as susceptible to false recognition as an older child is.

An extensive search of the literature indicates that research in the area of false memories has been confined, almost exclusively, to adults as participants. It is for that reason that this researcher has chosen to replicate prior studies by Roediger and McDermott but using children as participants. Included in this study will be students in the eighth (approximately 13 to 14 years old) and second (approximately 7 to 8 years old) grades as well as college students. Since the research indicates that false memories are stemming from an abundance of outside influences based on a lifetime of experiences, children have not been exposed to those same experiences, and we have typically just assumed that children would not have the same rate of false recognition, this researcher has tested this accepted theory to determine if age does have an influence on the rate of false recall and false recognition.

Summary of Chapter II

Chapter II presents an overview of the literature that is related to the subject matter being examined. The growing phenomenon of childhood sexual abuse recovered from repressed memory is discussed. Recent research showing the propensity for false recall and recognition is explained. The correlation between this research and false memories is also examined. Finally, the lack of younger children as participants in this body of research is pointed out with a proposal to remedy this oversight.

CHAPTER III

Methodology and Procedures

Introduction

The following chapter offers a detailed overview of the methodology that was used in the research study. The intent of this study was to determine if age has a significant effect on the accuracy of one's recall and/or recognition. The paradigm used in the Roediger and McDermott (1995) study will be adapted using students from university undergraduate psychology classes, eighth grade middle school students, and second grade elementary students. This chapter includes a discussion of the procedures that were implemented and an explanation of the exact instruments that were used within the investigation.

Participants

As a result of the nature of this research, the population from which the sample for this study was selected came from three sources. The undergraduate students participating are taking psychology courses at the University of Tennessee at Chattanooga. The eighth grade students used in the study attended LaFayette Middle School in Walker County, Georgia. The second grade students that were tested attended Gilbert Elementary School, also located in Walker County, Georgia. Both of these public schools are within the city limits of LaFayette, Georgia. LaFayette is a rural community in northwest Georgia approximately 25 miles south of Chattanooga, Tennessee.

Permission to conduct the study at LaFayette Middle School and Gilbert Elementary School was granted by the principals at each school (Appendices A & B).

The second and eighth grade students were given a parental consent form (Appendix C) to take home prior to the experiment. No student was permitted to participate without parental authorization. An assent form (Appendix D) is included in this study to document the exact explanation offered to the younger participants prior to gaining their consent to participate.

Materials

Three lists of words were adapted from the 1995 study by Roediger and McDermott (Appendix E). Their lists were developed from materials originally used in an earlier study by Deese (1959). Each list contained 15 associated words. Prior to the presentation of these lists to the second grade participants, the classroom teachers of these students were allowed to review the lists to determine the appropriateness of each word, as well as the overall length of the lists. Teachers were asked to confirm whether or not the students would understand the words on the lists. Secondly, they were asked to confirm that a 15-word list is compatible with the attention span of these young children.

At the conclusions of the presentation of each list, participants were asked to recall as many of the words as possible and write those words on the appropriate form (Appendix F). Following the presentation and recall of the third word list, students were presented with a randomly associated list of 192 words (Appendix G). This comprehensive word list was made up of the 45 words on the 3 lists presented to each participant, 135 words from 9 additional word lists – each comprised of 15 associated

words – which were not presented to the participants, and 12 lures. In the context of this study, a lure is a word that is highly associated with the words on the presented list but is never actually presented itself. Since this comprehensive list is comprised of 12 word lists, each list had a lure that was included in this large list that was used for the recognition test.

Testing Procedure

Prior to testing, participants were read an informed consent document (Appendix H), the second and eighth grade students were read an assent document, their rights were explained, and each was asked to sign a copy of the document, acknowledging their understanding. Participants were tested in their normal classroom setting. They were instructed that they would see and hear a list of words and would then immediately be asked to write down as many of those words as possible, using the form that was provided. In each classroom, there was a television and VCR placed where every participant could easily view the screen. A word appeared on the screen with the word immediately being spoken. Each word was viewed and heard at the approximate rate of 1 word per 1.5 seconds. At the conclusion of the presentation of each list, the narrator said, "Recall." Students were allowed 2 minutes to recall and write the words that they saw and heard from the presented list.

Following the presentation and recall test of the third list, participants' papers were taken up. The recognition test words were then distributed with participants being instructed to label each word on the list as "old" if they were confident it had appeared on one of the three presented lists, and "new" if they were confident that the word had not

appeared on either of the three presented lists. Participants were given as much time as necessary to complete this task.

Confidentiality

Participants' names were held in confidence. Each participant was given a recall and recognition test to complete. These two tests were grouped by labeling "participant #1" on the first pair, "participant #2" on the second pair, etc. At no time were the results of these two tests linked with a specific student.

Statistical Analysis

This particular study consisted of an independent variable that was the class level for each participant. Since the "class level" in this study was second grade, eighth grade, or college, the independent variable also represents the age of the participants. Means for the number of specific responses for each test were determined. This study contained four dependent variables: total number of presented items recalled, total number of lures falsely recalled, total number of presented items recognized, and the total number of lures falsely recognized. A separate one-way analysis of variance was performed on each dependent variable. A standard alpha level of $p < 0.05$ was used for the reporting of significant effects. Post hoc tests were performed using the Tukey HSD (honestly significant difference).

Summary of Chapter III

This chapter introduced information about the participants who were included in the experimental phase of the study. The materials that were used, such as the three word lists adapted from the lists used by Roediger and McDermott in their 1995 study, were presented. Also discussed in this chapter were the schools' principals' informed consent, parental consent, and the participant informed consent.

Testing procedures were described as well as the confidentiality that was afforded to each participant. Finally, the method for statistical analysis was described.

CHAPTER IV

Findings and Analysis of Data

Introduction

The independent variable in this study was class level, used to categorize the age of the student. The four dependent variables were: 1) the total number of presented items *recalled*, 2) the total number of lures *falsely recalled*, 3) the total number of presented items *recognized*, and 4) the total number of lures *falsely recognized*. A separate one-way analysis of variance was performed on each dependent variable. An alpha level of $p < 0.05$ was used for the reporting of significant effects and post hoc tests were performed using the Tukey HSD.

The four hypotheses to be examined were:

- 1) the older the child, the more accurate the recall,
- 2) the older the child, the greater the number of false recalls
- 3) the older the child, the more accurate the recognition, and
- 4) the older the child, the greater the number of false recognitions.

Findings of the Study

The mean performance score of participants from each grade is presented for each dependent variable in Table 1. The rate of *accurate recall* (hypothesis 1) was significantly affected by the age of the participant with each age group performing better than the previous younger group. For the *false recall* scores (hypothesis 2), it was determined that the scores of the second grade students and the eighth grade

TABLE 1
DESCRIPTIVES OF THE FOUR DEPENDENT VARIABLES
CATEGORIZED BY CLASS LEVEL

		N	Mean	Std. Deviation
Correct Recall	second graders	49	34.40%	0.11
	eighth graders	49	48.00%	0.11
	college	47	55.20%	0.11
	TOTAL	145	48.00%	0.14
Recall of non-presented lures	second graders	49	2.30%	0.07
	eighth graders	49	6.80%	0.13
	college	47	16.30%	0.18
	TOTAL	145	8.40%	0.14
Correct Recognition	second graders	49	63.40%	0.19
	eighth graders	49	79.30%	0.11
	college	47	79.70%	0.13
	TOTAL	145	74.00%	0.17
Recognition of non-presented lures	second graders	49	23.10%	0.29
	eighth graders	49	57.80%	0.28
	college	47	72.30%	0.27
	TOTAL	145	51.00%	0.35

students were similar with both significantly lower than the college students. Examining the *accurate recognition* scores (hypothesis 3), it was noted that the eighth grade students and the college students had similar scores, with both performing significantly better than the second grade students. The *false recognition* scores (hypothesis 4) were significantly affected by the age of the participant with each age group having more false recognitions than the previous, younger age group.

Analysis of the Data

For the first hypothesis, there was a significant effect of class level (age) on the accuracy of recall, $F(2, 142) = 43.27, p < .001$. A post hoc analysis revealed that each age group differed from the others. The mean score for second grade students was

34.4%, while the mean score for eighth grade students was 48.0%, and college students were highest at 55.2% (see Table 1).

Examining the second hypothesis, the percent of critical lures falsely recalled was lowest in second graders and highest in college students, $F(2, 142) = 14.26, p < .001$. A post hoc analysis revealed that there was no statistically significant difference between the performance of the second grade and eighth grade students. However, there was a statistically significant difference between the performance of these two groups and the performance of the college students. The mean score for the second grade students was 2.3%, with the mean score for eighth grade students at 6.8%. The mean score for the college students was highest at 16.3% (see Table 1).

The percent of accurate recognition was significantly different based on age, with the lowest scores coming from the second graders and highest scores from the college students, $F(2, 142) = 18.82, p < .001$. A post hoc analysis demonstrated that there was no statistically significant difference between the performance of the middle school students and that of the college students. There was a statistically significant difference between the performance of those two groups and the performance of the second grade students. The mean score for the second grade students was 63.4%. Significantly higher was the mean score for the eighth grade students at 79.3% and 79.7% for college students (see Table 1).

For the fourth hypothesis, it was discovered that there was a significant effect of class level (age) on the percentage of false recognition, $F(2, 142) = 39.61, p < .001$. A post hoc analysis demonstrated that each age group differed from the others. The mean score for the second grade students was lowest at 23.1%. The mean score for the eighth

grade students followed at 57.80%. The mean score for the college students was highest at 72.3% (see Table 1).

Summary of Chapter IV

There was evidence in these data for a developmental change in accurate and false memory production. The youngest children were poorest at recall and recognition. Eighth graders performed as well as college students on recognition but still evidenced weakness in recall. False memories were rare in the recall of second or eighth graders, though they appeared in the college sample. Again a developmental trend appeared in the false recognition, with second graders having the fewest, followed by eighth graders, and then college students.

CHAPTER V

Conclusions and Implications for Further Research

Introduction

The original question that the researcher proposed to answer was: Does age have any effect on the rate of false memories? This question was considered significant after a review of the literature revealed that assertions of children's memory performance were made while using adult participants almost exclusively in the available research. The researcher tested these assertions using second grade students, eighth grade students, and undergraduate college students as participants.

Summary

Although four separate hypotheses were listed, they each reflect a similar conclusion among researchers. It is commonly accepted that memory development is a gradual process with cognitive accuracy improving with age. Another accepted belief is that certain factors such as the development of word associations and organizational strategies result in individuals having a higher rate of false recall and false recognition as they get older and these systems develop (Bjorklund, 1987). Therefore, one would expect to find a significant improvement in the mean scores of the second graders to eighth graders to college students in the areas of accurate recall and accurate recognition. In addition, one would also expect a significant increase in the mean scores of false recall and false recognition. The data from this study were consistent with previous research that asserted that mean scores from each of the four categories increased with age.

However, the unique conclusions of this study include the discovery that subjects' scores did not increase significantly with age in all four of the categories.

The data from this research supported the conclusion that accurate recall does improve with age. Just as previous researchers (Doris, 1991; Ceci & Brock, 1993; and Poole & White, 1984) had hypothesized, the data indicated that eighth graders performed significantly better than the second graders, and college participants scored significantly higher than the eighth graders.

Previous studies conducted by such researchers as Hock, Romanski, Galie, and Williams (1978) and Mandler and Robinson (1978), asserted that participants in a recognition task would take advantage of their life experiences. Such experiences, they believed, would help to build strong word associations and other memory strategies. As a participant increased in age and therefore had more life experiences, the recognition rate of accuracy would improve. The data from this research supported the conclusion that although recognition mean scores improve with age and the second graders scored the lowest, there was no significant difference in recognition scores between the eighth graders and the undergraduate college students.

Previous researchers hypothesized that rates of false recall and false recognition would also increase with age. McEvoy, Nelson, and Komatsu (1999) realized that participants would be more likely to inaccurately recall and recognize non-presented words as they were presented with additional words that strongly associated with the lure. Several researchers (Nelson, McKinney, Gee, & Janczura, 1998; Nelson, Bennet, Gee, Schreiber, & McKinney, 1993; Anderson, 1983; Collins & Loftus, 1975; and Cramer, 1968) explained that words develop a strong association with other words as a result of

language used in everyday life. As one uses words in a variety of contexts, the association gains in strength. The data from this study supports the conclusion that rates of false recall and false recognition do increase with age. However, the data also supports the conclusion that there is no significant difference in the performance of the second graders and eighth graders in the area of false recall. Both of these groups do score significantly lower than do college students in this same area. The rates of false recognition that were found in this study are consistent with previous research assertions. Eighth graders scored significantly higher than second graders but significantly lower than the college participants.

Conclusions

The original question to be addressed was, "Does age have an effect on the propensity for false memory?" The data from this research leads to the conclusion, "Yes," but with specific stipulations. If a participant is being asked to "recall" an event, word, person, etc., he/she has to depend on an organizational strategy to assist with the retrieval of the requested fact. The data from this research supports the conclusion that this rather complex task does improve with age as the specific strategy develops. An even more complex task, "false recall," would require the participant to not only have a well-developed organizational strategy but also to have experience using the strategy to the point where he/she is led to a highly associated event, word, person, etc. Although the occurrence of this type of "false memory" does increase with age, the current research supports the assertion that eighth-grade participants have not developed this strategy beyond the level of the second-grade participants. Older participants, such as the college

students used in this study, do have a significantly higher rate of false recall than do the other participants. However, it is yet to be determined at what age the significant change takes place.

Another type of memory, "recognition," requires a participant to simply recognize a previously experienced event. With the answer serving as its own cue, eighth-grade students were able to perform at an equivalent level with the college participants. The associated concept of "false recognition" requires a slightly more developed organizational system that would assist a participant to use highly associated cues and lead him/her to an incorrect recognition. The current study supports the conclusion that this type of "false memory" does increase significantly from the second grade to the eighth grade to college level participants.

The data also supports the validity of the four stated hypotheses. The evidence supports the conclusion that the older the participant, the more accurate the recall and/or recognition. Similarly, the older the participant, the more likely he/she is to demonstrate false recall and/or false recognition. However, the data also supports the conclusion that recall and recognition do not develop at the same rate.

In the current study, the researcher discovered that one could be led to false assumptions if "memory" is considered a one-dimensional system. Just as there are different types of memory (i.e., recall, recognition), there are also different levels of organizational strategies required to assist with memory. Rather than the assertion, "Memory improves with age," it is a more accurate statement that these organizational strategies improve with age.

The results of this study support the claim by Dirks and Neisser (1977) who asserted that age differences in memory are more likely if the task is complex. Flavell, Miller, and Miller (1993) explained that a complex task is one that requires the development of the retrieval process. Therefore, recall is more difficult for younger children because there are no organized systems in place. Word associations have not developed. With recognition, the presented word serves as its own cue so the task is less complex than recall.

The data from this research provides an interesting and unique indication that memory develops at a different rate depending on whether the task is complex or relatively simple. The more complex task of recall shows a gradual improvement with age as organizational systems and word associations develop. As a result, there is a statistically significant improvement from the second graders to the eighth graders to the college students.

The demonstration of false recall requires an even greater development of memory strategies. Not only would the participant have to recall without presented cues, but would also have to have developed organizational strategies so sophisticated that he/she would be drawn to the non-presented lure. The data in this research supports the conclusion that participants in the age range from 13 to 14 years old (eighth graders) show no significant difference from participants 7 to 8 years old (second graders). Obviously the development of this more complex task develops at some point during the high school years – between eighth grade and college.

In contrast, the data from the easier task of recognition demonstrates an improved performance by the eighth grade participants. When presented with a cue – the actual

word that was originally presented now included among a larger word list – the eighth graders were able to identify the correct word at an almost identical rate as that of the college participants. There was a statistically significant improvement in accuracy in both of these groups when compared to scores of the second graders.

Although not as complex as the task of demonstrating false recall, false recognition still requires sophisticated memory strategies. The lures are included in the major word list but to incorrectly identify the lure as an originally presented word, one would have to have well-developed organizational memory strategies in order to be misled by the lures. The data from this study supports the conclusion that such development is a gradual process. Therefore, the data demonstrates a statistically significant increase in the rate of false recognition from the second graders to the eighth graders to the college students.

It is not simply the increase in age that leads to the improvement of one's memory. Rather, the data from this research supports the conclusion that it is the development of more sophisticated organizational strategies that result in not only a higher rate of accurate memory but also a higher rate of false recall and false recognition. As a host of other researchers have asserted (Anderson, 1983; Collins & Loftus, 1975; Nelson, McKinney, Gee, & Janczura, 1998; Underwood, 1965 & 1983; and Roediger & McDermott, 2000) the development of strategies such as word association can occur as the result of language used repetitively in our everyday life. However, this researcher's data demonstrates a unique finding. Rather than witnessing a steady, gradual development in memory strategies, the data supports that there is significant

improvement of these strategies that occurs at some point after the eighth grade (13 to 14 years old) but before the participant enters college (18 to 19 years old).

Implications for Application and Further Research

In a court setting, as we learn more about false memories, it is becoming more difficult to gain a conviction based on an individual's "eye-witness" testimony in the absence of corroborating evidence. However, we may currently give more credence to a child's testimony as assertions claim that the younger the child, the less likely it is that he/she will experience false memories. In this study, the researcher has substantiated that assertion. It may be a valuable tool to understand that "recall" does improve with age but "false recall" is no more prevalent in an eighth grader than it is in a second grade student. It may also be important to realize that an eighth grade student has developed "recognition" strategies as well as college participants while "false recognition" appears to increase with age as previously believed.

In the academic arena, a possible implication could be that teachers of middle school students should give "multiple choice" or "matching" test questions to insure that students are given the best possible opportunity to demonstrate what they have learned. Although "fill in the blank" tasks (recall) improve with age, this research indicates that "multiple choice" or "matching" tasks (recognition) may result in higher test scores. The problem is not that students have not learned the material. Rather, the difficulty occurs when the student attempts to retrieve that information. This study demonstrates that the task of "recognition" is much more highly developed than "recall" through the middle school years.

Another possible implication centers on the test results in the "false recall" category. As defined in this study, a "false recall" occurs when a participant is led to incorrectly list a word that did not actually appear but is a strong associate of the words that did appear. As an employee at a middle school (grades 6 through 8), I met with teachers from each of the three grades (each grade separate from the others). The teachers were asked what one task was the most difficult to convey to their students. With no exceptions, they explained that they had a great deal of trouble getting the students to "see the big picture." They explained that students could remember facts and, depending on the intelligence level of the student and the amount of test preparation time, adequately answer questions correctly on tests. However, the major problem that transcends over many subjects is that the students struggle to take these facts and make inferences from them. They read a paragraph, recall facts from within the text, but have difficulty explaining the main theme of what they have read. They memorize facts about a specific war but can not identify what we can learn from these facts. Possibly, this area of difficulty does not stem from a lack of intelligence or motivation for which many teachers admitted to accusing their students. According to the findings of this research, the ability to take words (or "facts" as the case may be) and be drawn to an associated word or fact may be too complex a task for the average middle school student. Another possible explanation is that the student may be capable of completing the task but requires specific instruction as how to reach such conclusions. An example of this type of instruction would be the use of graphic organizers.

The conclusion of this research asserts that a significant memory development occurs after the early teenage years as demonstrated by the 13 and 14 year old

participants in this study. A replication of this research using slightly older participants may provide a better understanding of when the significant development takes place.

Another possible consideration would be to replicate this study using the exact words used by Roediger and McDermott (2000). The word lists used in this recent research were adapted from their original lists. The words used were those that the second grade participants' teachers felt were understandable by the younger students.

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APPENDICES

Appendix A

La Fayette Middle School

*419 Roadrunner Blvd.
La Fayette Georgia 30728*

Phone 706-638-6440

Fax 706-638-7616

*Mr. Kevin Richardson
Principal*

August 23, 2001

*Mr. Terry Chance
Assistant Principal*

*Ms. Angie Ingram
Assistant Principal*

Danny Williams has explained to me the study that he will be conducting with LaFayette Middle students. I give my full support and consent to allow him to pursue this endeavor with those students who volunteer to participate, after obtaining signed parental consent, and with the signed informed consent of the individual student.

Sincerely,

Mr. Kevin Richardson
School Principal

Appendix B

*Gilbert Elementary School**87 South Burnt Mill Road**LaFayette, GA 30728**Phone (706) 638-2432; Fax (706) 638-0722**Mr. Ernest L. Reece, Jr.*
*Principal**Mr. George C. Kapsal, Jr.*
Assistant Principal

August 23, 2001

Danny Williams has explained to me the study that he will be conducting with specific second grade students at Gilbert Elementary School. I offer my consent for this research to take place, provided that each student participating in the study provides us with both a signed parental consent form as well as a signed informed consent from the student – after the process has been explained to him/her.

Respectfully,

Ernest Reece
Principal*Mary Black, Curriculum Specialist**Jana Marshall, School Counselor*

Appendix C

Parental Consent Letter

Dear Parent or Guardian,

I am Danny Williams, counselor at LaFayette Middle School. I am currently working toward my doctoral degree in education from the University of Tennessee at Knoxville. I would like to include your child in my dissertation study. The study will examine memory functions in children to help determine if children's memories perform similarly to adults' memories.

All testing will be completed in only one session of not more than 30 minutes. The testing will be conducted in your child's normal classroom and the teacher will be present at all times. No academic subject will be affected and no grade will be given for participation in this research study.

A research team from the UT-Chattanooga Psychology Department, headed by Dr. Richard Metzger, will assist in the data collection. The research team will sign a confidentiality statement regarding the data collected from the students.

Students participating in this study will watch a video that shows a list of words and reads each word out loud. Upon completion of the word list, students will be asked to write down as many of the words as they can remember. Following the presentation and recollection of three such lists, the students will be given another form that contains the words from all three previously shown word lists as well as several words from other lists that were not presented to the students. The students will be asked to identify those words that were contained on the word lists that they saw and heard.

Please return the bottom portion of this letter so I may document your formal consent for your child to participate, if your child chooses to participate. No child will be required to participate. In addition, your child may withdraw from the project at any time. All signed consent forms will be stored for three years following this study. The storage of the forms will be with Dr. Richard Metzger, Psychology Dept., 350 Holt Hall, UT-Chattanooga. Feel free to contact me at LaFayette Middle School if you have any questions (638-6440). Thank you in advance for helping me to further my studies.

Danny Williams
Counselor

I, _____, do give my consent for _____
(Parent/Guardian Name) (Student's Name)

to participate in the study Mr. Williams is attempting with the research team from UT-Chattanooga on memory function.

Parent/Guardian Signature

Date

Appendix D

The Effect of Age On the Propensity for False Memories

Assent Form

- I. The examiner will use the following introduction with the participating students:**

Hello, my name is Danny Williams. Your parent or guardian and your teacher say that you are willing to help me. If you want to be part of this study that will last about 30 minutes, you will stay in your regular classroom, with your teacher present at all times. You will not be given a grade for participation in this research and it will not effect any academic subject that you are taking. All I will ask you to do is look at the television screen, see and hear a list of words, and then write down as many of those words as you can remember. I will ask you to do this for three different lists of words. When we complete all three lists, I will give you another sheet of paper that contains all the words listed on those three lists plus a lot of other words from different lists that you will not see or hear. I will ask you to try to identify the words that were on the three lists that you will be seeing and hearing. It is not very difficult and I am sure that you will do a good job. Please remember, I do not need to know what words your neighbor remembers so please keep your eyes on your own paper. Are you willing to help me with this project? (Child's response). Great! If you decide, at any time, that you don't want to do this anymore, all you have to do is tell me and you can join the other students in another one of your classrooms.

I really appreciate your help! I am going to turn on the TV and VCR now. Can everyone see the screen from where they are sitting? (Children's response). Okay, then please watch the words that appear on the TV screen and listen to each one of them being read to you. When the list is finished, the voice on the TV will instruct you to begin writing the words that you remember. Are you ready? Let's begin.

Appendix E**Word Lists**List One

nurse

sick

medicine

health

hospital

dentist

ill

patient

List Two

note

sound

piano

sing

radio

band

horn

concert

List Three

web

insect

bug

fly

crawl

poison

bite

creepy

Appendix F**Response Form for Subject**

Subject # _____

Please write down any words that you remember being on the list that you just saw and heard. Do not write any words after time has been called. Do not go back and write in any words after we have started on another list.

LIST 1:

LIST 2:

LIST 3:

Appendix G

Recognition Form for Subject

Subject # _____

Beside each word listed, please write an "O" for "old" if the word was presented on one of the three word lists that you just saw and heard. Write an "N" for "new" if the word was not presented on either of the three word lists.

__dark	__blue	__coal	__black	__night	__grief
__funeral	__ink	__gray	__white	__cat	__color
__death	__bottom	__brown	__charred	__milk	__stool
__health	__basket	__noon	__beautiful	__snore	__speed
__fright	__radio	__chocolate	__butter	__wood	__physician
__kiwi	__dolls	__jump	__orchestra	__awake	__cautious
__sour	__small	__note	__cocktail	__stop	__cliff
__pretty	__toast	__office	__table	__dough	__jazz
__bitter	__poison	__snail	__sky	__blanket	__dance
__wine	__clinic	__salad	__snooze	__horn	__web
__honey	__delay	__dream	__symphony	__cure	__citrus
__high	__sister	__sandwich	__recliner	__doctor	__instrument
__good	__fly	__sleep	__music	__hair	__rye
__ripe	__lawyer	__chair	__fast	__nap	__spider
__cake	__art	__tall	__female	__cushion	__bowl
__legs	__sitting	__insect	__sweet	__crawl	__wait
__tired	__clouds	__date	__crust	__ill	__sofa
__cherry	__melody	__sugar	__creepy	__listless	__rest
__low	__young	__fruit	__surgeon	__slow	__bed
__building	__cute	__jelly	__sick	__orange	__swivel
__sound	__taste	__girl	__bug	__lethargic	__wake
__airplane	__aunt	__loaf	__rocking	__patient	__banana
__concert	__turtle	__bite	__tart	__peace	__dive
__daughter	__slice	__bench	__hospital	__juice	__piano
__tooth	__animal	__sluggish	__yawn	__niece	__elevate
__rhythm	__dentist	__berry	__band	__soda	__tarantula
__traffic	__doze	__dress	__tower	__sing	__jam
__desk	__medicine	__vegetable	__nice	__ugly	__hesitate
__slumber	__arachnid	__pie	__over	__boy	__eat
__feelers	__candy	__molasses	__drowsy	__pear	__nurse
__seat	__food	__up	__apple	__quick	__sit
__flour	__heart	__bread	__couch	__above	__stethoscope

Appendix H

Informed Consent Form

You are invited to participate in a research study. The purpose of this study is to investigate the effects of age on memory. In your regular classroom setting, details of the nature of the study will be explained to you. Next, the informed consent form will be explained and students will be asked to sign it if they decide to continue with the study. The study will take place during the last part of your regularly schedule class. If you chose to not participate, you may leave early with no consequences. If you decide to participate in the study, you will receive extra credit from your instructor upon completion of participation in this research study.

Each participant will be asked to watch a video where they will see and hear a list of words. At the end of the presentation, students will be asked to write down as many of those words as they can remember. A total of three word lists will be presented, each followed with a time for you to write down as many of the words as you can remember. Upon completion of all three word lists, you will be given a paper with many words listed. All of the words you saw from the three word lists will be contained on this list as well as words from several other lists that were not presented. You will be asked to recognize and identify those words that were on the three original word lists.

There are no foreseeable risks from participating in this study. The information in the study will be kept confidential. Once the data is collected, there will be no way to match a student with specific answers. There will be no reference made in oral or written reports which could link you to the study.

If you have questions at any time about the study or the procedures, you may contact the researcher, Danny Williams, at LaFayette Middle School (638-6440). If you have questions about your rights as a participant, contact the UTK Compliance Section of the Office of Research at (865) 974-3466.

Your participation in this study is voluntary, you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at any time without penalty. If you withdraw from the study before data collection is completed, your data will be returned to you or destroyed.

CONSENT

I have read the above information (or had it explained to me) and agree to participate in this study. I have received a copy of this form.

Participant's name (print) _____

Participant's signature _____

Date _____

Vita

Daniel D. Williams, Jr. was born in Chattanooga, TN on July 14, 1953. He was raised in Fort Oglethorpe, GA where he attended Fort Oglethorpe Elementary and Junior High School. He graduated from Lakeview High School in 1971. From there, he attended Dalton Junior College and earned an Associate of Arts Degree in liberal arts in 1973. In 1975, he received a Bachelor of Science Degree in psychology from The University of Tennessee at Chattanooga (UTC). He later returned to UTC where he earned a Master of Education Degree (1989) in Community Counseling while also completing the master's curriculum for a certification in School Counseling. He will receive a Doctor of Education Degree with a major in Education in May 2002.

Danny worked thirteen years in the social work field while employed with the Georgia Department of Family and Children Services and later with Chattanooga Big Brothers / Big Sisters Association. Since earning his master's degree, he has served as a counselor for the last thirteen years. He began his counseling career with Walker Technical Institute (recently renamed Northwestern Technical College). He then moved to The University of Tennessee at Chattanooga before serving the last three years at LaFayette Middle School, located in LaFayette, Georgia.

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