

The Emergence and Developmental Progress of Autobiographical
Memory

by

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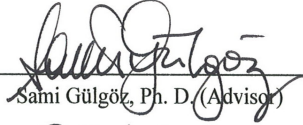
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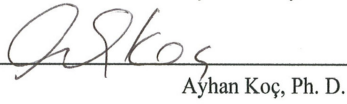
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ABSTRACT

The present study mainly tries to confirm the predicted developmental progress for autobiographical memory. The predicted developmental progress of autobiographical memory is expected to involve seven levels and each level necessitates the completion of the preceding level. In order for autobiographical memory to emerge, an individual has to reach to the fifth, sixth and seventh levels. However, there have been inconsistencies about the fact that the first four levels have to be completed in order to pass to fifth, sixth and seventh level. Therefore, the present study tries to find out if it is possible to develop autobiographical memory without the completion of first four levels. The sample of the present study comprised of 120 children, between 2 and 6 years old. The children were visited at their homes twice with a 4-week interval. In the first visit, the child met and played a game with the researcher and received a gift from the researcher. 4 weeks later, in the second visit, the child was required to recall the researcher and gift. The child was also asked to recall the game that he played with the researcher and also to behaviorally enact it. Since narrative structure development also has been stated to influence the emergence of autobiographical memory, the levels of children's narrative structure development were also investigated for this purpose. In the second visit, the researcher also asked the children two questions about one of their past doctor visits and birthdays. Results of the study have confirmed that autobiographical memory development follows the predicted developmental progress.

Keywords: Autobiographical Memory, Developmental Progress of Memory, Narrative Structure, Recall, Recognition

ÖZET

Bu araştırmada esas olarak, otobiyografik belleğin gelişimsel sürecinin öne sunulan doğrultuda olduğu doğrulanmaya çalışılmaktadır. Otobiyografik belleğin gelişimsel sürecinin 7 tane seviyesi olduğu düşünülmüş ve her bir seviyenin ortaya çıkışının bir önceki seviyenin tamamlanmasıyla olduğu savunulmuştur. Bu süreçteki son iki seviye otobiyografik belleğin ortaya çıkışını ileri sürmektedir. Bu araştırma ayrıca otobiyografik belleğin ortaya çıkması için ilk 5 seviyenin tamamlanmasının zorunlu olup olmadığını da ortaya çıkarmaya çalışmaktadır. Katılımcılar 2 ila 6 yaş arasındaki 100 tane çocuktan oluşmaktadır. Katılımcılar evlerinde 4 hafta arayla 2 kere ziyaret edilmişlerdir. İlk ziyarette katılımcı araştırmayla tanışır, onunla hamurlardan bir oyun oynar ve de daha sonra araştırmacıdan bir hediye alır. 4 hafta sonrasında ise ikinci ziyaret gerçekleştirilir. İkinci ziyarette ise katılımcıdan araştırmacıyı anımsaması ve hediyeyi hatırlaması istenir. Hediyeyi hatırlayıp hatırlamadığı iki şekilde test edilir; anımsama ve tanıma. Katılımcıların hediyeyi anımsama ve tanıma seviyelerinin yaşları artıkça değişiklik gösterdiği görülmüştür. İkinci ziyarette katılımcıların ayrıca ilk ziyarette araştırmacıyla birlikte oynadıkları oyunu da hatırlamaları gerekmektedir. Katılımcılar bu oyunu da iki şekilde hatırlayabilirler; davranışsal canlandırma veya sözlü anımsama. Anlatı becerisi otobiyografik belleğin ortaya çıkışını etkileyen bir unsur olarak görüldüğünden ikinci ziyarette katılımcıların anlatı becerileri de test edilmektedir. Ayrıca katılımcıların otobiyografik bellek gelişimlerini derecelendirebilmek için de katılımcılardan iki tane otobiyografik bellek anılarını anlatmaları istenmiştir. Bulgular temel bellek becerileri önce geliştiğini göstermiştir. Otobiyografik bellek gelişimi diğer bellek becerilerinin gelişimine bağımlılık olduğunu düşündüren bir seyir sergilemiş ve olaya ilişkin bir şemanın olup olmaması farklılık yaratmıştır. Olayda bir şema olduğu takdirde, olaya ilişkin belirli bilgileri hatırlamanın daha az önem taşıdığı gözlemlenmiştir. Ayrıca, otobiyografik bellek gelişiminde anlatı becerisinin etkisi de saptanmıştır.

Anahtar Sözcükler: Otobiyografik bellek, Bellek Gelişimsel Süreci, Anlatı Becerisi, Anımsama, Tanıma

DEDICATION

To my mother, father, and sister

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TABLE OF CONTENTS

STATEMENT OF AUTHORSHIP.....	III
ABSTRACT	IV
ÖZET.....	V
DEDICATION.....	VI
ACKNOWLEDGEMENTS.....	VII
TABLE OF CONTENTS.....	IX
LIST OF TABLES	XI
LIST OF FIGURES	XII
ACRONYMS	XIII
INTRODUCTION.....	14
1.1 AUTOBIOGRAPHICAL MEMORY	14
1.2 RESEARCH QUESTIONS AND THE PRESENT STUDY.....	16
LITERATURE REVIEW.....	18
2.1 INFANTILE AMNESIA	18
2.2 THE EMERGENCE OF AUTOBIOGRAPHICAL MEMORY	20
2.3 EVALUATING THEORIES OF AUTOBIOGRAPHICAL MEMORY	26
2.4 THE PREDICTIONS ABOUT THE DEVELOPMENTAL PROGRESS FOR AUTOBIOGRAPHICAL MEMORY ..	30
2.5 OVERVIEW OF THE PRESENT STUDY	35
2.6 VARIABLES.....	37
2.6.1 <i>Independent Variables</i>	37
2.6.1.1 The Age of the Child	37
2.6.1.2 Narrative Structure Development	38
2.6.2 <i>Dependent Variables</i>	38
2.6.2.1 Person Recall.....	38
2.6.2.2 Object Recall and Recognition.....	39
2.6.2.3 Procedural Memory.....	39
2.6.2.4 Autobiographical Memory	40
2.7 HYPOTHESES	40
METHOD.....	44
3.1 PARTICIPANTS	44
3.2 MATERIALS	46
3.2.1 <i>Balloon Story</i>	46
3.2.2 <i>Play-doh Game</i>	46
3.2.3 <i>Questions about birthday and doctor visit</i>	47
3.3 PROCEDURE.....	47
RESULTS.....	49
4.1 SCALES	49
4.2 DESCRIPTIVE STATISTICS	51
4.3 DURABILITY OF MEMORIES AND AGE.....	56
4.4 MEMORY PROCESSES AT DIFFERENT AGES	58
4.5 PREDICTORS OF NON-SCRIPTED AND SCRIPTED AUTOBIOGRAPHICAL MEMORIES	61
4.6 TYPES OF MEMORIES AND SES.....	67

CHAPTER 5	70
DISCUSSION	70
5.1 SUMMARY OF FINDINGS	70
5.1.1 <i>Durability of Memories and Age</i>	70
5.1.2 <i>Memory processes at different ages</i>	72
5.1.3 <i>Predictors of non-scripted autobiographical memory</i>	74
5.1.4 <i>Predictors of scripted autobiographical memory</i>	74
5.2 THE DEVELOPMENT OF AUTOBIOGRAPHICAL MEMORY	76
5.3 MEMORIES BEFORE AGE 4	77
5.4 LIMITATIONS AND FUTURE DIRECTIONS	78
5.5 IMPLICATIONS OF THE PRESENT STUDY	79
REFERENCES	82

LIST OF TABLES

3.1 The Distribution of Sample According to SES and Age Groups.....	44
4.1 Means and Standard Deviations of Percentage Scores of Memory Measures	
According to Age Groups.....	52-53
4.2 Correlation Matrix For Memory Types.....	56
4.3 Summary of Hierarchical Regression Analysis for Variables Predicting Non-Scripted Autobiographical Memory.....	62
4.4 Summary of Hierarchical Regression Analysis for Variables Predicting Free Recalled Scripted Autobiographical Memory.....	64
4.5 Summary of Hierarchical Regression Analysis for Variables Predicting Probed Scripted Autobiographical Memory.....	66
4.6 Means and Standard Deviations of Percentage Scores of Memory Measures	
According to SES Groups.....	69

LIST OF FIGURES

4.1	Mean percent scores across ages.....	54
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ACRONYMS

<i>ABM</i>	Autobiographical Memory
<i>SES</i>	Socio-Economic Status
<i>CAMI</i>	Children's Autobiographical Memory Inventory

Chapter 1

INTRODUCTION

1.1 Autobiographical memory

Autobiographical memory is “the memory for events and issues related to the self including memories for special events and for the personal facts of one’s life” (Brockmeier & Wang, 2002). Autobiographical memory is generally assumed as a type of declarative memory and more specifically a type of episodic memory that involves a sense of self experiencing the event at a specific point in time and space. These types of memories can be based on either a single event or repeated events in the past (Pressley & Schneider, 1997). Conway and Rubin (1993) have claimed that the autobiographical memory is not just self-referenced but also includes episodes that have personal significance (as cited in Nelson & Fivush, 2004).

Over the past decade, one of the most debated issues related to autobiographical memory in childhood is the emergence of autobiographical memory. It has been stated that in order for autobiographical memory to emerge, some abilities must be developed in advance (Howe, 2000). However, these predictors of autobiographical memory are not agreed upon. Some of the researchers suggest that

autobiographical memory emerges when the development of cognitive self is completed whereas others suggested that it only emerges when the child starts to have narrative skills (Howe & Courage, 1997; Fivush, 2002). Since the predictors of autobiographical memory have been determined with certainty, researchers determine the onset age of autobiographical memory according to the theory they base their research on. Therefore, some anticipate 2 years of age as the onset of autobiographical memory whereas others suggest that the onset of autobiographical memory is 4 years of age.

Another important debate in the field of autobiographical memory is the durability of children's memories, in other words the limits of their memory span. The durability of children's memories is also an important factor for the emergence of autobiographical memory (Howe & Courage, 1993). Memories cannot be recalled when the memories are not durable for a certain period of time. However, when they become durable, children can recall some of their past experiences which means their autobiographical memory is ready to emerge. The durability of memories was generally analyzed by infantile amnesia studies. Adults were asked to trace back their earliest memories and according to their earliest memory, the onset of their autobiographical memory has been found out which allowed researchers to make conclusions about the changes in the durability of memories.

1.2 Research Questions and the Present Study

The main research question in this study is whether the development of autobiographical memory follows the predicted developmental progress for autobiographical memory. The predicted developmental progress is proposed to involve seven memory processes. Each one of these seven memory processes corresponds with the different levels of predicted developmental progress and each level requires some degree of competence on more basic processes. The present study examines if the first four levels of the predicted developmental progress have to be successfully completed in order for autobiographical memory to emerge.

Melton (1963) stated that a conceptualization of processes of memory has to involve at least three stages (as cited in Roediger & Guynn, 1996). These stages are encoding, storage, and retrieval. The initial learning or acquisition of information is referred to as encoding. After the information is encoded, it has to be stored so that it is maintained over time. Retrieval, on the other hand, is the process of bringing information out of memory for current use. In this stage, the person is trying to access the stored information. Retrieval can be done in different ways such as behavioral enactment, recognition and recall. Ornstein and Haden (2001) stated that the development of memory should be studied by analyzing age-related differences in the basic processes that are involved in encoding, storage, retrieval and reporting of information. The levels of the predicted developmental progress are determined by taking the basic processes into account. Therefore, the predicted developmental progress is expected to reflect age-related differences accurately.

Another research question in the study is whether the ability to recall autobiographical events is dependent upon the development of narrative structure development. Because autobiographical memories are recalled in a story form, individuals should have an advanced narrative structure in order for autobiographical memory to emerge. In this study, the extent of narrative structure development that is necessary for autobiographical memory is examined.

The present study also tries to find out whether the durability of memories will show the expected pattern observed in infantile amnesia findings. Previous studies have confirmed that the offset age for infantile amnesia is 3-4, which means that adults or older children have retrieved events from after this age period (Howe, 2000; Howe & Courage, 1997; Nelson & Fivush, 2003; Usher & Neisser, 1993). In a way, this suggests that the durability of memories increases starting from 3-4 years of age and memories tend to remain available thereafter. The present study examines if this pattern is evident for children between 2 and 6 years of age. The durability of memories of children older than 4 should be greater than the durability of memories of children 3-years old or younger, showing a sharp increase between age 3 and 4.

Chapter 2

LITERATURE REVIEW

2.1 Infantile Amnesia

Infantile amnesia as a phenomenon was first suggested by Freud (as cited in Nelson & Fivush, 2004). According to Freud (1953), there were two different explanations for infantile amnesia. He suggested that the memories that people could not remember were either too arousing or disturbing. The arousing or emotional memories are repressed since the ego cannot deal with them, and the disturbing ones are reconstructed into insipid stories that provide a secure sense of self. Therefore, people cannot remember the actual event. However, Freud stated that even if people cannot consciously retrieve the actual event, these early autobiographical memories influence everyday behaviors (as cited in Howe, 2000).

James (1890), who also recognized the infantile amnesia phenomenon, had defined infancy as a “booming, buzzing confusion” period and consequently he suggested the weakness of the infant mind as the reason of infantile amnesia (as cited in Nelson & Fivush, 2004). In line with James’s view, it was widely believed that infants and young children lacked memory. Most of the earlier theories tried to

explain the absence of autobiographical memory in the early years of childhood in terms of an amnesia barrier that needs to be overcome to enable memories to persist into later life. Usually the infantile amnesia is seen as some sort of barrier that prevents the adults from traveling backward beyond 3 or 4 years of age to recover the earliest memories.

Contemporary theories accounting for infantile amnesia focused on different explanations than earlier theories. For Usher and Neisser (1993), the immaturity of the infant brain was a major contributing factor to infantile amnesia. According to this view, the hippocampus is not fully developed at birth and because it is responsible for encoding of events, its late development plays a role in infantile amnesia. According to Rovee-Collier and Hayne (2000), infantile amnesia is an outcome of problems in identifying the origins of memories, weak representations, or mismatches of context.

Usher and Neisser (1993) stated that the difference between children's and adults' schemata is also a contributing factor for infantile amnesia. Since adults think of their lives in terms of a series of well-defined periods, their schemata constitute a rich retrieval structure and thus facilitate recall. However, young children do not have schemata similar to adults, that is, they do not think of their experiences in the form of personal narratives. These narratives develop in later years and their development was found to facilitate recall of experiences. In line with Usher and Neisser's study, Fivush and Hamond (1990) also suggested that infantile amnesia is an outcome of a retrieval problem. However, they think that another kind of schemata change is at work, such that, when young children recall things, they often focus on aspects of the

event that would not seem memorable to an adult and since these aspects lose their uniqueness and attractiveness in later life, the event itself is forgotten in the long run. In short, Fivush stated that infantile amnesia occurs because the cues at retrieval are different than the cues at encoding.

Howe and Courage (1997), on the other hand, proposed that the reason for infantile amnesia is the nonexistence of self-concept in early memories. With the development of self-concept, self in memory can be possible, enabling people to recall their early autobiographical memories. According to Howe and Courage, the notion of self in memory is also a crucial factor for the development of autobiographical memory. They made clear that the only factor that can overcome the amnesia barrier and therefore change the nature and retention of a child's memories is the development of self since it acts as an organizing schema facilitating all of the 3 stages of memory process: encoding, storage, and retrieval.

2.2 The emergence of autobiographical memory

There are several theories suggesting different factors that influence the emergence of autobiographical memory. Some of these factors include the creation of additional memory systems, development of sociolinguistic abilities, developments in children's cognitive sense of self and the emergence of autonoetic consciousness or self-awareness (Howe, 2000). One of the theories of autobiographical memory states that autobiographical memory is the result of a late-developing component of a

multiple memory system (Howe, 2000). In multiple memory system, one memory system allows higher-order memory processes and conscious recollection like declarative memory and the other system carries on lower forms of memory such as skill learning and habit formation or in other words non-declarative or procedural memory. Nelson (1995, 1997, 2000) argued for the existence of multiple memory systems with different developmental time courses (as cited in Courage & Howe, 2004). Pillemer and White (1989) suggested two distinct memory systems. One of these systems is more primitive than the other one and is present since birth. It contains information about experiences which are expressed behaviorally but not verbally. The other memory system starts developing over the preschool years and contains information specific to events. The information gathered in this memory system can be reached both verbally and nonverbally. Acquisition of language and starting to engage in verbal exchange with adults is two critical factors that help the emergence of the second system which is generally referred as autobiographical memory.

Another multiple memory system was suggested by Leichman and Ceci (1993) who claimed that the development of autobiographical memory is due to the occurrence of the gist-like representations. Even though infants and young children may use the same processes of encoding, storage and retrieval as adults, their verbal representations of these memories are in verbatim form, whereas, adults or older children have gist-like representations. The memories that are encoded in verbatim form cause children to forget events rapidly because these verbatim memories fade

more rapidly than gist memories. The shift from verbatim to gist memories happens as infantile amnesia disappears and autobiographical memory starts to emerge.

However, little or no empirical evidence was found to confirm the multiple memory system theories (Howe, 2000). Research that was conducted to find neurological support for dual memory system obtained very little direct evidence as well. There was also no evidence for a shift in the ability to remember events that would support the appearance of a new memory system. In addition, there is no finding suggesting gist-like representations after 3 years of age. For example, Rovee-Collier (1997) demonstrated that toddlers as young as 2 years of age can extract gist-like information. Polster, Nadel, and Schacter (1991) have stated that it was more rational to state memory as a unitary but flexible system rather than multiple systems because beginning with infancy, considerable continuity was found in the development of memory (as cited in Howe, 2000). The acceptance of this view led researchers to find alternative suggestions for the onset of autobiographical memory.

According to the sociolinguistic perspective, which is mainly adopted by Nelson and Fivush, development of narratives is the critical element for the development of autobiographical memory (Fivush, 2002). Language allows children to arrange their memories in the form of narratives, which in turn, allow them to organize their prior experiences in a coherent way by representing a sequence of actions. In addition, these narratives also provide ways of understanding the relations between events from a subjective perspective. With the development of these narrative skills, the establishment of “a personal life story” occurs which acts as an

aid for the encoding process, helps the organization in the storage and is used also as a cue for retrieval (Howe, Courage, & Edison, 2003).

The learning process of the narrative skills occurs in social context, usually with the parents (Fivush, 2002). Children start referencing their past in the conversations with parents during social interactions and these interactions are found to facilitate their memory in two ways. First, they provide a form of rehearsal. The memory of the event is strengthened each time an individual talks about it. Second, children learn the normative way to organize and report the past. As a matter of fact, theorists who work within the sociolinguistic perspective suggest that autobiographical memory does not emerge until preschool years (Fivush & Schwarzmueeller, 1998). During the preschool years, children develop their language-based representation skills, which are required for sharing their experiences with others. At the age of 3 or 4, the narrative self develops with the help of social interactions, and this allows the retention of memories organized around a life story, which marks the emergence of autobiographical memory. These theorists also state that distinctiveness and frequent rehearsal at childhood and/or adulthood should be considered as two major factors that allow some of the events from early childhood to be remembered in adulthood.

An alternative view for the onset of autobiographical memory suggests personalization of the event as a factor that contributes to the emergence of autobiographical memory (Howe & Courage, 1997). There is evidence that even events that had happened at the age of 2 could be remembered. Howe and Courage

related this finding with the developments in the cognitive self. They suggested that there are two fundamental facets of self, the “I” and the “me” (Howe, Courage, & Edison, 2003). The “I” can be defined as “a subjective or implicit sense of self as a thinker, knower and causal agent” whereas the “me” is “an objective or explicit sense of self with the unique and recognizable features and characteristics that constitute one’s self-concept.” Meltzoff (1990) and Neisser (1993) have argued that at birth, infants are not aware that they are a separate entity from the environment (as cited in Howe & Courage, 1997), and after a while they start to acquire the awareness of individuation and by the time they are around the age of 18 to 24 months, the emergence of an independent, recognizable self occurs which is the facet of “me”. The autobiographical memory begins when the cognitive self, the facet of “me”, has recognizable features, and these can serve to organize memories of personally experienced events. An event is no longer considered as something that happened but it is regarded as something that happened to “me” (Howe, 2000). Even though these theorists stated that the development of cognitive self is the cornerstone that launches autobiographical memory, they did not discard altogether the effects of narratives and social cognition (Howe & Courage, 1997). According to their view, these factors do not affect the onset of autobiographical memory but they provide an expressive outlet as autobiographical memory continues to evolve and mature. This view was supported by empirical evidence indicating that the emergence of cognitive self is developmentally prior to the development of language. Even though the cognitive self theory sets a lower limit for the formation of autobiographical memories, it does not ensure that age 2 is the onset for autobiographical memories. Cognitive self-concept is generally found necessary for autobiographical facts but in order to engage in

autobiographical remembering cognitive self-concept is not sufficient. Cognitive self-concept facilitates the representation of events which allows children to give details about autobiographical event facts but in order to recall a chain of events, narrative structure must develop. Autobiographical remembering is possible only if events are in the form of a chain and they are retold in the form of narratives.

Perner and Ruffman (1995), in their metacognitive perspective, have suggested that the factors that support the emergence of autobiographical memory are the advances in metacognition, more specifically the development of theory of mind (as cited in Naito, 2003). Children's growing understanding of mind at around age 4 was emphasized as a critical prerequisite for autobiographical memory (Reese, 2002). Tulving (1985) argued for a distinction between "remembering" and "knowing" (as cited in Naito, 2003). "Remembering", which corresponds to autobiographical memory, depends on "autonoetic consciousness" whereas "knowing", or semantic memory, requires "noetic consciousness". "Noetic consciousness" requires knowing or thinking about a past event without recollective awareness. Very young children's memory is based on "noetic" awareness because these children cannot encode events as personally experienced but they know that it has occurred. When children reach the age of 4, they begin having "autonoetic" consciousness and are able to reflect on the perceptual origins of their own knowledge. Children become capable of true recollection as they gain a better understanding between what they know and how they know it (Reese, 2002). The shift from "noetic" to "autonoetic" awareness marks the emergence of autobiographical memory (Naito, 2003).

2.3 Evaluating theories of autobiographical memory

Research on children's memory of experienced events has provided limited support for theories of autobiographical memory.

The sociolinguistic perspective argued that narrative development is the key factor in the emergence of autobiographical memory. Fivush, Haden and Adam (1995) explored the relationship between the developmental changes in the structure and coherence of preschoolers' personal narratives and their autobiographical memories. Children's memories were assessed at 40, 46, 58 and 70 months of age and the results suggested that even those children at the age of 40 months were able to recollect their memories in the form of narratives. Thus, the ability of forming coherent narratives was not found to be influential for the onset of autobiographical memories. However, the narratives of children were found to become more complex, more coherent and more detailed over time, indicating the facilitating role of language for the memories represented in the form of narratives.

Fivush and Schwarzmueeller (1998) followed up the study conducted by Fivush et al. (1995) and asked the same children about the events they had recalled when they reached the age of 8. The results demonstrated that children were able to recall the events accurately and with many details. However, children provided different information than they provided when tested as young children. This study mainly provided evidence for young children's ability to remember distinctive events of their preschool years as they entered middle childhood because the 8-year-old children

were able to recall at least one event that occurred when they were 3 years old. These studies, taken together provide some limited support for the sociolinguistic perspective.

Other studies have focused on the relationship between the cognitive self and autobiographical memory. Lewis and Brooks-Gunn (1997) conducted a study evaluating 1-year-olds' self-recognition by a mirror test which predicted the achievement of cognitive self (as cited in Nelson & Fivush, 2004). After seeing his/her reflection on the mirror, if a child who had a red spot on his/her nose tries to touch it, he would be assessed to have passed the mirror test. It was found that most children pass the test between 16 and 24 months of age. Howe and Courage (1993), considered the results of mirror test as an index for the development of cognitive self. They concluded that autobiographical memory could not exist before the development of cognitive self since there is no "me". Reese et al. (1999) confirmed that these children who were able to recognize themselves in the mirror showed better memory skills (as cited in Nelson & Fivush, 2004). However, they also suggested that the effects of cognitive self were diminished, since the level of maternal reminiscing style directly predicted the child's memory reports for older ages, which leads to the conclusion that the development of cognitive self could not be suggested as the core element that determines the onset of autobiographical memory. Therefore, cognitive self should be considered as a necessary but not a sufficient factor for the emergence of autobiographical memory.

Bruce, Dolan and Phillips-Grant (2000) found compatible results with Perner and Ruffman's (1995) metacognitive theory in which they had stated that "knowing" preceded "remembering". They calculated the cumulative relative percentages for known and remembered events. The median age of remembered events was 6.07 years whereas the median age of the known events was 3.20. The mean for these medians came out as 4.64, which was determined as the average age for the onset of autobiographical memory. This finding was also well-suited with metacognitive theory that claims age 4 to be the onset age of autobiographical memory.

Even though Bruce et al.'s (2000) results were in line with Perner and Ruffman's (1995) theory, Naito (2003) did not find support for this theory. In her study, which includes Japanese children between the ages of 4 and 7, the relation between theory of mind and memory was explored by controlling for age, verbal intelligence and cued recall. Naito used two versions of a false belief task and a task of knowledge origins as measures of theory of mind skills, and four memory tests measuring source memory, free recall, memory of temporal order, and listening span. Previously, Perner and Ruffman (1995) had confirmed the relation between theory of mind and autobiographical memory but they had obtained these correlations without controlling for age. The results of Naito's (2003) study demonstrated that these correlations were no longer observed when the age variable was controlled. Naito (2003) also demonstrated that the false belief measures were not always correlated with autobiographical memory which brings out the need for conducting future studies in order to find out which kind of theory of mind ability is related to autobiographical memory.

Based on the results of research on autobiographical memory, a dynamic developmental systems theory was suggested which enabled researchers “to take a more global view of the entire autobiographical memory system rather than proposing one or another development is necessary or primary” (Reese, 2002, p.137). By having a global view, biological, social, cognitive and linguistic influences on autobiographical memory can be integrated. According to dynamic developmental systems theory, autobiographical memory emerges gradually across the preschool years by social interaction and cognitive development (Nelson & Fivush, 2004). Contrary to previous theories, the dynamic developmental system theory has not determined a single cause for autobiographical memory since it considers the reason for the emergence of autobiographical memory to be a combination of different causal “inputs”. Therefore, the effect of a particular input at any point is regarded as dependent on the state of the entire system at that point. The changes that take place in the early childhood years are believed to be integrative across social and cognitive systems, resulting in a different sense of self with a different functional value of personal memory, among many other important changes.

The dynamic developmental systems theory is a recent theory without adequate research support. However, six steps have been outlined by Thelen and Smith (1998) for conducting research by taking dynamic developmental systems theory into account (as cited in Reese, 2002). These steps are, (a) to define the collective variable of interest, (b) to isolate the preferred state of autobiographical memory at various ages and under various conditions, (c) to conduct intensive longitudinal studies, (d) to identify transition points, (e) to discover potential control

parameters affecting autobiographical memory and (f) to test if various cognitive, social and linguistic factors would affect children's verbal memory reports through the use of training and enrichment studies. Even though some progress has been made on all of these, more studies are needed to obtain a more complete picture of autobiographical memory development.

2.4 The predictions about the developmental progress for autobiographical memory

In order for autobiographical memory to emerge, at first some basic memory processes must develop (Simcock & Hayne, 2003). These basic memory processes are: recognition, recall, and procedural memory.

Recognition skill is present at birth, in the first 6 months of infancy it starts to develop and that is why it is considered as one of the most basic memory processes (Kail, 1990). Martin (1975) conducted an experiment that confirms that recognition memory starts to develop in the first six months of life (as cited in Kail, 1990). Martin tested three groups of infants who are 2-, 3 1/2-, and 5- month-olds. The test lasted for two days. On the first day, these groups of infants were shown a geometric figure for 30 seconds for six times. On the second day, the figure was shown 6 more times for 30 seconds each. It was expected that if infants recognized the figure on the second day, they would look at it less than they did originally. At all ages, it was found that

infants looked at the figure less on the second day. It was concluded that recognition memory is developing between the ages of 2 and 5 months.

Myers and Perlmuter (1978) conducted a study with preschoolers in order to compare their recognition and recall abilities (as cited in Schneider & Pressley, 1997). Preschoolers were presented lists of objects, pictures or words to learn and then they were required to recognize and recall these items. It was found that preschoolers recognized more of these items than they recalled, with their recall levels being very poor. Therefore, it was concluded that children were able to encode the materials that were presented to them but they were not proficient enough to search their memories and self prompt themselves about those materials.

According to the findings mentioned above, the first and second levels of the developmental progress for autobiographical memory can be determined as recognition and recall memory. At the first level, the encoding process relies primarily on basic memory processes such as recognition. The strategies used by children rely on external cues to retrieve information. Therefore, familiarity of the cue will be influential in later recognition. At the second level, the children will be able to retrieve information with the help of the cues generated by the children themselves. This refers to the fact that at this stage, the children can verbally recall the encoded information (Simcock & Hayne, 2003).

After the child becomes capable of recognizing and recalling the encoded information such as faces or objects, s/he will begin to encode and retrieve actions.

Since actions involve faces and objects in addition to a series of interaction between them, they are more complicated than faces or objects. Therefore, the child will first encode actions as not connected with each other. Retrieval of actions can be done in two ways; behavioral enactment or verbal recall. Therefore, at the third level of the developmental progress, children will encode actions as not connected with each other. These disconnected actions will be retrieved by behavioral enactment since verbal recall develops more subsequent than behavioral enactment (Simcock & Hayne, 2003)

At the fourth level of the memory development, the child will connect the actions while encoding them. The child will know which action precedes or succeeds another. However, the child will still not recall these actions verbally but only retrieve them by behavioral enactment. The child will display the actions in a consecutive order. This level will demonstrate whether the child has developed procedural memory. Procedural memory is the memory for skills or sequences of behavior and according to Squire (1987) this type of memory cannot be consciously inspected or verbally reported (as cited in Parkin, 1997). Procedural memory is also considered one of the most basic processes of memory and it is suggested to precede the development of declarative memory (Hayne, Boniface & Barr, 2000). These four levels of the developmental progress are expected to develop one by one, building up each other to make up autobiographical memory.

The next level of the memory development allows children to encode events as they form a chain of events. This encoded chain of events is scripted. A script is a combined representation of common events that are experienced or heard of frequently and that have a general structure. A script facilitates memory by the structure and components that act as cues in both encoding and retrieval (Fivush, 2007). At this stage, the retrieval of scripted chain of events is done with the help of probes. Since probes are considered as external cues, in a way, at this stage children recognize these scripted events.

The emergence of autobiographical memory necessitates two component processes: self-concept and narrative structure. Self-concept must be present in order for autobiographical memory to emerge. Cognitive self-concept develops starting from 18-24 months and it is generally referred as the “mirror recognition” stage since the children become able to recognize their image in the mirror with cognitive self understanding (Nelson, 2003). In this period, the child starts to use the linguistic terms such as “I”, “me”, “my” or his/her own name and by these linguistic terms, the child begins to make a contrast between the perspective of the self and the other. Since autobiographical memory involves events experienced as self-related, children must learn to distinguish between the events that happened to them and to others, in other words, develop cognitive self-concept. Therefore, cognitive self-concept must also be considered as an important prerequisite for autobiographical memory.

Autobiographical memory also requires the event to be encoded in a form that allows for later retrieval, to be stored so that it will be available much later and to be

retrieved with adequate cues. In order for these to take place, the child should have developed narrative schemas/structures (Nelson & Fivush, 2004). Narrative structure allows children to organize their prior experience in a coherent way by representing a sequence of actions and also enables them to verbally recall their autobiographical memories in respect to their personal life stories. However, since the narrative skills that are necessary to talk about self-related events are acquired around 3 - 4 years of age, the autobiographical memories of infants and very young children cannot be studied. Researchers cannot determine what exactly infants and very young children remember about events when expressed nonverbally or with a single word or simple motor responses (Howe, 2000).

The sixth level of the developmental progress enables children to encode events as they form a chain of events. Retrieval of this chain of events are done with verbal recall and it is in narrative form. The events that are encoded in this stage have occurred only once which means that these events are in a non-scripted form (Fivush, 2007). Similar to the previous level, at the last level, events are encoded as they form a chain of events and these encoded events are retrieved by verbal recall which is in narrative form. However, unlike the previous level, these events have taken place several times in a child's life so at the last level the child become capable of verbally recalling scripted events (Fivush, 2007).

Autobiographical memory is a function of the fifth, sixth and seventh levels of the developmental progress. At the fifth level, even though retrieval is done with the help of the probes, the events are encoded as they form a chain of events. The sixth is

the sufficient level for events experienced one time as a single episode and the seventh level is a general script structure that is a function of generalized and consolidated personal experiences, observed events (actual or media), and stories. According to Fivush (2002), no autobiographical memories are observed from 2 years of age children, between 2 and 4 children can have a few autobiographical memories but starting from ages 4 and 5 the number of autobiographical memories increase rapidly.

2.5 Overview of the Present Study

The present study mainly tries to confirm the predicted developmental progress for autobiographical memory. The developmental progress has been formed by taking basic processes of memory, encoding, storage, and retrieval into account. The occurrence of each level of the developmental progress has to follow one another which means that in order to move on to another level, the preceding level has to be achieved. As mentioned previously, the last three levels of the predicted developmental progress suggest the formation of autobiographical memory. In order for autobiographical memory to emerge, an individual has to reach the fifth, sixth and seventh levels. However, there are differences of opinion about the fact that the first four levels have to be completed in order to pass to the fifth, sixth and seventh levels. Therefore, the present study tries to find out if it is possible to develop autobiographical memory without the completion of first four levels.

While some researchers such as Nelson and Fivush (2004) have claimed that narrative development is necessary for the emergence of autobiographical memory, other researchers such as Howe and Courage (1997) have not considered narrative development as the critical element for the emergence of autobiographical memory. The present study also tries to figure out if the development of narrative structure is necessary for autobiographical memory to emerge.

The present study also tries to analyze the durability of children's memories in order to confirm the pattern found in the infantile amnesia studies. According to previous literature, it was found that before 3 or 4 years of age children have less developed storage capacities for their memories which did not allow them to hold on to these memories for long periods of time (Howe & Courage, 1993). Therefore, the events that are experienced before 3 or 4 years of age can not be recalled in adulthood since these memories do not have enough durability. After the age of 4, the durability of children's memories was stated to increase which allowed them to recall these events in future years.

The children who participated in the study were evaluated for person recall, object recognition and recall, narrative structure, procedural memory, non-scripted autobiographical memory and scripted autobiographical memory. Cognitive self-concept which is considered as one of the predecessors of autobiographical memory was not taken into consideration in the present study. The children who participated in the study were at least 2 years old which means that they should already have a developed cognitive self-concept.

In order to address these issues, children aged between 2 and 6 were contacted twice. In the first contact, children met with the researcher, played with play-dohs and then received a gift from the researcher. After an interval of one month, children were tested for recall of the researcher and the gift. Then children were asked to verbally recall the game and enact the steps involved in playing with it. Finally, children's recall of autobiographical events and their level of narrative structure were tested.

2.6 Variables

2.6.1 Independent Variables

2.6.1.1 The Age of the Child

The age of the child is the most important predictor in the study. Cognitive changes that come with age determine the developmental phases that correspond to important changes in cognitive and memory development. As children grow, their cognitive and memory abilities are found to be enhanced (Groeger, 1997). The durability of memories is also expected to increase with age because of the increase in children's memory span. As children get older, they become able to retrieve more memories from their past because of the advances in their encoding and storage processes. Therefore, the durability of memory of an event that has happened four weeks before its retrieval will be greater for older children. The children also retrieve

more memories from their past as they get older and therefore the older children are also more likely to recall one of their birthdays and doctor visits.

2.6.1.2 Narrative Structure Development

Autobiographical memory emerges when the processes of encoding, storage, and retrieval function in required ways. Narrative structure has to be developed so that the basic processes of memory are enabled to perform in the way that helps the emergence of autobiographical memory. As stated before, language allows children to arrange their memories in the form of narratives and these linguistically based narratives provide ways of understanding relations between events from a subjective perspective which enables the occurrence of “a personal life story”(Fivush, 2002).

2.6.2 Dependent Variables

2.6.2.1 Person Recall

One of the dependent variables of the study was person recall. The children were asked to identify the researcher and their answers determined their level of person recognition. Most children in the study were expected to recognize the researcher because face recognition ability is found to emerge very early. The

children were asked to trace back the first place they had seen the researcher which enabled the researcher to make comments about the children's level of person recall.

2.6.2.2 Object Recall and Recognition

Object recall and recognition were also examined in the present study as dependent variables. The children were asked to recall the gift the researcher brought to them 4 weeks ago. If they could recall the gift, it would be stated that these children can perform object recall. The children also were asked to recognize the gift among several toys in order to determine their level of object recognition. The children who were successful in object recall were also expected to succeed in object recognition. However, even though children that succeeded in recognition might fail at recall since recognition develops earlier than recall as stated in the predicted developmental progress.

2.6.2.3 Procedural Memory

Procedural, nondeclarative, memory consists of non-conscious abilities, priming and some forms of classical conditioning (Bauer, 1996). Some of these non-conscious abilities include the capacity for learning habits and skills. Therefore, by a change in behavior or performance the procedural memory becomes apparent.

Procedural memory can also be characterized as slow, reliable and inflexible. This kind of memory was observed in the behavioral enactment of the play-doh game.

2.6.2.4 Autobiographical Memory

Two types of autobiographical memory were examined in the present study. The first type was non-scripted autobiographical memory and it was measured by the play-doh game. The children who had advanced non-scripted autobiographical memory were expected to verbally recall how they played with the play-doh game.

Another type of autobiographical memory that was examined was scripted autobiographical memory. In order to analyze children's scripted autobiographical memory, children had to recall one of their birthdays and doctor visits. The children verbally recalled these memories either with free recall or with probes.

2.7 Hypotheses

Hypothesis 1: The durability of memories in older children is expected to be greater than younger children since older children have larger memory span. The younger children cannot remember events that happened previously since they cannot hold these events in their memories long enough to retrieve them after a time period (Howe & Courage, 1993). However, older children can hold on to the memories of these events and retrieve them after an interval. The increase in the durability of

memories is necessary for the emergence of autobiographical memory. Children who can retrieve the events that had happened a while ago can demonstrate the skills of autobiographical memory better than younger children.

Hypothesis 2: Children are expected to develop recognition abilities prior to recall abilities. Young children do not have much experience in searching memory and retrieving information when compared to older children (Myers, Gramzow, Ornstein, Wagner, Gordon, & Baker-Ward, 2003). These younger children also may have limited language skills and therefore they may have hard time comprehending the basic principles of narrative structure. Therefore, the proportion of younger children who will be successful on recognition tasks will be higher than the proportion of the younger children being successful on recall tasks. Recognition tasks focus on the differentiation between stimuli that have and have not been experienced previously. Since the recognition tasks only involves “yes” and “no” responses, it is considered as a more sensitive indicator of young children’s memory when compared with recall tasks. On the other hand, older children can accomplish recall tasks that require children to search, retrieve and report their memories by answering open-ended questions. As previous studies have confirmed, recall abilities of children develop in later years compared to recognition abilities.

Hypothesis 3: Children who display non-scripted and scripted autobiographical memories are expected to be older than children displaying only procedural memories. Children who display non-scripted and scripted autobiographical memories also had displayed procedural memories. Procedural

memory has been found to become operative at early stages of development and most of the studies have confirmed that procedural memory is age invariant (Parkin, 1997). Functional independence of procedural memory also has been confirmed by most of the studies. The procedural abilities have been found to function properly even though children have not yet developed autobiographical abilities. Therefore, as previous literature has confirmed procedural memory is expected to evolve prior to declarative memory (Bauer, 2005; Groeger, 1997; Parkin, 1997). Since autobiographical memory is a kind of declarative memory, procedural memory also has to develop before autobiographical memory.

Hypothesis 4: Children who display free recalled scripted autobiographical memories are expected to be older than children displaying probed scripted autobiographical memories. Previous studies have confirmed that participants have performed better in probed recall when compared to free recall for the same task (Kahana & Caplan, 2002). Free recall was found to be difficult because the availability of cue information is very low. Therefore, younger children can retrieve past information more easily with probed recall since in probed recall the availability of cue information is higher.

Hypothesis 5: Children who display free recalled scripted autobiographical memories are expected to be older than children displaying non-scripted autobiographical memories. Children who display free recalled scripted autobiographical memory had displayed non-scripted autobiographical memories. Hudson (1986) and Nelson (1988) have confirmed that specific event recall was better

than general event recall for children between 3 to 7 years of age (as cited in Fivush, 1997). Fivush (1993) has also stated that young children are able to recall specific and novel experiences in more detail and retain these memories for longer periods of time (as cited in Fivush, 1997). In order to form scripts children should have repeated exposure to experience. Children should have repeated narratives about these experiences so that they could develop free recalled scripted autobiographical memories. Therefore, children will perform better in non-scripted autobiographical task when compared to free recalled scripted autobiographical memory task.

Hypothesis 6: Children who use narratives in their speech are expected to have developed free recalled scripted autobiographical memory. Children's use of narratives helps the processes of encoding, storage and retrieval in a way that helped them to recall their memories autobiographically. Children who are using narratives in their speech have an established life story which will enable their autobiographical memories to develop (Fivush, 2002).

Chapter 3

METHOD

3.1 Participants

The sample of the present study comprised of 120 children, between 2 and 6 years old. 56 of these children were females and 64 of them were males and they had a mean age of 4.26 with standard deviation of 1.28 (min = 2, max = 6). The distribution of number of children based on SES and age can be seen from Table 3.1. The SES groups were defined according to the residential areas of the children.

Table 3.1 The distribution of the sample according to SES and age groups

SES Groups	<u>Sample Size</u>					Total
	Age 2	Age 3	Age 4	Age 5	Age 6	
Low	8	8	10	6	8	40
Middle	0	2	3	0	0	5
High	10	14	16	23	12	75
Total	18	24	29	29	20	120

Even though we did not expect to see differences between 5 and 6 years of age, the children who were 6 years-old were included into the study in order to examine children's narrative and declarative memory development in a more precise way. The development of procedural memories is generally attributed to begin when children are around 2 years and therefore 2 years of age was chosen as the lower limit.

The sample was formed by using snowball sampling and by contacting kindergartens. The researcher contacted friends and relatives that have children between 2 and 6 years of age. They were informed about the study and the kinds of activities that children would engage in were explained to them in detail. The acquaintances of friends and relatives were asked to help the researcher to find participants for the study. In addition, the researcher recruited the assistance of some of the kindergartens and primary schools in Istanbul and informed them about the study. The kindergartens who accepted to help the researcher informed parents about the study and the parents who wanted their children to participate in the study have contacted the researcher.

3.2 Materials

3.2.1 Balloon Story

The “balloon story” was used to determine children’s narrative structure development. The “balloon story” is composed of 6 pictures and these pictures delineate the story of a boy that sees a balloon man and wants a balloon. The balloon man gives the balloon to the boy but after a while the balloon slips from the boy’s hand and flies off. Therefore, the boy starts crying. This wordless picture story was developed and originally used by Karmiloff-Smith (1981). Previous studies have also used the “balloon story” (Küntay, 2002). The researcher showed the pictures of the “balloon story” to the children and wanted them to make up a story based on these 6 pictures.

3.2.2 Play-doh Game

In order to measure the degree of children’s behavioral enactment and verbal recall, the researcher and the children played a play-doh game. The child was taught how to play the game by the researcher. The aim of the game was to fill a plastic human body with appropriate body parts. The children learned how to make a heart and a bone by molding red and white play-dohs. Then, the children learned where to place these molded shapes by the help of the instructions of the researcher. The reason

for choosing this kind of a game was for enabling children to remember play session as an event and report this event in the right sequence.

3.2.3 Questions about birthday and doctor visit

In order to analyze children's recall of a chain of events as belonging to a script, the children were asked to recall one of their past birthdays and doctor visits. The questions were taken from Children's Autobiographical Memory Inventory and applied to the children with the same technique (CAMI; Bekerian & Goodrich, 2000). First, the researcher asked the child to talk about what happened at his birthday and his doctor visit. Then the researcher used some probes such as "What did you do at your birthday?", "Who came to your birthday?", "Did you get any presents?", "Who gave you that present?", "What did you do at the doctor's?", "Why did you go to the doctor?", "Who took you to the doctor's?" in order to help children to elaborate their doctor visit and birthday.

3.3 Procedure

The children were visited at their homes twice with a 4-week interval between these visits. In the first visit, after meeting with the child, the researcher introduced herself and then the researcher showed the child the game that they were going to play together. The child was informed that the game belongs to the researcher and after they played with it, the researcher was going to take it back with her. The child and the researcher played the play-doh game which lasted approximately 5-10 minutes.

Even though the child had to complete the tasks of the game by him/herself, the researcher helped the child if he/she could not. The help was equal for all age groups. After the game the researcher gave a toy as a gift to the child and then left.

The second visit was done after 4 weeks. This time the researcher generally asked some questions to the child and also asked for a narrative using the “balloon story”. At first, the researcher asked the child if s/he remembered the researcher. If the child answered this question as “yes” then in order to be sure the child recalls the researcher, the child was asked to name the place where s/he had seen the researcher before. Then the child was asked if s/he recalls the gift the researcher had brought to him/her. If the child could not recall the gift, he/she was inquired to recognize the gift among photos of several toys. Then, the researcher asked the child questions about the play-doh game. The researcher tried to find out if the child was able to verbally recall what they had done together in the previous session. All the children were also required to demonstrate how to play the game regardless of their levels of verbal recall. After these questions about the previous sessions, the “balloon story” and the questions about doctor visit and birthday were applied to the child.

Both of the visits were recorded with a video recorder for coding the data appropriately for subsequent analyses. The children were coded based on their level of recall of the researcher, recall of the gift, recognition of the gift, recall of the play-doh game, behavioral enactment of the play-doh game, narrative of the balloon story and recall of doctor visit and birthday. The codes for the memory levels of children were checked for inter-rater reliability with a second coder.

Chapter 4

RESULTS

The purpose of the study was to confirm the predicted developmental progress for autobiographical memory which included object recognition, person and object recall, procedural memory, narrative structure, non-scripted autobiographical memory and scripted autobiographical memory development.

4.1 Scales

Some measures comprised of more than one item and therefore for these variables scales were formed and their internal consistencies were analyzed.

Procedural memory scale included eight items ($\alpha = 0.78$) such as recognizing the plastic human body, selecting red and white play-dohs, using the mold, making a heart and a bone and placing the heart to the chest and the bone to the leg of the human body.

Scale that was formed for narrative structure included five items ($\alpha = 0.89$). This scale included variables created for “the balloon story” and these were;

talking about the setting, explaining the problem and its solution, describing the pictures as connected in a story format, and using the past tense.

Non-scripted autobiographical memory scale consisted of four items ($\alpha = 0.68$) which were, reporting that the game was played with play-dohs, a heart and a bone were made and they were placed into a human plastic body. When the item about play-dohs was excluded the scale's internal consistency increased ($\alpha = 0.79$). Even though there was an increase in the internal consistency, the analyses were conducted by using the original version of the scale since the item was considered to be important for the purposes of the present study.

Two scales were constructed for scripted autobiographical memory. One of these scales were free recalled autobiographical scale and it consisted of 2 items ($\alpha = 0.64$). These items were free recall of a birthday and a doctor visit. The other autobiographical scale was probed autobiographical memory scale which also consisted of two items ($\alpha = 0.59$). The children were given some probes to help them to talk about their birthday and doctor visits in detail. The proportion of the answered probes per given probes were calculated separately for birthday and doctor visit and these proportions represented the probed autobiographical memory scale.

All of the variables in these scales, except the scripted autobiographical memory scales, were coded as 0 (did not recall at all/did not mention at all), 1 (prompted recall/mentioned very vaguely) or 2 (recalled/mentioned). Since the

questions in the free recalled autobiographical memory scale were taken from CAMI (Bekerian & Goodrich, 2000) their coding was also done accordingly. The coding for the variables in the free recalled autobiographical memory scale was done as 0 (did not recall at all), 1 (recalled vaguely), 2 (recalled), or 3 (recalled perfectly). Since the proportions of answered probes per given probes were calculated, there was not any special coding for the probed autobiographical scale.

The coding was done by two coders for all the scales, except the scripted autobiographical memory scales. The second coder coded 101 participants. The inter-rater reliability between the coders was 90% for person recall, 91% for object recall, 50% for object recognition, 83% for procedural memory, 89% for narrative structure, 90% for non-scripted autobiographical memory.

4.2 Descriptive Statistics

Table 4.1 contains the means and standard deviations of the dependent variables for each age group. Since the scales of these variables did not have equal number of items the scores of these scales could not be compared. In order to eliminate this, each scale score was converted to percentages by dividing the score by the maximum possible score and multiplying by 100.

Measures used in this study exhibited a high level of variability. Narrow age intervals were particularly vulnerable to such variability in that, the high level

of variability masked the age differences. Therefore, the optimal span for age intervals was determined to be one year.

Table 4.1 Means and Standard Deviations of Percentage Scores of Memory Measures According to Age Groups

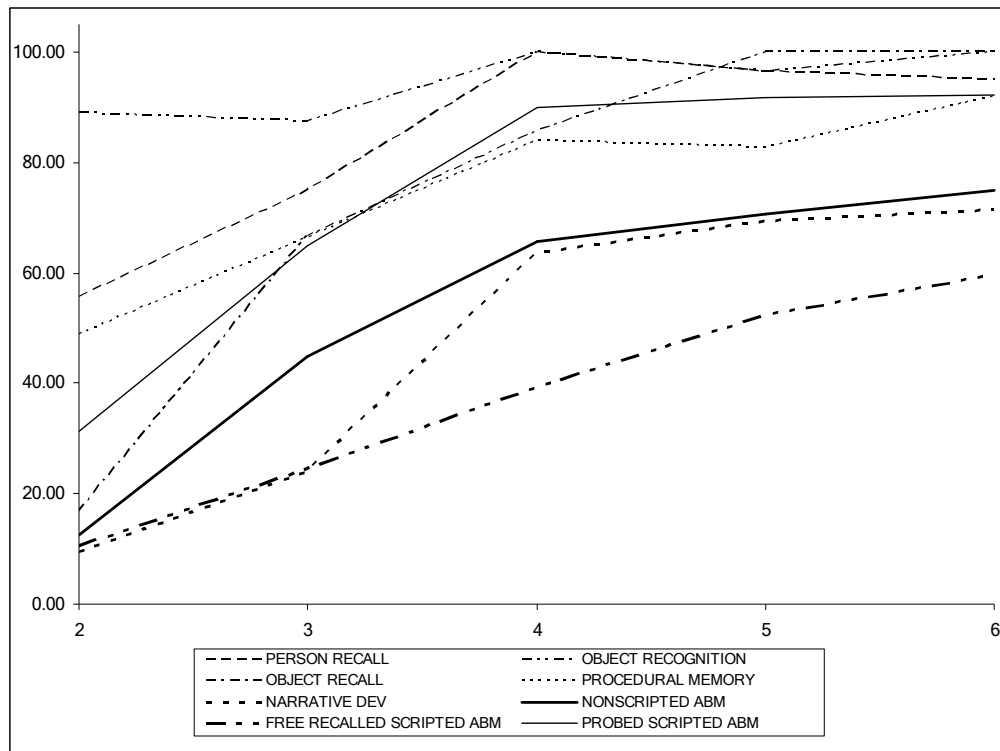
Type of Memory	Age	M	SD	N
Object Recognition	2	88.89	32.34	18
	3	87.50	33.78	24
	4	100.00	0.00	29
	5	96.55	18.57	29
	6	100.00	0.00	20
Person Recall	2	55.56	51.13	18
	3	75.00	44.23	24
	4	100.00	0.00	29
	5	96.55	18.57	29
	6	95.00	22.36	20
Object Recall	2	16.67	38.35	18
	3	66.67	48.15	24
	4	85.71	35.63	28
	5	100.00	0.00	29
	6	100.00	0.00	20
Procedural Memory	2	48.96	24.37	18
	3	66.41	18.41	24
	4	83.84	21.29	29
	5	82.76	20.43	29
	6	91.88	14.64	20
Narrative Structure	2	9.44	13.92	18
	3	24.17	28.42	24
	4	63.57	25.42	29
	5	69.31	28.53	29
	6	71.50	32.00	20

Table 4.1 (continued) Means and Standard Deviations of Percentage Scores of Memory Measures According to Age Groups

Type of Memory	Age	M	SD	N
Non-scripted Autobiographical Memory	2	12.50	19.65	18
	3	44.79	37.58	24
	4	65.63	28.59	29
	5	70.69	30.67	29
	6	75.00	19.87	20
Free Recalled Scripted Autobiographical Memory	2	10.42	17.08	16
	3	24.60	17.17	21
	4	39.29	23.22	28
	5	52.47	29.13	27
	6	59.65	33.94	19
Probed Scripted Autobiographical Memory	2	31.25	38.62	12
	3	65.00	33.83	20
	4	90.00	22.82	25
	5	91.67	17.55	24
	6	92.11	18.73	19

Figure 4.1 shows the means for all the variables across the ages of 2 and 6.

Figure 4.1 Mean percent scores across ages



As figure 4.1 shows, at age two, object recognition is the most developed ability followed by person recall, procedural memory, probed scripted autobiographical memory, object recall, non-scripted autobiographical memory, free recalled scripted autobiographical memory and narrative structure, respectively. At age 3, every variable increases and the order from the most developed to least developed stays the same except for object recall which catches up with the level of procedural memory. Object recognition and person recall are the most developed type of memories at age 4. Following them are the probed scripted autobiographical memory, object recall, procedural, non-scripted

autobiographical memory, narrative structure and free recalled scripted autobiographical memory. Unlike age 2 and 3, at age 4, children show a better performance in narrative structure than autobiographical memory. At age 5, the only difference in the order of the variables from age 4 is that object recall performance becomes almost perfect. At age 6, object recall and object recognition are both perfected, followed by person recall, probed scripted autobiographical memory, procedural, non-scripted autobiographical, narrative structure and free recalled scripted autobiographical memories.

Table 4.2 summarizes the correlations between memory types. As expected, all of the correlations are positive. Object recognition was significantly correlated with person recall, procedural memory, and non-scripted autobiographical memory. Person recall was significantly correlated with object recall, procedural memory, narrative structure, non-scripted autobiographical memory, probed scripted autobiographical memory and free recalled scripted autobiographical memory. Object recall was significantly correlated with procedural memory, narrative structure, non-scripted autobiographical memory, probed scripted autobiographical memory and free recalled scripted autobiographical memory. Procedural memory was significantly correlated with narrative structure, non-scripted autobiographical memory, probed scripted autobiographical memory and free recalled scripted autobiographical memory. Narrative structure was significantly correlated with non-scripted autobiographical memory, probed scripted autobiographical memory and free recalled scripted autobiographical memory. Non-scripted autobiographical memory was

significantly correlated with probed scripted autobiographical memory and free recalled scripted autobiographical memory. Probed scripted autobiographical memory was significantly correlated with free recalled scripted autobiographical memory.

Table 4.2 Correlation Matrix for Memory Types

Variable	2	3	4	5	6	7	8
1. Object Recognition	.25**	.15	.23*	.16	.29**	.13	.07
2. Person Recall	---	.43**	.31**	.38**	.42**	.45**	.38**
3. Object Recall		---	.53**	.52**	.59**	.57**	.43**
4. Procedural Memory			---	.56**	.57**	.47**	.46**
5. Narrative Structure				---	.58**	.52**	.53**
6. Non-scripted Autobiographical Memory					---	.50**	.45**
7. Probed Scripted Autobiographical Memory						---	.60**
8. Free Recalled Scripted Autobiographical Memory							---

Note: * $p < .05$, ** $p < .001$

4.3 Durability of Memories and Age

In order to test the first hypothesis of the study about the durability of memories according to age, one-way analyses of variances (ANOVA) were conducted. Object recognition, person and object recall, procedural memory, non - scripted autobiographical memory, scripted autobiographical memory (probed and

free recalled) were taken as the dependent variables whereas age was taken as the independent variable.

The age univariate main effect analyses indicated significant differences in the means of person recall ($F(4, 115) = 7.96, MSE = 7516.76, p < .001$), object recall ($F(4, 114) = 24.33, MSE = 24030.11, p < .001$), procedural memory ($F(4, 115) = 14.58, MSE = 5878.14, p < .001$), non-scripted autobiographical memory ($F(4, 115) = 16.16, MSE = 13352.09, p < .001$), probed scripted autobiographical memory ($F(4, 95) = 15.36, MSE = 10353.34, p < .001$), and free recalled scripted autobiographical memory ($F(4, 106) = 11.92, MSE = 7606.62, p < .001$) for the different age groups. There was not a significant difference between age groups in object recognition. This can be attributed to the fact that children from every age group were successful in object recognition. As shown in Figure 4.1, even children from age 2 had mean scores above 85%.

In order to find which of the age groups differed significantly from each other, multiple comparisons were conducted. The alpha level for the Tukey HSD test was set at $p < .05$.

In person recall, significant differences were observed between age 2 and ages 4, 5, and 6 and between age 3 and 4. For object recall, age 2 group was significantly lower than age 3, 4, 5 and 6. In addition, age 3 group was also significantly lower than age 5 and 6. In procedural memory, children at age 2 performed significantly lower than those in age 3, 4, 5 and 6. Similarly, children

in age 3 group had scores lower than those in age 4, 5 and 6. For non-scripted autobiographical memory, age 2 group had significantly lower scores than age 3, 4, 5 and 6. Age 3 group had also significantly less developed non-scripted autobiographical memory than ages 5 and 6. In terms of probed scripted autobiographical memory, age 2 group was significantly lower than age 3, 4, 5 and 6 and age 3 was also significantly lower than 4, 5 and 6. For free recalled scripted autobiographical memory age 2 group had significantly lower scores than age 4, 5, and 6. In addition, for free recalled scripted autobiographical memory age 3 had also significantly lower scores than 5 and 6.

4.4 Memory processes at different ages

The second, third, fourth and fifth hypotheses of the study concerned differences between different types of memory at each age. First, an overall mixed analysis of variance was conducted. Then, analyses were done to compare different types of memory at each age by comparing memory scores separately at each age.

In order to compare different types of memory processes at different ages a mixed multivariate analysis of variance was conducted. Memory type was the within-subjects variable whereas age was the between-subjects variable. The means and standard deviations for dependent variables were presented in Table 4.1. The tests of between-subjects effects indicated that age ($F(4, 88) = 42.29$, $MSE = 66931.19$, $p < .001$) was significant. The tests of within-subjects effects

indicated that memory type ($F(7, 616) = 51.25, MSE = 29550.95, p < .001$) and the interaction between memory type and age ($F(28, 616) = 2.90, MSE = 1669.32, p < .001$) were significant.

In order to test the hypotheses of the study, one-way within-subjects analyses of variance were conducted for each age group separately. The results of these analyses indicated that memory type was significant for age 2 ($F(7, 77) = 10.38, MSE = 9687.57, p < .001$), age 3 ($F(7, 112) = 9.17, MSE = 8522.00, p < .001$), age 4 ($F(7, 154) = 19.85, MSE = 8985.21, p < .001$), age 5 ($F(7, 154) = 11.85, MSE = 5576.14, p < .001$), and age 6 group ($F(7, 119) = 10.50, MSE = 3275.17, p < .001$). Pairwise comparisons with Bonferroni correction ($\alpha = .05$) were conducted to analyze the significant differences between memory types separately for each age group.

The second hypothesis of the study was about the development of recognition abilities prior to recall abilities. In order to test this hypothesis, the differences in children's levels of object recognition, object recall and person recall were analyzed. The only significant difference was between object recognition and object recall at the age of 2. According to this, at age 2 object recognition was significantly more developed than object recall. These three memory types did not have any significant developmental differences for all other ages.

The third hypothesis of the study was about the development of procedural and autobiographical memories. According to the hypotheses, procedural memory would precede non-scripted and scripted autobiographical memories. Procedural memory was not significantly more developed than probed scripted autobiographical memory for any age group. However, procedural memory was significantly more developed than non-scripted autobiographical memory for ages 2 and 6. Procedural memory was also significantly more developed than free recalled scripted autobiographical memory for ages 2, 3, 5, and 6.

The fourth hypothesis was about the development of probed and free recalled scripted autobiographical memories. Probed scripted autobiographical memory was expected to precede free recalled scripted autobiographical memory. Probed scripted autobiographical memory was found to be significantly more developed than free recalled scripted autobiographical memory for ages 3, 4, 5, and 6.

The fifth hypothesis of the study proposed that non-scripted autobiographical memories of children would be more advanced than free recalled scripted autobiographical memories at each age. Mean scores for non-scripted autobiographical and scripted autobiographical memories increased for each subsequent age. However, none of the means differed significantly from each other. Therefore, non-scripted and free recalled scripted autobiographical memories of children were equally developed at each of the ages 2, 3, 4, 5 and 6.

4.5 Predictors of non-scripted and scripted autobiographical memories

Another approach to testing the hypotheses related to the development of script-based and non-script based autobiographical memory would be to determine the predictors of their development. More basic memory processes may be considered to predict the development of autobiographical memory which relies on such processes. For that reason, hierarchical regression analyses were conducted on non-scripted autobiographical memory, free recalled scripted autobiographical memory, and probed scripted autobiographical memory using age, object recognition, person recall, object recall, procedural memory and narrative structure as predictors to examine the amount of variance accounted for by each variable in the models.

When non-scripted autobiographical memory was taken as the dependent variable, age was entered as the first predictor into the model. As stated in Table 4.3, age was found to account for 30.10% of the variance in non-scripted autobiographical memory which was significant. The predictors included in the second model caused a significant increase by 14.30% in the variance in non-scripted autobiographical memory. Procedural memory was found to significantly increase the variance in the non-scripted autobiographical memory by 5.00%. Narrative structure also created a significant increase by 3.00% in the variance of non-scripted autobiographical memory. For the last model, object recall, procedural memory and narrative structure had significant coefficients and so they were variables that could predict non-scripted autobiographical memory. Object

recall had the highest beta value ($\beta = .26$), followed by narrative structure ($\beta = .22$) and procedural memory ($\beta = .21$).

Table 4.3 Summary of Hierarchical Regression Analysis for Variables Predicting Non-Scripted Autobiographical Memory (N = 120)

Variable	B	SE B	Beta	Df	R ²	R ² Change	F	F Change
Model 1				(1, 117)	.30		50.37**	
Age	15.08	2.13	.55**					
Model 2				(4, 114)	.44	.14	22.71**	9.73**
Age	6.32	2.53	.24*					
Object Recognition	.25	.12	.15*					
Person Recall	.13	.08	.13					
Object Recall	.31	.08	.37*					
Model 3				(5, 113)	.49	.05	21.71**	10.29**
Age	4.05	2.55	.15					
Object Recognition	.20	.11	.12					
Person Recall	.13	.08	.12					
Object Recall	.24	.08	.29*					
Procedural Memory	.40	.12	.27*					
Model 4				(6, 112)	.52	.03	19.82**	5.79*
Age	1.73	2.68	.06					
Object Recognition	.20	.11	.12					
Person Recall	.10	.08	.10					
Object Recall	.22	.08	.26*					
Procedural Memory	.31	.13	.21*					
Narrative Structure	.22	.09	.22*					

Note. **p < .001, *p < .05.

As indicated in Table 4.4, when free recalled scripted autobiographical memory was taken as the dependent variable, age was found to account for 33.30% of the variance in free recalled scripted autobiographical memory which was significant. The predictors included in the second model did not cause a significant increase. Procedural memory was also found not to significantly increase the variance in autobiographical memory. Narrative structure created a marginally significant increase by 2.2 % in the variance of autobiographical memory. When the coefficients for the final model were examined, the variables that could predict autobiographical memory were age and narrative structure. Age had the highest beta ($\beta = .33$), followed by narrative structure ($\beta = .21$). Since narrative structure was considered as a predictor of free recalled scripted autobiographical memory, the sixth hypothesis of the study which stated that children who use narratives in their speech are expected to have developed free recalled scripted autobiographical memory was confirmed.

Table 4.4 Summary of Hierarchical Regression Analysis for Variables Predicting Free Recalled Scripted Autobiographical Memory (N = 120)

Variable	B	SE B	Beta	Df	R ²	R ² Change	F	F Change
Model 1				(1, 108)	.33		53.89**	
Age	13.49	1.84	.58**					
Model 2				(4, 105)	.36	.03	14.91**	1.61
Age	11.33	2.40	.49**					
Object Recognition	-.11	.11	-.08					
Person Recall	.14	.08	.16					
Object Recall	.05	.08	.06					
Model 3				(5, 104)	.38	.02	12.92**	3.52
Age	9.76	2.51	.42**					
Object Recognition	-.14	.11	-.11					
Person Recall	.14	.08	.06					
Object Recall	.004	.08	.01					
Procedural Memory	.23	.12	.19					
Model 4				(6, 103)	.41	.02	11.69**	3.80+
Age	7.71	2.69	.33*					
Object Recognition	-.14	.11	-.10					
Person Recall	.12	.08	.14					
Object Recall	-.01	.08	-.02					
Procedural Memory	.17	.12	.14					
Narrative Structure	.17	.09	.21+					

Note. **p < .001, *p < .05, +p = .054.

When probed scripted autobiographical memory was taken as the dependent variable, as stated in Table 4.5, age was found to account for 29.70% of the variance in probed scripted autobiographical memory which was significant. The predictors included in the second model caused a significant increase by 11.50% in the variance in probed scripted autobiographical memory. Procedural memory was also found to significantly increase the variance in the probed scripted autobiographical memory by 2.40%. Narrative structure increased the variance in probed scripted autobiographical memory by 0.6% but it was not found to be a significant increase. For the last model, person recall and object recall had significant coefficients. Object recall had the highest beta value ($\beta = .26$), followed by person recall ($\beta = .19$).

Table 4.5 Summary of Hierarchical Regression Analysis for Variables Predicting Probed Scripted Autobiographical Memory (N = 120)

Variable	B	SE B	Beta	Df	R ²	R ² Change	F	F Change
Model 1				(1, 97)	.30		40.96**	
Age	13.88	2.17	.55**					
Model 2				(4, 94)	.41	.12	16.47**	6.14**
Age	6.64	2.65	.26*					
Object Recognition	-.02	.13	-.01					
Person Recall	.18	.09	.19*					
Object Recall	.26	.08	.33*					
Model 3				(5, 93)	.44	.02	14.39**	3.99*
Age	4.85	2.76	.19					
Object Recognition	-.06	.13	-.04					
Person Recall	.19	.09	.20*					
Object Recall	.22	.08	.28*					
Procedural Memory	.26	.13	.19*					
Model 4				(6, 92)	.44	.006	12.14**	0.94
Age	3.84	2.95	.15					
Object Recognition	-.05	.12	-.04					
Person Recall	.17	.09	.19+					
Object Recall	.21	.08	.26*					
Procedural Memory	.21	.14	.16					
Narrative Structure	.10	.10	.11					

Note. **p < .001, *p < .05, +p = .05.

4.6 Types of Memories and SES

Although, it was not the focus of the current study, the possibility of SES to act as a confounding variable was considered. In order to observe whether there were any influences of SES and if SES influenced the pattern of development for memory types, two-way univariate analyses of variance (ANOVA) were conducted for all the dependent variables. Object recognition, person and object recall, procedural memory, narrative structure, non-scripted autobiographical memory, probed and free recalled scripted autobiographical memory were taken as the dependent variables whereas SES and age were taken as the independent variables. Table 4.6 contains the means and standard deviations of the dependent variables for each SES group.

The results of two-way univariate analyses indicated that there was a significant main effect of age for object recognition ($F(4,108) = 2.99$, $MSE = 1360.49$, $p < .05$), person recall ($F(4,108) = 6.89$, $MSE = 6186.63$, $p < .001$), object recall ($F(4,107) = 24.55$, $MSE = 23662.21$, $p < .001$), procedural memory ($F(4,108) = 13.00$, $MSE = 5052.38$, $p < .001$), narrative structure ($F(4,108) = 20.99$, $MSE = 13008.73$, $p < .001$), non-scripted autobiographical memory ($F(4,108) = 14.80$, $MSE = 12266.11$, $p < .001$), probed scripted autobiographical memory ($F(4, 88) = 9.89$, $MSE = 6715.79$, $p < .001$) and free recalled scripted autobiographical memory ($F(4, 99) = 8.60$, $MSE = 5490.20$, $p < .001$). The SES main effect analyses indicated significant differences in procedural memory ($F(2,108) = 3.89$, $MSE = 1512.37$, $p < .05$), and narrative structure ($F(2,108) = 5.84$,

$MSE = 3619.99, p < .05$). In order to find which of the SES groups differed significantly from each other, Post Hoc tests were done. The alpha level for the Tukey HSD test was set at $p < .05$. In procedural memory and narrative structure, significant differences were observed between low and high SES groups. The SES and age interaction effects were significant for person recall ($F(5,108) = 2.37, MSE = 2130.82, p < .05$) and narrative structure ($F(5,108) = 2.48, MSE = 1534.71, p < .05$). Therefore, it can be concluded that SES influences the pattern of development for person recall and narrative structure.

Table 4.6 Means and Standard Deviations of Percentage Scores of Memory Measures According to SES Groups

Type of Memory	SES	M	SD	N
Object Recognition	Low	92.50	26.67	40
	Middle	80.00	44.72	5
	High	97.33	16.21	75
Person Recall	Low	82.50	38.48	40
	Middle	80.00	44.72	5
	High	89.33	31.08	75
Object Recall	Low	74.36	44.24	39
	Middle	80.00	44.72	5
	High	78.67	41.24	75
Procedural Memory	Low	67.66	25.86	40
	Middle	80.00	14.25	5
	High	80.50	22.84	75
Narrative Structure	Low	38.25	27.91	40
	Middle	34.00	34.35	5
	High	57.73	37.87	75
Non-scripted Autobiographical Memory	Low	47.18	32.95	40
	Middle	50.00	39.53	5
	High	61.67	35.67	75
Free Recalled Scripted Autobiographical Memory	Low	28.65	26.17	32
	Middle	36.67	21.73	5
	High	43.69	30.93	74
Probed Scripted Autobiographical Memory	Low	80.83	30.57	30
	Middle	87.50	25.00	4
	High	77.27	34.17	66

Chapter 5

DISCUSSION

5.1 Summary of Findings

The present study was conducted in order to confirm predicted developmental progress of autobiographical memory, to find out if the durability of memories show the expected pattern observed in infantile amnesia findings, and to investigate if narrative structure is a necessary process for the emergence of autobiographical memory.

The findings of the study will be summarized in the same order as the hypotheses were stated.

5.1.1 Durability of Memories and Age

The first hypothesis of the study was about durability of memories and age. The durability of memories of older children was expected to be greater than of younger children. As expected, older children were more likely to maintain information for the duration between the two visits compared to younger children

particularly in terms of person and object recall, procedural memory, non-scripted autobiographical memory, probed scripted autobiographical memory, and free recalled scripted autobiographical memory.

The durability of all of the memories, except object recognition, showed the expected pattern. Object recognition ability of children was already above 85% at the age of 2, and therefore in terms of object recognition older and younger children did not have any differences in their memory durability. Younger children were highly skilled as older children in object recognition. Person recall ability of children reached 50% at the age of 2, object recall, procedural memory and probed scripted autobiographical memory abilities reached 50% at the age of 3, non-scripted autobiographical memory ability reached 50% at the age of 4, and free recalled autobiographical memory ability reached 50% at the age of 5. The durability of memories generally increased starting from 3-4 years of age. The durability of memories of children older than 4 were found to be greater than the durability of memories of children 3-years old or younger. Therefore, it can be suggested that the pattern that was found in infantile amnesia findings also applies to children between 2 and 6 years of age (Howe, 2002). Most of the studies about infantile amnesia suggested that the offset for infantile amnesia is 3 and a half or 4 years of age which means that the memories of individuals become more durable or their memory span increases afterwards (Nelson & Fivush, 2004). As stated previously, these amnesia studies were conducted with adults and the results are similar to the findings of the present study which was conducted with children between the age of 2 and 6. Therefore, it

can be concluded that the durability of memories of children in the present study follow the similar pattern observed in infantile amnesia studies conducted with adults.

5.1.2 Memory processes at different ages

One of the hypotheses about memory processes at different ages was related to the development of recognition and recall abilities. According to this hypothesis, younger children were expected to be successful on recognition tasks more than recall tasks. In the present study, there were two recall and one recognition measures; person and object recall, and object recognition. Significant differences between object recognition and person recall were not found at any age group which refers to the fact that object recognition cannot be considered as a prerequisite to person recall. However, significant difference for object recognition and object recall was found at the age of 2. Therefore, object recognition is more advanced compared to object recall only at the age of 2.

Another hypothesis about memory processes at different ages was related to the development of procedural and autobiographical memories. Children who display non-scripted and scripted autobiographical memories were expected to be older than children displaying only procedural memory which refers to the fact that procedural memory expected to be more developed than autobiographical memory. Procedural memory was found to be more advanced than non-scripted autobiographical memory for every age group. It was also found to be more

advanced than free recalled scripted autobiographical memory for age 2, 3, 5, and 6. However, procedural memory was not more developed than probed scripted autobiographical memory at any age group. Therefore, the hypothesis of the study about procedural and autobiographical memory is partially confirmed. Procedural memory can only be considered as a prerequisite for free recalled scripted autobiographical memory.

Another hypothesis of the study about memory processes at different ages was related to the development of probed and free recalled scripted autobiographical memories. Children who display free recalled scripted autobiographical memory were expected to be older than children displaying only probed scripted autobiographical memory. In other words probed scripted autobiographical memory was expected to be more enhanced than free recalled scripted autobiographical memory. Probed scripted autobiographical memory was found to be more developed than free recalled scripted autobiographical memory at the ages of 3, 4, 5, and 6.

Another hypothesis of the study about memory processes at different ages was related to the development of non-scripted autobiographical memory and free recalled scripted autobiographical memory. Children with developed non-scripted autobiographical memories were expected to be younger than children with developed free recalled scripted autobiographical memories. It was found that non-scripted and free recalled scripted autobiographical memories of children do not have any significant differences. Since the hypothesis was not confirmed, it

can be concluded that non-scripted and free recalled scripted autobiographical memories develop at equal levels for every age group.

5.1.3 Predictors of non-scripted autobiographical memory

One of the research questions of the present study was whether or not the first four levels of the predicted developmental progress for autobiographical memory is necessary for the development of non-scripted autobiographical memory. It was found that object recognition, object and person recall, and procedural memory significantly predicted non-scripted autobiographical memory. Therefore, for the development of non-scripted autobiographical memory, object recognition, object recall, person recall and procedural memory were found to be the prerequisites.

5.1.4 Predictors of scripted autobiographical memory

One of the research questions of the present study was whether or not the first four levels of the predicted developmental progress for autobiographical memory is necessary for the development of scripted autobiographical memory. None of the memory types were found to significantly predict free recalled scripted autobiographical memory. On the other hand, person recall and object recall were found to predict probed scripted autobiographical memory. Since probes act like external cues, the retrieval in probed scripted autobiographical

memory is similar to recognition and therefore, the elements of a past event such as a person or an object help the retrieval process of probed scripted autobiographical memory.

Another research question of the study related to the predictors of scripted autobiographical memory was whether narrative structure development was necessary in order for scripted autobiographical memory to develop. Narrative structure was found to create a marginally significant increase in the variance of free recalled autobiographical memory. However, when probed scripted autobiographical memory was taken as the dependent variable, narrative structure was not found to create a significant difference. Therefore, narrative structure can be considered as predicting the development of free recalled scripted autobiographical memory.

Narrative structure might be influencing free recalled autobiographical memory in two different ways. First of all, narrative structure might facilitate the representations of the events in free recalled scripted autobiographical memory (Fivush, 2002). To have a more advanced narrative structure enables individuals to recall events in a story form which helps the formation of free recalled scripted autobiographical memory since the events in this type of memory are generally represented in a story form. Second, the measures of free recalled scripted autobiographical memory might cause us to think that the children that have a more advanced narrative structure have more developed free recalled scripted autobiographical memory (Howe, Courage, & Edison, 2003). Since free recalled

scripted autobiographical memory is measured by reporting the past events, individuals who have a less advanced narrative structure cannot tell about their autobiographical memories in order and in detail. These individuals are categorized as having less developed free recalled scripted autobiographical memories even though their memories might be fully developed but the only problem is that they cannot report their memories in an advanced form because of a less advanced narrative structure.

5.2 The Development of Autobiographical Memory

Even though previous studies were not able to decide upon the predictors of autobiographical memory, the present study was able to find some answers for this problem (Howe, 2000). First of all, it was made clear that autobiographical memory is not dependent on one factor like stated in previous studies it has many predictors which are object recognition, person recall, object recall, procedural memory, and narrative structure (Fivush, 2002; Howe & Courage, 1997; Naito, 2003).

The predicted developmental progress for autobiographical memory was also confirmed. As expected, children first developed memory for object recognition followed by person and object recall. Then they developed procedural memory followed by probed scripted, non-scripted, and free recalled scripted autobiographical memory. Procedural memory was found to be a prerequisite for

free recalled scripted autobiographical memory at age 2, 3, 5 and 6. The sixth and the seventh levels of the predicted developmental progress can be either non-scripted autobiographical memory or free recalled scripted autobiographical memory since they develop concurrently.

5.3 Memories before Age 4

As mentioned previously, infantile amnesia is the inability of adults or older children to recall events that occurred before the age of about 3 or 4 years (Fivush, 2002). Even though adults remember most of the memories about previous experiences, they cannot retrieve the ones that have taken place in early childhood (Fivush, 2002). Children, similar to adults, are also unable to retrieve some of their past experiences.

The present study analyzed the durability of children's memories and it can be concluded that before the age of 4 the durability of children's memories is rather low when compared to the memories at the age of 4, 5, and 6. Since these children cannot keep the events that they experienced before the age of 4 in their memory spans long enough to remember them afterwards, these memories disappear. This should be considered as the same issue with adults' incapability of retrieving the events that happened before the age of 3 or 4. Nelson and Fivush (2004) explain infantile amnesia as a lack of autobiographical memory. They have proposed that the reason why adults cannot recall these earlier memories is because encoding processes are not facilitated by a developed autobiographical

memory. Therefore, it can be suggested that the time children begin to remember personal experiences, in other words, the time they begin to develop autobiographical memory, determines the earliest memories they will recall as adults.

5.4 Limitations and Future Directions

The major limitation of the present study was variability. There was high within-age variability which might have affected the results. For example, because of this high variability significant differences among some age groups were not found. Previous studies have found significant differences among ages 4, 5, and 6 in terms of narrative development (Fivush, 2002). However in the present study these significant differences had vanished because of the high variability within-age groups.

Another limitation of this study was sample size. The age groups were categorized into 6 monthly intervals but the analyses could not be done with these categorizations since there was not sufficient number of participants in each group. Therefore, the analyses were conducted with age groups that were coded by yearly interval. In future studies to analyze the developmental effects of memory in 6 monthly intervals, a larger sample must be used. Most of the participants were from high SES group followed by low and middle SES groups. Even though some of the analyses conducted by SES resulted to be significant,

more significant results could be reached if there were more participant from low and middle SES groups.

Another limitation of the study was the presence of some mothers while collecting data. Since younger children were not used to stay alone with a stranger, mothers were allowed to stay with the children while the researcher was spending time with the children. Even though mothers were not allowed to answer any of the questions, some mothers interfered when their children were not able to give the answers to the questions of the researcher. Therefore, for future research mother should not be allowed to stay in the same room with the child for any reason at all.

The children were visited at their homes twice with a 4 weeks interval and during this time nobody should remind the children about the researcher and the first visit. However, this was something that researcher could not control and therefore it can be counted as another limitation of the study. Even if the mothers were warned about the effects this could create on the results of the study, the researcher could not be certain if every mother complied with this warning. Thus, results of the study did not yield any defect because of this limitation.

5.5 Implications of the Present Study

The present study made contributions to the field by studying the development of autobiographical memory by taking the age-related differences in the basic processes into account. The levels of the predicted developmental

progress of autobiographical memory were formed accordingly and it was found that development of autobiographical memory follows a pattern. Therefore, this study shed light to the arguments about the developmental progress of autobiographical memory.

The present study also confirmed that the durability of memories show the similar pattern observed in infantile amnesia findings (Howe, 2002). By finding a similar pattern for children between 2 and 6 years of age, this study was able to explain the overlapping among the offset of infantile amnesia and the onset of autobiographical memory. For most of the memory types, children older than 4 years of age have higher durability which enables memories to remain for longer periods of time. Most of the infantile amnesia studies that are conducted with adults have also found the same results. 4 years of age also indicated the emergence of autobiographical memory which refers to the fact that the time children begin to develop autobiographical memories intersects with the time the memories start to become more durable.

There were a lot of inconsistencies in the field about the necessity of narrative structure development for the emergence of autobiographical memory. Although, Nelson and Fivush (2004) have stated that in order autobiographical memory to emerge narrative development is necessary Howe and Courage (1997) did not considered narrative development as a must for the development of autobiographical memory. The present study contributed this debate by finding

that narrative development is indeed a predictor for the emergence of free recalled scripted autobiographical memory.

In conclusion, the present study answered some important issues in the field of memory development and autobiographical memory by studying a comprehensive age range in children which helped to analyze the development patterns of different kinds of memories.

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