EFFECTS OF PERCEPTUAL FLUENCY ON AUTOBIOGRAPHICAL MEMORIES

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ABSTRACT

EFFECTS OF PERCEPTUAL FLUENCY ON AUTOBIOGRAPHICAL MEMORIES

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The aim of this study was to find if manipulating fluency, that is, the ease of processing, could affect confidence ratings about whether an event occurred in the respondents' past. To test the familiarity misattribution hypothesis, which states that familiarity caused by fluent processing can be misattributed to past experience if the source of fluency cannot be identified, two methods were used: a revelation task, which was anagram solving and repetition priming.

In the revelation task the familiarity misattribution hypothesis and the activation based hypothesis were tested by presenting one of the words in each one of the Life Event Inventory (LEI) items as an anagram or an unrelated anagram before the LEI, respectively. Higher confidence ratings for LEIs with an anagram compared to LEIs without anagrams would indicate that a revelation effect. A revelation effect was not observed for either condition. Therefore, the previous findings of revelation effect for autobiographical memories (Bernstein et al., 2002) could not be replicated when Turkish counterparts of LEI and anagrams were used.

In the repetition priming experiments, the participants' awareness of the source of fluency was manipulated by presenting either a subliminal or a

supraliminal prime before they responded to a LEI item. The prime was either the same as the verb of the LEI sentence, or a different verb. Participants gave higher confidence ratings if subliminal primes were identical to, rather than different from, the verb of the sentence. If the participants were aware of seeing the primes, this difference disappeared. These results were consistent with the familiarity misattribution hypothesis.

Keywords: Autobiographical Memory, Fluency, Familiarity misattribution, Revelation Effect, Priming

ÖZ

OTOBİOGRAFİK HAFIZADA ALGISAL AKICILIK ETKİSİ

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Mevcut çalışma, algısal akıcılık etkilerini otobiyografik hafıza kapsamında incelemiştir. Bu çalışmanın amacı akıcılığı, diğer bir deyişle işleme rahatlığını, manipule ederek katılımcılarının bir olayın geçmişlerinde yaşanılmış olduğundan ne kadar emin olduklarını etkileyip etkilemediğini belirlemektir. Akıcılık kaynağının tanımlanamaması halinde, akıcı işlemlerin yol açtığı tanıdıklığın geçmiş deneyime bağlanacağını belirten aşinalığı yanlış atfetme hipotezini test etmek için, açığa çıkarma görevi olarak anagram çözmek ve tekrarlı hazırlama etkisi olmak üzere iki metod kullanılmıştır.

Açığa çıkarma görevi olarak kullanan metodla aşinalığı yanlış atfetme hipotezini test etmek için, Yaşam Olayları Envanteri (YOE)'nin her maddesinin bir kelimesi anagram olarak verilmiştir. Aktivasyon bazlı hipotezi test etmek için anagramların YOE maddelerinden önce verildiği başka bir koşul sunulmuştur. Anagramlı YOE'nin anagramsız YOE'ne göre daha yüksek güvenilirlik oranları vermesi, otobiyografik hafızalarda açığa çıkma etkisinin olduğunu gösterecektir. Ne YOE maddelerinden önce anagramların verildiği durumda, ne de YOE maddelerinde anagramlar olduğunda bir açığa çıkma etkisi görülmemiştir. Dolayısıyla sonuçlarımız otobiyografik hafızalardaki açığa çıkma etkisinin önceki bulgularını, YOE Türkçe karşıtları ve anagramlar kullanıldığında tekrarlamamıştır.

Tekrarlı hazırlama etkisi deneylerinde, katılımcıların akıcılığın kaynağının farkında olmaları YOE maddelerine tepki vermeden önce eşik-altı ya da eşik-üstü hazırlayıcı gösterilerek manipule edilmiştir. Hazırlayıcı, ya YOE cümlesinin yüklemi olarak, ya da farklı bir yüklem olarak verilmiştir. Katılımcılar, eşik-altı hazırlayıcılar cümlenin yüklemiyle aynı olduğunda, farklı olduğundan daha yüksek düzeylerde olayın başlarına gelmiş olduğu görüşü belirtmişlerdir. Katılımcılar hazırlayıcıları gördüklerini farkettiklerinde ise, bu fark ortadan kalkmıştır. Bu sonuçlar aşinalığı yanlış atfetme hipoteziyle uyumludur.

Anahtar Kelimeler: Algısal akıcılık etkileri, otobiyografik hafıza, açığa çıkma etkisi, hazırlama etkisi

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CHAPTER 1

INTRODUCTION

Memory research deals with the methods to measure past experiences and interpretations of these measurements such as influences of past experience on current processing. However, there is also an influence of current activities and processing on memory decisions. One of these influences is fluency, which is defined as the ease of processing of a present activity (Jacoby, 1991; Jacoby, Kelley & Dywan, 1989; Jacoby & Whitehouse, 1989; Johnston, Dark & Jacoby, 1985; Lindsay & Kelley, 1996; Rajaram, 1993; Kelley & Rhodes, 2002; Oppenheimer, 2008; Whittlesea, 1993; Whittlesea & Leboe, 2000). Fluency can be a useful cue for memory judgments; however, when the source of fluency is present conditions and not a past experience and it is misattributed to past experience, it can lead to memory errors and can be a basis for memory illusions (Whittlesea, Jacoby & Girard, 1990; Jacoby & Whitehouse, 1989; Whittlesea, 1993). In the present study, we examined if the effects of fluency on recognition judgments for episodic memory (Whittlesea, Jacoby & Girard, 1990; Jacoby & Whitehouse, 1989; Whittlesea, 1993), could be extended to autobiographical memories.

The attributional approach to memory

Jacoby, Kelley & Dywan (1989) proposed in their attributional model of memory that the judgment that a recognition test item is from a study list (judging that the item is old) does not arise from the activation of memory traces. Instead the subjective feeling of "oldness" arises from nonconscious decision processes through which cognitive processes at test are attributed to memory. This hypothesis is based

on the idea that prior exposure to an item facilitates the processing of an item when it is encountered again. Therefore, the attributional approach to memory proposes that our cognitive system has the nonconscious assumption that if something is processed fluently; it should be due to being familiar caused by a past experience. This nonconscious assumption works when people are oriented to make a memory judgment.

The attributional approach to memory (Jacoby & Dallas, 1981; Jacoby, 1991; Jacoby, Kelley & Dywan, 1989; Jacoby & Whitehouse, 1989; Johnston, Dark & Jacoby, 1985; Lindsay & Kelley, 1996; Kelley & Rhodes, 2002; Whittlesea, 1993; Whittlesea & Leboe, 2000) emphasizes the importance of attributions and interpretations in memory decisions and the active role of the rememberer in remembering (Bartlett, 1932; Jacoby, Kelley & Dywan, 1989; Roediger & McDermott, 1995) and has gained power with the study of nonconscious memory effects starting with Jacoby and Dallas's (1981) studies. Jacoby and Dallas (1981) have found that there was an enhanced perceptual identification of words if they were presented briefly between masks before the identification task. The importance of this study was that the words that were presented between masks were presented subliminally therefore, they were not processed at a conscious level. Even processing at a nonconcious level was found to affect perceptual identification due to being processed more fluently. These findings contributed to memory research by indicating that memory could show its effects on behavior even when there is no conscious awareness.

Support for the attributional approach to memory came from further studies conducted by Jacoby and Whitehouse (1989), Whittlesea (1993), Whittlesea, Jacoby and Girard (1990) on episodic memory, which indicated that the recognition judgments may be based on the ease of perceptual processing. The results support the viewpoint that a sense of subjective familiarity that results from fluent processing is misattributed to past experience if there is no other source to be attributed.

The pioneering studies of Jacoby and Whitehouse (1989), Whittlesea (1993), Whittlesea, Jacoby and Girard (1990) have shown that manipulating processing at

retrieval phase can affect recognition as does manipulations done on the encoding phase of recognition. The effects of manipulations done at retrieval on recognition brings different insights to memory studies, since these effects show that memory is a reconstructive process (Bartlett, 1932) and the condition people are in when they are making a memory judgment affects the final decision. These effects show that what people recall or recognize may not correspond to what they encoded; what they report as a memory they remember can be altered by the present conditions they are in when they are trying to remember it (Garry et al., 1996). So memories are not exact records, remembering is not a passive process; memory is an active constructive process (Bartlett, 1932).

Episodic and autobiographic memories

According to Tulving (1985, 2002) episodic memory is a neurocognitive (brain/mind) system, uniquely different from other memory systems. Episodic memory is the system that enables human beings to remember past experiences. Remembering past experiences requires mental time travel and conscious awareness that remembering our experiences is different from our awareness of our current state, or imagining or dreaming (Tulving, 2002). This special kind of consciousness we have when we mentally travel back in time during remembering is called autonoetic (self-knowing) consciousness. It allows us to be aware of the subjective time that the events took place. Mentally traveling in time requires, in addition to autonoetic consciousness, a rememberer referred to as "self", which has the capability to exist not only in the present but also in subjective time.

When Tulving (1972) first introduced the term episodic memory (personally experienced events or episodes) and semantic memory (general knowledge or facts) he dissociated them according to kinds and sources of information to be remembered. As Tulving (1985) developed the concept of episodic memory further, he concluded that episodic memory involved more than what memories tested in laboratories involved. Laboratory experiments designed to measure episodic memory require participants to make decisions about whether "what" they have studied is the same as the tested item. While according to Tulving (1985, 2002) episodic memory is not only about information involving "what" but it also involves

"where" and "when" information. In other words episodic memory is about things that happen with particular time and place information.

Autobiographical memory is what most people talk about when they use the term "memory" in everyday language. Autobiographical memory is remembering past experiences from one's own life (Cabeza & Jacques, 2007). One reason for the emergence of Autobiographical Memory (ABM) research was the claims that ABM research deals with complex real life phenomena and sheds light on memory research that could not be studied in laboratory (Rubin, 1986). Complex constructive processes, effects of emotion and vividness, and remote memory retrieval are some of the aspects of memory that are proposed to be absent in most of the laboratory memory studies that researchers can investigate by studying autobiographical memory (Robinson, 1986; Brewer, 1986; Neisser, 1986; Cabeza & Jacques, 2007, Rubin, 2005).

One of the defining features of autobiographical memories is their relevance to the self (Brewer, 1986; Barclay, 1986; Conway & Playdell-Pierce; Conway, 2005). However, this does not differentiate autobiographical memories from episodic memories because an agent referred to as "self" is proposed to be one of the requisites for the mental time travel in the definition of episodic memory (Tulving, 2002). Everything a person remembers from the past requires the involvement of the self, which does not differentiate ABM from episodic memory. Therefore, most of the ABM researchers do not dissociate episodic memories from autobiographical memories. Instead when they use the term ABM they are dissociating it from Laboratory Memory (LM), which correspond to distant memories and recent memories respectively (Cabeza & Jacques, 2007; Bernstein, 2002; 2004; 2009; Garry et al., 1996; Sharman et al., 2004).

To investigate ABM, researchers have developed and used several methods, which will be reviewed in detail in the next chapter. Diary studies (Linton, 1975; Wagenaar, 1986) and other methods for recording events such as using digital cameras (Burt, 2008; Burt, Kemp & Conway, 2008) or video-taping (Mendelsohn et al., 2009), cue-word technique (Crovitz & Schiffman, 1974), autobiographical memory interview (AMI) (Kopelman, Wilson & Baddeley; 1989), autobiographical

interview (Levine et al., 2002) and using Life Event Inventory (LEI) (Garry et al., 1996; Heaps and Nash, 1999; Bernstein et al., 2002) are examples of these techniques. The findings from using these methods suggest that one of the characteristics of ABM is its hierarchical organization (Linton, 1986; Wagenaar, 1986; Conway, 2005). The more specific levels of representations are embedded in the more general levels of representation, which does not involve any specific details about time, place, and sensory information about a specific event. For instance if the word "bicycle" is given as a cue-word, "I used to ride my bicycle when I was in primary school." is a representation at a general level, whereas "When I was in 4th grade, on a very hot summer day, I came across a strange animal when I was riding my bicycle around the fields near our summer house." would correspond to an event at the specific level. According to Conway (2005), episodic memory lies at the most specific level of the hierarchical organization of autobiographical memory. One of the defining characteristics of episodic memories is that they are on a forgetting trajectory (Conway, 2009) and will be forgotten if they do not become integrated with the general level of representation referred to as autobiographical knowledge base (Conway, 2005; Conway, 2009). According to the Self Memory System (SMS) framework that was proposed by Conway and Playdell-Pierce (2000) and Conway (2005) to account for the structure of ABM, the autobiographical knowledge base corresponds to personal semantic memory, and the specific memories attached to it are episodic memories. This proposal suggests that ABM consists of a semantic and an episodic component. Other studies that were conducted to investigate ABM using several methods, such as using AMI (Kopelman, Wilson & Baddeley, 1989), autobiographical interview (Levine et al., 2002; Murphy et al., 2008), using video-recording (Mendelsohn et al., 2009) and neuropsychological studies (Cabeza & Jacques, 2007; Gilboa, 2005) have also contributed to the finding that ABM is composed of semantic memory and episodic memory.

Another common finding obtained by conducting research using the methods to investigate ABM is that more memories are forgotten or remembered inaccurately as the retrieval delay increases (Linton, 1975; Wagenaar, 1986; Crovitz & Schiffman, 1974; Conway, 2005; Conway, 2009; Mendelsohn et al., 2009).

However, autobiographical memories are characterized by a very strong belief value not correlated with their accuracy (Brewer, 1986; Mendelsohn et al., 2009). Scoboria et al. (2004) proposed the idea that LEI studies, for example, measure autobiographical belief, not autobiographical memories because participants are required to make a decision about whether the events have occurred rather than whether they remember the occurrence of the events in a LEI.

Fluency misattribution and autobiographical memory

Fluency of processing appears as an important aspect of how the imagination inflation effect (Sharman et al., 2004) and the revelation effect for autobiographical memory are explained (Bernstein et al., 2002; 2004). It is thought that a feeling of familiarity arises from fluent processing and this is misattributed to the occurrence of the events described by the LEI items in the distant past of the person. Imagination inflation research (Garry et al., 1996; Heaps & Nash, 1999; Sharman et al., 2004; Sharman & Barnier, 2008) showed that requiring participants to imagine a childhood event enhanced confidence that the event occurred in childhood (Garry et al., 1996; Heaps & Nash, 1999; Sharman et al., 2004; Sharman & Barnier, 2008). Another retrieval manipulation applied using LEIs is using a revelation task. Requiring participants to solve an anagram before making a confidence judgment about the occurrence of the event led to an enhancement in confidence that the event occurred in childhood, similar to imagination inflation (Bernstein et al., 2002; 2004; 2009).

The present studies

In the present study, the reconstructive nature of ABM, in other words, the possibility of changing autobiographical belief was investigated by manipulating processing of fluency during retrieval. Manipulating fluency was accomplished by using a revelation task and by using primes. To manipulate fluency a revelation task was used in Experiments 1 and 2. The revelation effect, which is the increase in a participant's tendency to report a test item as old if it is presented in an unusual or distorted way was investigated for ABM recognition to find if it can affect the confidence levels about occurrence of childhood events (Bernstein et al., 2002; Bernstein et al., 2004; Bernstein et al., 2009). The second part of this study

investigated if repetition priming effects, which were found in episodic memory could also be extended to autobiographical memories (Jacoby & Whitehouse, 1989; Whittlesea, Jacoby & Girard, 1990; Whittlesea, 1993).

This thesis is organized such that in Chapter 2 review of the related literature is presented. Then in Chapter 3, the method of the experiments and the results are given. In Chapter 4 a general discussion of the results are given, followed by the conclusion.

CHAPTER 2

LITERATURE REVIEW

In the following literature review, first methods used to investigate the structure of ABM are reviewed. The findings about the characteristics and structure of ABM by using these methods and neuropsychological findings about ABM will be reviewed next. Due to the relevance of the self and ABM, information about the Self-Memory-System proposed by Conway and Playdell-Pierce (2000) and Conway (2005) will be given. Then revelation effect as an example of fluency effects in episodic memories, revelation effect for ABM and repetition priming as an example of fluency will be reviewed.

2.1 Autobiographical Memories

Starting with an increase in interest in ABM, due to its proposed advantages such as complex constructive processes, recollective qualities of emotion and vividness and remote memory retrieval compared to studying LM (Cabeza and Jacques, 2007) and due to the relationship between ABM and repressed memories, false memories and memory illusions, an extensive amount of research has been conducted on autobiographical memories. ABM research involves studies to find out about the nature and structure of ABM and ABM's reconstructive nature (Bartlett, 1932) and whether and how confidence judgments about memories of personally experienced events can be affected.

2.1.1 Methods Used to Investigate ABM

To investigate ABM, researchers have developed and used several methods. The cue-word technique (Crovitz & Schiffman, 1974); recording events by using diaries (Linton, 1975; Wagenaar, 1986) and video recording (Mendelsohn et al., 2009); autobiographical memory interview (AMI) (Kopelman, Wilson & Baddeley; 1989); autobiographical interview (Levine et al., 2002) and using Life Event Inventory (LEI) (Garry et al., 1996; Heaps and Nash, 1999; Bernstein et al., 2002) are examples of these methods that are reviewed in this section.

The cue-word technique is one of the techniques for investigating ABM. This technique was introduced by Galton in 1883 (cf. Crovitz & Schiffman, 1974) and revised by Crovitz and Schiffman (1974). In the cue-word technique, participants are required to report a past experience, in response to the presented cue-word, which is a high frequency, imaginable, concrete word, and to date the memory. Using the cue-word technique either the distribution of the reported memories or from the verbal reports of the participants the search strategies used for ABM retrieval can be investigated.

Another method to investigate ABM is doing diary studies. Even though the diary studies have some disadvantages such as using a single participant and the selection of the events by the participants, the findings of these studies cannot be undervalued. The diary studies of Linton (1975) and Wagenaar (1986) shed light on the usage of cues on the recall of ABMs, the importance of the characteristics of encoded events such as emotional involvement, salience and pleasantness, and the importance of passage of time on forgetting of ABMs.

Linton's (1975) aim in conducting her diary study was to find out about her dating accuracy across time. She recorded two or three events each day for five years. After different retention intervals ranging from one month to 3 years, using the description of the recorded event she tried to recall the date of the recorded event. Wagenaar (1986) in his diary study recorded his memories for six years. He recorded his memories with "who", "what", "where" and "when" cues accompanied by the salience, emotional involvement and pleasantness of the event. The salience of the event was rated on a seven-point scale, the emotional involvement on a five

point scale, and the pleasantness on a seven point scale. During recall he used the "what" "where" "when" and "who" cues to retrieve his memories he recorded. When he was recording his memories he also included a critical detail with a question and an answer. The critical detail was selected by Wagenaar (1986) such that if the event was retrieved from memory given all the cues, the critical detail would be guaranteed also to be recalled.

Filming is another method used to study ABM by recording events. Mendelsohn, Furman, Navon and Dudai (2009) filmed a 29 year old healthy woman E.S. carrying out her daily activities for two days. Actually, the video was taken to be used as a documentary to be used for behavioral and neuroimaging studies in Mendelsohn et al.'s (2009) lab. Therefore, when E.S. was filmed she was not aware that she would be tested on her memory later on. She was administered a memory questionnaire while undergoing fMRI after four months and after two years and four months. The questionnaire was composed of a verbal (VQ) and a pictorial questionnaire (PQ). VQ consisted of yes/no questions accompanied by a confidence judgment for each question, asking about the recognition of the recorded events. Some of the questions had accurate while some had some inaccurate details. The confidence judgments were rated on a three point scale. In the PQ, first a cued-recall then a recognition test were given for each image. In the cued-recall test an image was given and a particular detail about it was questioned and E.S. had to recall the detail. For the recognition phase the image and the question was given with two possible answers and she had to choose among one of them and give a confidence rating for her choice. The accuracy and the confidence judgments for VQ and PQ were analyzed. Also the activity of brain regions, which were proposed to be the ABM network (Gilboa, 2004; Svoboda et al., 2006) and the activity of the brain regions such as the hippocampus and the amygdala supposed to be accompanied during retrieval of these memories were analyzed.

Neither the cue-word technique nor the diary studies could tap the dissociations of semantic and episodic memory components of ABM. Kopelman, Wilson and Baddeley (1989) developed the Autobiographical Memory Interview (AMI), which can be used to assess retrograde amnesia, the inability to recollect

remote memories and to assess the semantic memory component of ABM. AMI consists of an interview to assess the recall of autobiographical incidents, which corresponds to the episodic memory and of personal facts from the participant's past, which corresponds to personal semantic memory. The participants are required to recall incidences and facts from childhood, early adulthood and recent past. In the autobiographical incidents schedule, the participants are given names of incidents to be recalled such as "before school", "at primary school" from childhood; "first job", "wedding" from early adulthood; "an event in this hospital/ institution/ place where interviewed" or "a relative or visitor in the last year" from recent past and are required to recall a specific memory rather than a general memory about these cues. If the participants fail to produce specific memories, they are provided by further cues such as "involving siblings?", "involving teacher", "at reception?" etc.

Personal facts required from the participants are answers to questions such as the name of their primary school teacher, the birth date of their children and the name of the place they were living in at the time the interview took place respectively for childhood, early adulthood and recent past. The researcher writes down whatever the participants report as close to verbatim and two experimenters independently score these reports. The autobiographical incidents are scored according to the richness of contextual and perceptual detail and recollection of time and place of the recalled event. Before the scoring, the veracity of the memories is checked either by gathering information from the patients' relatives, or checking the medical records or checking the inconsistencies in the patient's memory reports.

Murphy et al. (2008) suggested that using separate tests as used in Autobiographical Memory Interview (AMI) developed by Kopelman, Wilson and Baddeley (1989) to assess the personal semantic memory component of ABM may artificially divide the two components of ABM. Using separate tests may not take into account the natural interaction of these two components, which in real life autobiographical recollection co-occur (Murphy et al., 2008). By using Autobiographical Interview developed by Levine et al. (2002), Murphy et al. (2008)'s research on patients with amnesic mild cognitive impairment (aMCI), which is characterized by a deficit in learning new information similar to

anterograde amnesia, have shown the dissociation of the episodic and semantic components. Autobiographical Interview is a test that is used to avoid the necessity of using separate tests to assess the dissociations of episodic and semantic memory components of ABM. In Autobiographical Interview, participants are required to recollect a personal past experience from five distinct life periods, which are from their early childhood (up to age 11), from adolescence (from age 11 to 18), from early adulthood (from age 19 to 30), from adulthood (from age 30 to 55) and from the past year. Participants are told to choose any event satisfying the following conditions: they should be events they were personally involved, events they recollect, not events they have heard from someone else and events with specific time and place from one of these periods. Participants are required to give as much detail about the event as possible. For each event the participants are given five minutes and they are allowed to speak until they are finished within this time limit. These five events are audio recorded and rated according to how much internal and external detail they involve. Internal details reflect the episodic memory. These details are subcategorized as the event (what happened, who were involved, actions, reactions and conditions of the environment), the place, the time and the perceptual information. External details are related to the other details that are not specific to the re-experiencing of the event. The external details were subcategorized as semantic (general facts and knowledge related to the event), repeated details, details about unrelated events and others (personal opinions).

Another method to investigate the nature of ABM is to use Life Event Inventories (LEIs) (Garry et al., 1996; Heaps and Nash, 1999; Bernstein et al., 2002). Conducting studies by using LEI is similar to recognition tests of episodic memory, with the difference that in episodic memory tests, the researchers can check the accuracy of the memory report, whereas in the studies investigating ABM with LEI, they do not. Studies using LEIs make it possible to investigate the effects of manipulations done during the retrieval phase of recognition for ABM. Some examples for these retrieval phase manipulations are the imagination inflation studies (Garry et al., 1996; Sharman et al., 2004; Heaps and Nash, 1999) and the studies conducted on the revelation effect for ABM (Bernstein et al. 2002; 2004;

2009). In imagination inflation studies, participants are required to imagine the occurrence of half of the LEI items before making a confidence judgment about the occurrence of the events in their childhood described by the LEI items. For the revelation effect studies, for half of the LEI items that involve a revelation task participants are required to solve the revelation task before making a confidence judgment about the occurrence of the events in their childhood described by the LEI items.

One caution that should be taken in conducting ABM research using LEIs is the absence of knowledge of the accuracy of ABM. Since the researchers cannot know the veracity of the events or the original memory traces for these events by using LEI studies, the researchers can only conclude that they can change the confidence levels for the occurrence of the events by manipulating processing during retrieval phase of recognition. However, the researchers cannot make any claims that the memories have been changed permanently.

Another problem of using LEI while conducting ABM research is that until recently, the distinction between ABM and autobiographical belief has not been made and there was an implicit assumption that LEI was a measure of memory for events. However, what LEI requires from the participants is to make a decision of whether the events have occurred rather than whether they remember the occurrence of the events. Therefore, the answer to the question could be based on a memory or another source. Scoboria, Mazzoni, Kirsh and Relyea (2004) have introduced the idea of autobiographical belief which is closely related to autobiographical knowledge (Conway & Pleydell-Pierce; Conway, 2005). According to Scoboria et al. (2004) autobiographical belief is all of the autobiographical information, which may be both accurate and inaccurate about oneself. Scoboria, Mazzoni, Kirsch & Jimenez (2006) made a distinction between ABM and AB belief such that ABM refers to recollecting an event and AB belief is believing that an event occurred whether or not it is remembered. What Scoboria et al. (2004) propose is that actually by using LEI researchers do not actually measure the autobiographical memory, instead they measure autobiographical belief. In studies using LEI, researchers have the tacit assumption that AB beliefs are based on ABM and are using one construct,

which is the autobiographical belief as an indication of a measurement of autobiographical memory (Scoboria et al., 2004; Scoboria, Mazzoni, Kirsch and Jimenez, 2006; Smeets, Merkelbach, Horselenberg and Jelicic, 2005). Therefore, finding differences in the confidence levels due to retrieval manipulations using LEI research may not be an indication of a change in autobiographical memory, instead it shows that these manipulations changes the beliefs of the people about the occurrence of the events.

To account for the distinction between autobiographical belief and ABM, Scoboria et al. (2004) hypothesized that plausibility, AB belief and ABM are nested constructs. Within this nested construct, general plausibility (GP) involves personal plausibility (PP), PP involves belief and belief involves memory. According to this nested structure if an event is believed to happen, the occurrence of the event is not ensured to be remembered. To test the hypothesis of the nested structures of these constructs and to find the relationship between them, Scoboria et al. (2004) had given ten events accompanied with Autobiographical Belief and Memory Questionnaire (ABMQ). The ten events were selected by the authors such that they would be events representative of a wide range of plausibility. As an example, two of the events were "Losing a toy" and "Getting abducted by a UFO". ABMQ was composed of five questions rated on an 8-point scale. The first two questions were used to assess the general plausibility. These questions were "How plausible is it that some people, before the age of 6, lose a toy?" "Out of 100 people, how many people before the age of 6, lose a toy". The third, fourth and fifth questions were used to assess personal plausibility, AB belief and ABM respectively. These questions on the ABMQ were "How plausible is it that you personally, before the age of 6, could have lost a toy?" "How likely is it that you personally before the age of 6, did in fact lose a toy" and "Do you actually remember losing a toy before you were the age of 6?".

2.1.2 The Conclusions from the Findings about the Structure and Characteristics of ABM

The findings from the methods used to investigate ABM have led ABM researchers to reach some conclusions about ABM. The conclusions from the findings about the structure and characteristic of ABM that will be reviewed in this section is that as the time interval increased ABM retrieval became more difficult; there are some cues that are more informative for ABM retrieval; when a cue word is given, there is a certain pattern of search for ABM retrieval and ABM is composed of episodic and semantic components.

The results of Crovitz and Schiffman (1974) showed that number of memories recalled decreased as the time from when it was experienced to when it was retrieved increased. The findings of Linton's (1975) diary studies also showed that as the time interval increases for the recall of recorded events and their recording time, more memories were forgotten, and the recall became harder. Another finding related to the cue-word technique is that it led to the discovery that the distribution of autobiographical memories during the lifespan has a typical shape (Rubin, 1986). Participants older than 50 years old reported almost no ABM before the age of three. This finding was named childhood amnesia. Most of the recalled memories came from the period when the participants were 10-30 years old, which was named the reminiscence bump.

Both Linton's (1975) and Wagenaar's (1986) results and other methods for recording such as using a digital camera (Burt, 2008; Burt et.al, 2008) indicated that ABM is not chronologically indexed, because the date of an event cannot be used as a search criterion and it is mostly absent in an event's memory representation. The "when" cue was the least effective cue used for the retrieval of ABM (Wagenaar, 1986). However, the "when" cue became an informative cue when it was accompanied by the other cues.

Wagenaar's (1986) findings indicated that even if an autobiographical memory could not be retrieved by the presentation of a single cue, it could be retrieved by presenting further cues. Another finding of Wagenaar (1986) was that the memories that were rated as salient and involving emotions were recalled more

correctly compared to usual and unemotional memories. This finding is in accordance with one of the proposed characteristic of ABM, which is the emotional involvement. However, it should be noted that emotional involvement cannot be used as a special characteristic that dissociates episodic memories from ABM, it only suggests that these events may be encoded in a special manner. In other words episodic memories with emotional involvement may have a better chance to be integrated to the semantic component of ABM, which makes them accessible over a long retention period.

The results obtained by using the techniques to investigate the structure of ABM have indicated that ABM is composed of episodic and semantic memories (Murphy et al., 2008; Kopelman, Wilson & Baddeley, 1989, Conway, 2005). For instance, in Murphy et al. (2008)'s research, the control group recalled more internal details, which is a measure of episodic memories, compared to the aMCI group. On the other hand, the aMCI group recalled more external details compared to the control group. The memory deficit of people with aMCI is an impairment of episodic autobiographical memory and they have an intact semantic autobiographical memory. These results support the view that ABM is composed of both episodic and semantic memories and these memories show dissociation on different groups.

For ABM, the activity of medial prefrontal cortex (PFC), which is associated with self-referential processing, also contributes converging evidence to the findings from behavioral studies about the nature of ABM that it has a semantic component in addition to an episodic component. Other contributions from neuropsychological studies to the structure of ABM indicating that it is composed of both semantic and episodic memory comes from patients with differential deficits in semantic ABM and episodic memory deficits. Semantic ABM deficits are correlated with deficits in bilateral anterior and especially left posterior temporal cortex, while episodic ABM deficits are correlated with damage to bilateral medial temporal regions and especially right anterior lateral temporal cortex (Gilboa et al. 2005).

Supporting evidence for the view that ABM is composed of episodic and semantic components also comes from the cue-word technique and the verbal

protocols of the participants during searching for an autobiographical memory to the provided cues. The verbal protocols of the participants showed that, when a cue was given, the first thing the participants did was to find a context related to the cue. This context was the lifetime periods or general events in the SMS framework proposed by Conway (2005), which will be reviewed in detail in the next section. This context refers to the semantic component of ABM. While participants were searching within that determined context they generated a new cue, which was related to the first cue and which further generated another cue. Finally when the memory that was sought for was found, which corresponds to the episodic component of ABM, participants verified that it was the correct memory and it was really a memory not an imagined event or a confabulation. According to these findings from the verbal protocols, Conway (2005) proposed the "generative retrieval" as the search strategy used for ABM, which was influenced by Norman & Bobrow's (1979) (cf. Conway, 2005) search-evaluate-elaborate model.

The search mechanism Cabeza and Jacques (2007) propose is in accordance with the search mechanism proposed by Conway (2005): generative retrieval. Cabeza and Jacques (2007) indicate that voluntary retrieval of an ABM given a cue-word requires an effortful search guided by the semantic knowledge. This effortful search in the retrieval of ABM is guided by semantic world knowledge, semantic personal knowledge, and inferences. The fMRI studies have found that in ABM, memory search and controlled retrieval processes involved activity of left lateral PFC, monitoring processes were associated with ventromedial PFC and self-referential processing involved the activity of the medial PFC (Cabeza & Jacques, 2007). Lateral PFC regions are active in memory search and retrieval of ABM. , Ventrolateral PFC activity during an initial search for remote events is consistent with the view that ABM retrieval is a generative and iterative process (Cabeza & Jacques, 2007). Especially left-lateral PFC regions activity also reflects the contribution of semantic information to ABM retrieval (Cabeza & Jacques, 2007).

Differential activity of the ventromedial PFC in ABM monitoring and activity of right dorsolateral PFC for LM tasks suggested that LM tasks require elaborate, conscious monitoring and ABM task require a quicker, intuitive and pre-

conscious form of monitoring referred to as feeling-of-rightness (FOR) (Gilboa, 2004; Cabeza & Jacques, 2007). This finding indicates that there is a difference between memory retrieval monitoring for recent memories and for distant memories corresponding to LM and ABM according to Cabeza and Jacques (2007).

The distinction between recent and distant memory recollection was also found in Mendelsohn et al.'s (2009) research. Mendelsohn et al.'s (2009) results indicated that the passage of time increased the acceptance of false details. This means that there was an increase in the "yes" judgments for remote memories compared to recent memories. This increase was also accompanied by an increase in confidence judgments. These findings indicated that E.S.'s memory performance declined with the passage of time. Mendelsohn et al. (2009) found that brain activity did not show significant difference for correct and incorrect events for both the recent and remote testing. However, for confidence judgments of recent testing there was an activity in the ABM network (Svoboda et al., 2006; Cabeza & Jacques, 2007), which includes precuneus, medial prefrontal cortex (mPFC), bilateral ventrolateral prefrontal cortex (VLPFC), bilateral dorsolateral cortex (DLPFC), and bilateral temporo-parietal junction (TPJ) while of remote testing there was an activity only in the bilateral temporal poles and left TPJ. Previous findings indicated that temporal poles (Patterson et al., 2007) and TPJ (Svoboda et al., 2006) were found to process personal-semantic information. For the recognition phase, Mendelsohn et al. (2009) found activity in the same network that was proposed to be the ABM network correlated with the recollection of ABMs (Svoboda et al., 2006). These findings led Mendelsohn et al. (2009) to conclude that the ABM network is more sensitive to confidence judgments than to accuracy of the memories. As retrieval delay increased, confidence ratings were not reflected in the ABM network anymore, instead activity was found in bilateral temporal poles, indicating a change in recollective experience and confidence judgments for remote memories. Mendelsohn et al. (2009) suggest that for remote memories recollection of ABM starts to depend on personal-semantic knowledge rather than vivid recollection of events. Therefore, as years pass, ABM retrieval becomes to depend on personal schemata instead of vivid recollection. Even though the results of Mendelsohn et

al.'s (2009) research on the filming of E.S. should be dealt with cautiously since it involved only one participant, with further supporting studies, which use this method with more participants, the results may be more indicative of general findings.

Another approach to ABM's structure comes from Rubin (2005). Rubin (2005) proposes that ABM is multimodal. Similar to Cabeza and Jacques (2007), Rubin (2005) distinguishes ABM not from episodic memories but from laboratory memories. According to Rubin (2005), ABMs are episodic memories that are recollected events from an individual's past. He considers that due to the complexity of real-life situation associated with ABM, which are not observed in laboratory studies, ABM studies require additional considerations both theoretical and methodological. According to ABM's multimodality, the systems contributing to ABM are all kind of senses, especially vision, emotion, and a narrative system, which forms causal relations without the need for language (Rubin, 2005). Narrative establishes a form of organization in ABM providing temporal and goal structure (Rubin, 2006). Since autobiographical memories are told to other people and oneself, they are recoded as narrative. Information that is central to the narrative structure of the used schema is remembered more than information that is not central. According to Rubin (2006) narrative corresponds to the conversational nature of autobiographical remembering (Barclay, 1986), the goals (Conway & Playdell-Pierce, 2000), and the life story (Conway, 2005). Since ABM involves rich emotional content and vivid visual imagery details, which are qualities that are relatively absent in LM (Cabeza & Jacques, 2007), in addition to the activation in the frontal lobes, there is also activity in the limbic system and occipital lobes in ABM retrieval (Gilboa, 2004; Rubin, 2005; Cabeza & Jacques, 2007). As Cabeza and Jacques (2007) mentioned the enhanced activity of the amygdala and the occipital lobes would be observed for LM memories if they had emotional content and vivid visual imagery details. Therefore, the activity of amygdala and the occipital lobes are not defining characteristics that differentiate ABM from LM, the activity arises due to qualities of memories whether they are LM or ABM. In addition to the systems, the two phenomenological properties of autobiographical

memories are their involvement of a sense of recollection, and a belief that a memory is accurate (Rubin, 2005; Rubin, Schrauf & Greenberg, 2003; Rubin & Siegler, 2004).

As was mentioned in the previous section, research using LEI is different from research using other methods. Related to the contribution of belief in ABM recognition research using LEIs, the concept of AB belief was introduced by Scoboria et al. (2004). Results obtained by using ABMQ indicated that as was predicted, GP was rated higher than PP, PP higher than belief and belief higher than memory. According to Scoboria et al.'s (2004) nesting model; GP ≥ PP ≥ Belief ≥ Memory. According to this equation, a superordinate construct is rated greater than or equal to a subordinate construct. When belief and memory ratings were compared for events, for 50.3 % of the instances memory and belief were given an equal rating and for 45.4 % belief ratings were greater than memory ratings. Therefore, the hypothesized distinction between belief and memory, which states that belief is a superordinate construct of memory was found. These results of Scoboria et al.'s (2004) indicate that by using LEIs, researchers assess the AB belief and the ratings of AB belief are greater than ABM. Since AB belief is assessed by using LEIs, actually the changes in confidence ratings due to retrieval manipulations correspond to a change in the person's AB belief. ABM or in more correct terms autobiographical belief research using LEI does not require from the participants a full recollection of the events that are assessed. The distinction between recollection and familiarity may be found in these studies by indicating that participants when they decide on the occurrence of an event actually know that the event occurred, but need not recollect or remember the event. Therefore, the decision is mostly based on familiarity and factors that affect subjective familiarity may affect the final judgment or the confidence level.

2.1.3 ABM, the Self and the Self-Memory-System

What makes autobiographical memories special are their relevance to the self (Conway and Playdell-Pierce, 2000; Conway, 2005). The self, which is represented as the self-concept is an organization of perceptions such as the person's

characteristics, abilities, values associated with experiences, goals and ideals with valences (Rogers, 1951a, p.136). According to Baumeister (1998), the self is composed of three important roots. The first is the "experience of reflexive consciousness", the second is the interpersonal aspect of self and the third root is the executive function. The first root, which is the experience of reflexive consciousness is the one most related to ABM, therefore, will be discussed in more detail in the following paragraph. Very briefly the interpersonal aspect of the self can be defined as the interaction of the social environment that contributes to the development of the self helping us to decide who we are and how we feel and behave in certain situations (Baumeister, 1998). And the third root, which is the executive function can be described as the initiator of action, the decision maker; it is this root, which gives the self an active role in our lives (Baumeister, 1998).

Experience of reflexive consciousness is, "conscious attention turning back towards its own source and gradually constructing a concept of oneself" (Baumeister, 1998). People are always processing information to make a sense out their environment; reflexive consciousness may be thought of processing information to understand ourselves, or to become aware of one's self, such that the individual can consciously represent who s/he is, what s/he is like (Baumeister, 1998). Experiences that involve reflexive consciousness can be answering questions such as what am I thinking about myself now, what are my opinions about myself, what do I like, what do I dislike, what are my beliefs and past experiences. Here the interconnection of the self and the autobiographical memories can be seen clearly, the inquiries about the self also involves inquiries about self-relevant memories, in other words, autobiographical memories or vice versa.

Conway and Playdell-Pierce (2000) and Conway (2005) proposed the Self-Memory-System (SMS) as a model for the organization of autobiographical memories. The SMS framework consists of two components: the working-self and the autobiographical knowledge base. The working-self component of the SMS is the goal-processing component that determines which memories will be accessed and how; and also, which memories will be inhibited due to the coherence of these memories according to the goals of the individual at a given moment. The working-

self component of ABM represents the connection of the self and ABM such that the self determines the construction of autobiographical memories due to the motivational and emotional relevance of the events to the self (Conway and Piercedell, 2000; Conway, 2005). In accordance with these definitions of the self and self-concept, the personal life history of an individual is the part that is closely related to the self. Accordingly, the personal life history can be defined as the semantic part of the autobiographical memory. Both behavioral and neuropsychological findings supported the view that ABM is composed of both episodic and semantic memory (Conway and Playdell-Pierce, 2000; Conway, 2005; Cabeza & Jacques, 2007; Kopelman, 1994; Kopelman, Wilson & Baddeley, 1989; Murphy et al., 2008).

The semantic part of autobiographical memories corresponds to the autobiographical knowledge base in the SMS (Conway and Playdell-Pierce, 2000; Conway, 2005) Autobiographical knowledge base according to the SMS model corresponds to long term memory representations. The SMS model distinguishes between recent and distant memories by proposing that recent memories are recently formed episodic memories and are on a forgetting trajectory unless they become integrated with long term memory representations, which corresponds to the autobiographical knowledge base. The autobiographical knowledge base at the very general level of representation involves lifetime periods. Lifetime periods are the representations such as “when I was studying in university” or like “when I was living in city X”. Lifetime periods are composed of general events, which are more specific compared to lifetime periods, but less specific compared to episodic memories. An example for general events may be “the times I went to my summer house” or “the times when we had department meetings”. Conway and Pleydell-Pearce (2000) proposed that general events are composed of event specific knowledge (ESK); however, Conway (2005) replaced this concept of ESK with episodic memories, which are the most specific representations in the autobiographical knowledge base organization. The most specific memories we recall or recognize from our past that involve sensory-perceptual-conceptual-

affective information are called the episodic memories (Conway, 2005; Conway, 2009).

According to Conway (2009), one of the characteristics of episodic memories is that they involve perspective, either a field or an observer perspective. The field perspective of autobiographical memories is remembering the events from the rememberer's own past perspective. On the other hand the observer perspective refers to as if observing the self from an outside observer's perspective as if watching from a camera (Nigro & Neisser, 1983). Distant compared to recent memories have more observer perspective, which may be an indication of the memory construction due to integration of episodic memories with more conceptual autobiographical knowledge. This finding also suggests that decisions about distant memories may not always be based on recollective experience and a sense of reliving as also suggested by Mendelsohn et al. (2009). Therefore, when testing recognition for ABM for distant childhood memories using a LEI, it can be suggested that since recollective experience may be lacking in distant memories participants may need to base their judgments more on the familiarity of the events, compared to recollection.

Another characteristic of episodic memories according to Conway (2009) is being rapidly forgotten. One of the most important conclusions we can derive from Conway's (2009) conception of episodic memories is that they are on a forgetting trajectory. Since episodic memories are rapidly forgotten they can be accessible only if they become integrated with highly organized and conceptual autobiographical knowledge base. Therefore, whatever we recall or recognize from our past is actually an episodic memory that is integrated in personal semantic memories or facts about ourselves. Therefore, when we are conducting a memory research on ABM, especially about recognition of ABM using LEI, we are actually testing distant episodic memories integrated in a semantic network. As suggested by Mendelsohn et al. (2009) for remote memories recollection of ABM starts to depend on personal-semantic knowledge rather than vivid recollection of events. Therefore, the recognition of ABM using LEI for remote memories may not involve the recollective experience as proposed for recent episodic memories. This suggestion

also brings the possibility that the judgments about the occurrence of these distant past experiences may be based more on familiarity compared to recollection.

2.2 Fluency Effects: the Revelation Effect and Repetition Priming

2.2.1 Revelation Effect

The revelation effect is the tendency to report a recognition test item as old, if it is distorted or presented in an unusual way at test, so that it has to be discovered or "revealed" before the recognition decision. The studies conducted on the revelation effect showed that the increase in "old" judgments compared to a condition in which test items were presented in normal form, was seen both for hits and false alarms (Watkins & Peynircioğlu, 1990; Peynircioglu & Tekcan; 1993). Tasks in which Watkins and Peynircioğlu (1990) have shown a revelation effect include showing words with some letters missing and showing those letters one by one gradually, presenting test words with their letters transposed, rotating letters in test words individually, and rotating test words as a whole. Another common method for obtaining a revelation effect has been solving anagrams (Watkins & Peynircioglu, 1990; Westerman & Greene, 1996; Westerman & Greene, 1998). The revelation effect was not limited to words, it was also observed when the study list was composed of digits and test numbers were presented in the form of Roman numerals, and when test numbers were presented as the solution to an equation (Watkins and Peynircioğlu, 1990), and the revelation effect also emerged for faces (Bornstein & Wilson, 2004).

Westerman and Greene (1996) demonstrated that a revelation effect was observed even for the case when there was a mismatch between revealed item and recognized item. For example, if the anagram was [DNRPOIAR] [5468321] (RAINDROP) and a recognition decision was made for a different word such as VINEYARD, a revelation effect was observed for the recognized item even though it was not identical to the revealed item.

The revelation effect was a challenge to the encoding specificity principle, the principle that stated that memory was improved when information available at encoding was also available at retrieval (Tulving 1983) and the transfer-appropriate processing framework, which stated that dissociations of memory tasks were better explained in terms of the degree of overlap between mental operations at study and test (Roediger et al. 1989), because the items tested in a distorted way, which were different from the way they were studied were recognized better.

It was found that the revelation effect was not caused by extra time or effort spent by the participants on the revealed items (Peynircioglu & Tekcan,1993; Luo, 1993). It did not depend on the meaningfulness and the difficulty or the successful completion of the revelation task (Westerman and Greene; 1998, Niewiadomski and Hockley; 2001), because it was also observed when nonwords were used as anagrams and even when a difficult revelation task was used, so that the revelation task was not completed successfully. It was not due to a delay between solving the revelation task and the recognition judgment. Because if the revelation task was replaced by only a time delay of 10 seconds, the revelation effect did not emerge (Westerman & Greene, 1998). It also did not depend on depth of processing or a memory search preceding the recognition decision (Lou, 1993). Westerman and Greene (1998) used synonym generation or letter counting, a task that requires a memory search and one that does not, respectively, as revelation tasks. The results showed that there was no difference in the revelation effect, confirming that the revelation effect did not depend on depth of processing or a memory search preceding the recognition test. The revelation effect was not caused by conceptual priming or perceptual priming either (Peynircioglu and Tekcan, 1993). When words from sets of semantic categories were used for the study list (Peynircioglu and Tekcan, 1993) or when orthographically and semantically similar and dissimilar targets and lures were used there was no difference in revelation effect.

One critical factor on which Westerman and Greene (1998) suggested that the revelation effect depended was the compatibility of the revealed and the tested items, however, this was not confirmed by the findings of Niewiadomski and Hockley (2001). Westerman and Greene (1998) found that the revelation effect

emerged when words were used as test items preceded by a memory span task, a synonym-generation task and a letter counting task, but not when arithmetic problems were used as the revelation task or when the word-span task was changed to a digit-span task. On the other hand, Niewiadomski and Hockley (2001), observed a revelation effect when the revelation task was composed of arithmetic problems and words were tested for recognition.

Another general finding about the revelation effect was that it was limited to episodic memory judgments (Watkins and Peynircioğlu, 1990; Peynircioglu and Tekcan, 1993; Frigo, Reas & LeCompte, 1999). Watkins and Peynircioğlu (1990) found that the revelation effect did not occur when words were judged for typicality as category instance, lexicality, frequency of general usage and number of times encountered during the preceding week as opposed to a recognition judgment. At the time the revelation effect had only been found for episodic memory judgments and no revelation effect was found for judgments of word frequency (Peynircioglu and Tekcan; 1993), personal relevance (Frigo et al.; 1999), lexicality or classification (Peynircioglu and Tekcan; 1993), which all belong to semantic memory judgments. So it was thought that the revelation effect was observed only for episodic memory judgments and could not be extended to semantic memory judgments.

However, in one study a revelation effect was found in a general knowledge questions task, which is supposed to require retrieval of information from semantic memory (Bernstein et al., 2002). Bernstein et al. (2002) used autobiographical memories, and general world knowledge questions to see if revealing a word through anagram solving would increase the confidence ratings about the occurrence of personally experienced events or make a false fact seem true, respectively. Bernstein et al. (2002) presented participants with general world knowledge questions and showed either correct or false answers. The participants had to respond “true” or “false” to these probes. For half of the questions the answers were intact and the other half were given as anagrams and had to be solved before giving a response. The results showed that an answer was more likely to be claimed to be true when it was shown as an anagram. So they showed that the revelation effect occurred for general world knowledge. They also showed that when anagrams

totally unrelated to the answers of the questions of the general world knowledge questions were presented a revelation effect was still observed.

To test whether the revelation effect was limited to episodic memory judgments, Frigo, Reas and LeCompte (1999) used an experimental condition in which they told the participants that they would hear some words embedded in white noise; after that they were given a recognition test. In reality, there were no words presented in white noise. In the recognition test a revelation task was used for half of the words. Frigo, Reas and LeCompte (1999) hypothesized that if the revelation effect depended on an episodic memory event, which is a previous exposure to some particular set of to-be-remembered stimuli, then for their experimental condition a revelation effect would not occur, because there are no items the participants are exposed to. However, if only a suggestion of episodic memory was sufficient for the revelation effect to occur, then the absence of to-be-remembered items would not prevent the emergence of the revelation effect. A typical revelation effect occurred; the revelation effect could occur when there were no items to be remembered, but an episodic event was suggested.

To determine if the revelation effect would occur without to-be-remembered items when the participants knew without any doubt that they had not been presented, Frigo, Reas and LeCompte (1999) asked participants to imagine that they heard a study list, without presenting them. The results showed that the revelation effect did not occur. So a suggestion of an episodic memory experience was a must for the revelation effect to be observed. Except Bernstein et al. (2002) all of these converging results support the explanation that the revelation effect is related to episodic memory. The reason for the revelation effect to be limited to episodic memory might be episodic memory's vulnerability to disturbance, because of its involvement of subjective judgments such as familiarity. Also episodic memory is less robust compared to semantic memory, based on single events, less organized and relies more on conscious effect (Frigo, Reas and LeCompte; 1999).

2.2.1.1 Familiarity-based accounts of the revelation effect

After the first findings of the revelation effect have been published (Watkins & Peynircioğlu, 1990; Peynircioglu & Tekcan; 1993), whether the revelation effect was due to familiarity or recollection of recognition memory (Jacoby, 1991; Yonelinas, 2002) was a question that attracted the attention of the researchers (Lou, 1993; Westerman and Greene, 1996; 1998; LeCompte, 1995; Westerman, 2000; Cameron & Hockley, 2000; Mulligan, 2007). Intuitively revealing a test item before the recognition test should change the familiarity of the recognition test item.

LeCompte (1995) used the process-dissociation procedure (PDP) introduced by Jacoby (1991) and the remember/know procedure introduced by Tulving (1985) to determine the effects of revelation on conscious recollection and feelings of familiarity. Process-dissociation procedure involves an inclusion and an exclusion group or condition. If participants are presented with two lists, one presented auditorily and one presented visually, the participants in the inclusion group are to respond "old" to items that they have heard or seen, the participants in the exclusion group are to respond "old" only for the words they have heard. In this case the responses to the seen words at the time of test are based on both recollection and familiarity for the exclusion group, and based only on familiarity for the inclusion group. In the remember/know procedure the participants are first presented with a study list and in the test phase they are instructed to decide whether the words that are presented were on the study list. If they decide that the word was on the study list, they are asked to give a decision of "remembering" encountering that word or "knowing" that the word was on the list despite that they could not consciously recollect the episode. The "Remember" responses were used as a measure of recollection and the "Know" responses were used as a measure of familiarity.

LeCompte (1995) found that there was no effect of revelation on recollection but the revelation effect increased familiarity. When targets and lures were analyzed separately it was seen that there was a revelation effect for lures, but not for targets However, Hicks and Marsh (1998) reported a revelation effect both for lures and targets, indicating that revelation affected lures more than targets. LeCompte (1995) also found that the revelation task reduced the probability of "remember" responses

and increased "know" responses, which means that the revelation effect decreases recollection and increases familiarity. When independence of remember and know responses were assumed (IRK) the results were the same. Both of the procedures showed that revealing a word increased feelings of familiarity but not recollection.

Another study that confirmed that the revelation effect depended on familiarity and not recollection was conducted by Westerman (2000). Westerman (2000) suggested that procedures that increased the contribution of recollection and reduced the contribution of familiarity to recognition judgments, such as using recognition decisions about target words and their alternate singular/plural forms and associative recognition between intact and rearranged word pairs, reduced or eliminated the revelation effect. Westerman (2000) used two conditions for the associative recognition task. One group of participants was told that they would be required to recognize the words as pairs. This group could use recollection for their recognition judgments and no revelation effect was found for this group. The other group was only told that they would be tested on words (not as pairs), for this group a revelation effect was observed. The revelation effect emerged only for the unwarned group, which used familiarity for recognition decision and familiarity-based recognition is a must for revelation effect. Westerman (2000) concluded that associative recognition tasks were the only episodic memory tasks that no revelation effect occurred, presumably because they depended on recollection only.

Cameron & Hockley's (2000) studies also showed that the revelation effect is based on familiarity and not recollection. They observed a revelation effect for item recognition but not for standard associative recognition, pairs of words presented together, because associative recognition depends on recollection and not familiarity. When they limited the encoding of information that would be useful for recollection such as reducing the exposure time of the study phase, they found a revelation effect both for item and associative recognition tests.

Mulligan (2007) manipulated the recollection component of recognition at study and at test and the results showed that the revelation effect was based on familiarity and not recollection. After semantic encoding, which increased recollection, the revelation effect decreased. All of the converging evidence (Lou,

1993; LeCompte, 1995; Westerman, 2000; Cameron & Hockley, 2000; Mulligan, 2007) confirmed that the revelation effect was based on the familiarity not the recollection component of recognition.

According to Lou's (1993) familiarity based account of the revelation effect, the revelation effect in the case of a revealed item identical to the recognized item was that the revelation task caused fluent processing, which led to heightened familiarity for the recognized item. Since the participants were not consciously aware of the manipulation that enhanced fluency, this familiarity was misattributed to having studied that item. Using fluency as a heuristic produced a false feeling of familiarity.

Westerman and Greene (1996, 1998) proposed another familiarity-based explanation of the revelation effect called the Global Matching Model (GMM). According to the Global Matching Model, solving the problems presented in a revelation task results in activation of traces in memory. When the to-be-recognized items are presented, the residual activation caused by the revelation task is added to the activation of the test item, which causes a feeling of familiarity. Westerman and Greene (1996, 1998) support their model by showing that when the revelation task is composed of numbers and the recognition test is done for words, they did not obtain a revelation effect. However, as was discussed previously, other studies did not replicate this result (Niewiadomski & Hockley, 2001).

2.2.1.2 Criterion-change based accounts of the revelation effect

Since some of the explanations of the revelation effect are closely related with the Signal Detection Theory (SDT) (Green & Swets, 1986; MacMillan & Creelman, 2004), a review of the SDT would be appropriate. Therefore, a theoretical background of SDT is given in Appendix A. As discussed in the theoretical background of the SDT, an increase in "old" judgments can be due to a change in memory sensitivity, d' or due to a criterion shift, an adoption of a liberal criterion. If the analysis of signal detection showed a smaller response bias value for items tested after the revelation task, it means that the participants adopted a more liberal criterion so that their bias for judgment of an item as old has increased.

To eliminate the confusion resulting from similar consequences of familiarity and bias explanations, Hicks and Marsh (1998) did not conduct standard yes-no recognition tests; instead they used a 2-AFC test. As was discussed in the theoretical background, forced-choice designs are proposed to be designs in which the criterion component of recognition decisions is eliminated, since participants base their decisions on the relative familiarity of the given items. Hicks and Marsh (1998) hypothesized that if the revelation effect was due to a more liberal criterion, there would not be a revelation effect in forced-choice recognition test. Hicks and Marsh (1998) applied some variations to increase the effect of familiarity such as using semantically similar targets and lures, using null trials and increasing the delay between the study and the test to reduce recollection component of recognition and to increase familiarity component. By increasing the delay, Hicks and Marsh (1998) proposed that the participants would have less conscious recollection for the studied items and they would have to base their judgments on familiarity. However, increasing the delay to decrease recognition may not be a right choice to test the affect of familiarity. Since Bernstein et al.'s (2009) findings showed that as the retrieval delay increased from 10 seconds to 20 seconds the effect of familiarity diminished. Even though Hicks and Marsh (1998) tried to increase the effect of familiarity, their results showed that when the possibility of a criterion-shift was eliminated no revelation effect and in some cases a reverse-revelation effect was found. Accordingly, Hicks and Marsh (1998) proposed that the revelation effect occured because of a decrement in familiarity caused by the activation of competing items after the revelation task, which decreased the signal-to-noise ratio and correspondingly led the participants to adopt a more liberal response criterion.

Niewiadomski and Hockley (2001; Hockley and Niewiadomski, 2001) also proposed that the revelation effect arises due to an adoption of a more liberal criterion level for test items. Niewiadomski and Hockley (2001) argued that if the revelation effect occurs due to an increment to familiarity as proposed by Westerman and Greene (1996, 1998) and LeCompte (1995) and Lou (1993), then participants exposed to two revelation tasks, should exhibit a greater revelation effect when compared to those who are exposed to only one revelation task.

Niewiadomski and Hockley's (2001) results showed that there was no difference in the revelation effect when recognition decision was preceded by one or two revelation tasks, which they used to reject familiarity-based explanations of revelation effect. Their SDT analysis showed that the criterion was more liberal for items that were revealed.

Niewiadomski and Hockley (2001)'s explanation for the revelation effect is based on working memory consumption by the revelation or problem solving task, which leads participants to adopt a more liberal-criterion level for test items. According to Baddeley's (2000) working memory model, the central executive which is the managing, decision making component of working memory (WM), allocates capacity to the subsystems of WM. Hence, dealing with the revelation task leaves less capacity for other tasks dealt at the same time.

To support their explanation of adoption of liberal bias, Hockley and Niewiadomski (2001) hypothesized that combination of very rare words and revelation should not have additive effects. Both very rare words and revelation cause liberal criterion change, so that when very rare words and common words are tested in the same list there would not be any further adoption of liberal bias for the very rare words. Hence, the revelation effect would not be observed for very rare words when they were presented together with common words. Hockley and Niewiadomski's (2001) results supported their hypothesis; a revelation effect was observed for common words, but not for very rare words in a mixed list test. The estimates of response bias showed that the criterion was more liberal for common words in the revelation condition, but it did not differ for the very rare words between intact and revelation condition.

2.2.1.3 A Combination of Decrement to Familiarity and a Criterion-Shift Account for Two Different Revelation Effects

Verde and Rotello (2004) and Major & Hockley (2007) suggested that different mechanisms underlie the revelation effect if the revealed item is the same as the recognized item and if the revealed item is not the same as the recognized item. If the revealed item is the same as the recognized item, the revelation effect is

because of a combination of a decrement to familiarity accompanied by an adoption of a liberal bias. If the revealed item is different, on the other hand, it is only because of adoption of a liberal bias.

Recent studies conducted by Verde and Rotello (2004) and Major and Hockley (2007) have also used 2-AFC tests to test revelation effect as Hicks and Marsh (1998) did. When the revealed item was the same as the test item a reduction in memory sensitivity similar to Hicks and Marsh's (1998) findings was observed, whereas when the revealed item was different than the tested item the revelation effect occurred due to a more liberal bias (Verde and Rotello; 2004, Major and Hockley; 2007). When there was a reduction in memory sensitivity it should also be accompanied by a reduction in response bias (Hicks & Marsh, 1998; Verde and Rotello; 2004) or by misattribution of familiarity (Hicks & Marsh, 1998), otherwise the results of an increment on both the hits and false alarms could not be explained.

2.2.1.4 The Revelation Effect for Autobiographical Memories

Until the work of Bernstein et al. (2002) the revelation effect was found to be limited to episodic memory judgments. Actually Bernstein et al.'s (2002) distinction between episodic memories and ABM in their article was recent memories and distant childhood memories respectively. They did not relate their findings with the SMS model proposed for ABM (Conway, 2005). Bernstein et al. (2002) wanted to find if solving an anagram in a sentence would make one more confident that the event described by the sentence was personally experienced as a child for autobiographic memories in a way similar to the way anagram solution affected episodic memories.

Bernstein et al. (2002) designed an experiment that consisted of a training phase and an experiment phase. In the training phase, a word was presented as an anagram in each sentence. Bernstein et al. (2002) stated that the anagrams in the training phase could not be solved with the help of the sentence context; they had to be solved according to a given rule (e.g. *went to the umoanitsn (2,3,1,5,7,4,6,9,8)*). Then in the experiment phase phrases from a Life Event Inventory (LEI) were presented. Half of the phrases were shown intact. In the remaining phrases one

word was presented as an anagram. The underlined words were presented as anagrams. The phrases in the experiment phase had more contextual cues (e.g. "broke a window playing ball") than the ones in the training phase (e.g "went to the mountains") so that the anagrams could be quickly solved even without using the rule for discovering them; however, this supposition was not tested empirically by Bernstein et al. (2002). For both the training phase and the experiment phase, the participants were to solve the anagram if the sentence contained one, and they had to indicate if the event described by the phrase happened to them before the age of 10 on an 8 point scale. The LEI ratings were significantly lower for intact sentences than for the sentences that contained an anagram. That is, as a result of solving an anagram the participants indicated more confidence that the event occurred in their childhood. Bernstein et al. (2002) stated that this showed that the revelation effect could be extended to remote memories and also to autobiographical memory.

When Bernstein et al. (2002) omitted the unconstrained training phase they observed no revelation effect. They argued that upon encountering an anagram in the training phase, which was presented in an unconstrained sentence the participants found the anagram solving task difficult. However, in the test phase, the anagrams were presented in constrained sentences; therefore, they could be solved very easily even without taking into account the rule to solve them. The quickness of solving these anagrams compared to the difficulty of solving the anagrams in the training part created a perception of discrepancy that produced an illusion of familiarity for the participants. Bernstein et al. (2002) suggested that people continuously evaluated their performances and the detected discrepancies in their performance. They concluded that the feeling of familiarity caused by the perception of this discrepancy was nonconsciously attributed to past experience and it was required for the revelation effect to occur in autobiographical memories.

Bernstein, Godfrey, Davison and Loftus (2004) aimed to test if autobiographical memory errors resulted from misattribution of familiarity. Bernstein et al. (2004) showed that the revelation effect was affected by the manipulation of how the participants processed words prior to unscrambling them by preexposing the words. Prior exposure to words would increase the fluency with

which those words were processed, which causes a feeling of familiarity. Bernstein et al. (2004) wanted to find out whether this familiarity would also increase the confidence in a person's childhood autobiographical memories. Their hypothesis was that when the source of the fluency was known, the participants would no longer misattribute familiarity to their childhood memories. Instead they would attribute the familiarity to the prior exposure, which happened in a sentence generation task about a child.

The participants were shown 48 words in the exposure phase and they were instructed in four consequent experiments to either count the vowels in these words or to visualize them or to generate a sentence about them or to generate a sentence about a child. Half of these words later appeared in the sentences in the test phase. The test phase contained 48-items from the Life Event Inventory. Half of these 48 sentences were shown intact and the other half contained an anagram. One half of the intact and anagram sentences, respectively, contained a word shown in the exposure phase. The word that was shown in the pre-exposure phase was the same word as an anagram in the anagram sentences. The remaining sentences contained words that were not shown in the exposure phase.

Bernstein et al. (2004) showed that the revelation effect depended on prior experience with the items used in the revelation task. When the prior exposure required only shallow processing, such as counting the vowels of the words, the revelation effect occurred for both old and new items. When the prior exposure required elaborate processing, such as visualizing the words or generating sentences about them, the revelation effect remained only for old items, and no revelation effect was observed for new items. When the prior exposure demanded participants to generate sentences about childhood, the revelation effect was eliminated for both old and new items, so that no revelation effect was observed. Bernstein et al. (2004) concluded that when the source of the fluency was obvious, the participants no longer misattributed the subjective familiarity to their childhood memories. Instead they attributed the fluency to the sentence generation task about a child, therefore, no revelation effect occurred. On the other hand, prior exposure by itself did not cause an increase in childhood autobiographical memory judgment confidence. It

increased confidence only when it interacted with a revelation task such as anagram solving. So Bernstein et al. (2004) showed that pure fluency could not be the reason for increasing a participant's confidence for a childhood memories occurrence. They used these results to support familiarity misattribution account for explaining the revelation effect for autobiographical memories.

Bernstein et al. (2009) examined if a revelation effect for autobiographical memories, which they have found earlier in Bernstein et al. (2002; 2004) studies, would also be found if anagrams were presented prior to LEI items. They presented either related anagrams or unrelated anagrams prior to making a confidence judgment about the occurrence of the event described by the LEI items and as a control condition they did not present anagrams. Their aim in conducting the research was to examine if the criterion-shift explanations of the revelation effect by using the SDT for episodic memory judgments could be applied to autobiographical memories as well. They manipulated the delay between solving an anagram and rating the LEI items, in the first experiment the delay was 10 seconds and in the second experiment it was 20 seconds. They argued that if solving an anagram affects the familiarity, then this effect should be transient and the results confirmed this argument. With a delay of 20 seconds the revelation effect found with a delay of 10 seconds disappeared. Since there can not be a way to check the veracity of ABMs by using a LEI, to be able to apply SDT for ABM, they have developed a mixture-model analysis by using a new SD mixture distribution model. According to the SD mixture model an unknown proportion *p* of the tested items corresponds to true events and accordingly *(1-p)* of the items correspond to false events. In accordance with the principles of SDT, familiarities of the true events and false events are d_t and d_f respectively. The combined familiarity distribution gathered all true and false events. The mixture distribution is composed of false events on the left, an overlapping part in the middle and true events on the right. The results of the mixture-model analysis indicated that the revelation effect occurred because of an illusion of familiarity (adoption of a more liberal criterion) when an unrelated anagram was presented, both because of an illusion of familiarity and a decrease in memory accuracy (decrease in d') when a related anagram was presented. This

explanation they offer for ABM is very similar to the explanations for the revelation effect for episodic memory (Hicks & Marsh, 1998; Verde and Rotello, 2004; Major and Hockley; 2007). Fluency resulting from solving unrelated anagrams may affect familiarity additively, while solving related anagrams may affect familiarity multiplicatively, indicating that solving related anagrams may enhance both the mean and the variability of the familiarity of items that have initially a higher familiarity compared to items that have an initially lower familiarity.

Bernstein et al. (2002, 2004) explained the revelation effect for autobiographical memories by familiarity misattribution caused by perception of discrepancy of the fluent processing. They claimed that neither Westerman and Greene (1998)'s global matching account nor Niewiadomski and Hockley (2001)'s criterion shift account explanations can explain their findings because, first of all, Bernstein et al. (2002) did not have a study list so that the activation of a whole study list was not possible. However, Bernstein et al. (2009) changed this viewpoint they held and they proposed a criterion shift account for the revelation effect for ABM when the revealed item was different than the tested item and a combination of a decrement to familiarity and a criterion shift account when the revealed item is same as the tested item. This explanation is consistent with the explanations offered for the revelation effect observed for episodic memory (Hicks & Marsh, 1998; Verde and Rotello, 2004; Major and Hockley; 2007).

2.2.2 Repetition Priming

Repetition priming refers to the process by which a prior exposure makes a memory more available or facilitates the perceptual processing of an item (Jacoby & Whitehouse, 1989; Tulving & Schacter, 1990). According to Jacoby & Whitehouse (1989), Whittlesea, Jacoby & Girard (1990) and Whittlesea (1993); prior processing increases fluency, which increases the automatic component of recognition, that is the familiarity of the processed item, and acts on the outcomes of recognition judgments nonconsciously even without a need for conscious recollection. Here the importance of fluency comes into play. If the source of the fluency is really a past experience, then the increase in familiarity due to fluency helps accurate memory

judgments. However, if the source of the fluency is not a past experience, but instead it is due to present processing of the physical properties of the item, and the source of it is not apparent, it is misattributed to past experience causing an incorrect memory judgment (Jacoby & Whitehouse, 1989; Whittlesea, 1993; Whittlesea, Jacoby & Girard, 1990).

The contribution of the nonconscious processing of familiarity to memory judgments is central to the attributional approach to memory (Kelley & Rhodes, 2002; Whittlesea, 1993). According to this approach, when we are making memory judgments, we are always making attributions. For instance greater fluency causes a sense of increased familiarity and this subjective familiarity is attributed to past experience in a task that requires a recognition judgment, unless the real source of fluency is obvious. Another important finding from studies investigating the role of fluency on recognition judgments is that it can also be misattributed to the attributes of the stimulus, if the task required from people is to make a judgments about famousness (Jacoby, Woloshyn & Kelley, 1989), pleasantness (Reber, Winkielman & Schwarz, 1998), truth (Reber & Scharwz, 1999), or distance (Alter & Oppenheimer, 2008).

To manipulate the awareness of the participants, Jacoby and Whitehouse (1989) used subliminal primes or supraliminal primes. They hypothesized that fluency of processing results in a feeling of familiarity, which would be attributed to past experience when subliminal primes were used, in other words, when the participants were unaware of the manipulation. However, if the participants were aware of the source of fluency, which was seeing the tested item before as a prime, they would discount the familiarity and would not misattribute it to past experience. To test this fluency hypothesis, Jacoby and Whitehouse (1989) conducted a study on episodic memory in which participants were first given a study list to be remembered for a recognition test and at retrieval they were either presented by prime words identical to the tested words or by a string of letters like xoxoxox subliminally for 50 msec. In this condition, the participants were more likely to give old judgments after the identical primes compared to when the exposure time of the primes were extended to 200 ms. The opposite results were obtained in this case.

When they changed the exposure times to 16 ms and 600 ms, respectively, the same results were obtained. The obtained results were consistent with the proposed hypothesis.

Whittlesea, Jacoby & Girard (1990) conducted a similar study also on episodic memories to test the attribution-based fluency account. Participants were presented a rapid list, and then at test they were shown target words and asked to decide if this word was repeated in the study list. Target words were shown either in light or heavy visual noise. After the experiment, the participants were questioned if they were aware of the manipulation of the clarity. Only the data from those participants who were unaware of the manipulation were analyzed. The results showed that participants were more likely to judge target words as repeated if they were presented in light visual noise compared to targets presented with heavy visual noise. If the participants were informed at the beginning of the experiment about the manipulation of clarity, the increase of repetition judgments for light masking disappeared. Therefore, the important factor in recognition judgments was not the fluent processing of the items but attribution of the fluency to repetition was required. When the participants were aware that the source of the fluency was presentation conditions at the time of test, they no longer misattributed it to past experience.

2.3 Overview of Literature Review

Fluency is defined as the subjective ease of processing an item (Jacoby, 1991; Jacoby, Kelley & Dywan, 1989; Jacoby & Whitehouse, 1989; Johnston, Dark & Jacoby, 1985; Lindsay & Kelley, 1996; Rajaram, 1993; Kelley & Rhodes, 2002; Oppenheimer, 2008; Whittlesea, 1993; Whittlesea & Leboe, 2000). Fluency is a factor that can have important effects on decision processes related to memory. Fluent processing that cannot be attributed to any obvious source is attributed to familiarity of the stimulus (Jacoby & Whitehouse, 1989; Whittlesea, Jacoby & Girard, 1990; Whittlesea, 1993; Bernstein et al., 2002; 2004).

The present study was conducted to show that fluency, which was found to change memory judgments or be a basis of memory illusions for episodic memories,

could also change confidence levels for autobiographical memories. (Whittlesea, Jacoby & Girard, 1990; Jacoby & Whitehouse, 1989; Whittlesea, 1993). Many studies conducted by using episodic memory (Jacoby & Whitehouse, 1989; Whittlesea, 1993; Whittlesea, Jacoby & Girard, 1990) support the viewpoint that a sense of subjective familiarity that results from fluent processing is misattributed to past experience. This is also one explanation for the revelation effect in autobiographical memories (Bernstein et al., 2002). If there was an obvious cause of fluent processing, the effect of misattribution disappeared. (Bernstein et al., 2004; Jacoby & Whitehouse, 1989; Whittlesea, Jacoby & Girard, 1990).

In the present study, the role of subjective familiarity arising from fluency on ABM judgments was tested by using two different manipulations, which were using a revelation task and repetition priming. In addition, the importance of fluency attributions for ABM judgments were investigated by manipulating the awareness of the source of fluency by using subliminal and supraliminal primes

For the revelation task there were two conditions. In one condition, corresponding to the revelation effect in which the target item is revealed in episodic memories (Watkins and Peynircioğlu, 1990; Peynircioglu and Tekcan, 1993; Verde & Rotello, 2004; Major & Hockley, 2007) and autobiographical memories (Bernstein et al., 2002; 2004; 2009), the revealed item was given in the sentence. In the second condition, corresponding to the revelation effect in which an unrelated item is revealed in episodic memories (Westerman & Greene, 1996; 1998; Verde & Rotello, 2004; Major & Hockley, 2007) and autobiographical memories (Bernstein et al., 2009), an unrelated item was presented before the sentence. For the condition when the revealed item was given in the sentence, familiarity misattribution hypothesis was tested. And for the condition an unrelated item was presented before the sentence, the global matching hypothesis (Westerman & Greene, 1996; 1998) and the criterion-shift hypothesis (Bernstein et al., 2009; Major & Hockley, 2007; Verde & Rotello, 2004) were tested. Both the global matching hypothesis and the criterion shift hypothesis could explain a revelation effect for this condition.

For the repetition priming experiments, the same familiarity misattribution hypothesis proposed for episodic memories (Jacoby & Whitehouse, 1989;

Whittlesea, Jacoby & Girard, 1990) and for autobiographical memories for the condition when the revealed item is given in the sentence (Bernstein et al., 2004) was tested. According to this hypothesis, presenting subliminal primes and consequently leading to fluent processing would cause a familiarity misattribution. Presenting the the verb of the LEI as subliminal prime would cause more fluent processing compared to a different verb. Therefore, an increase in confidence judgments when the subliminal prime was the same as the verb of the LEI would be expected. We would expect that the effect of misattribution to disappear if supraliminal primes were presented, making the cause of fluent processing obvious (Jacoby & Whitehouse, 1989; Whittlesea, Jacoby & Girard, 1990; Bernstein et al., 2004).

CHAPTER 3

EXPERIMENTS

3.1 INTRODUCTION

In the present study, the effect of fluency and subjective familiarity resulting from fluency on autobiographical memory judgments was tested by using two different tasks to manipulate fluency: Using a revelation task in Experiments 1 and 2; and repetition priming in Experiments 3 and 4. In Experiment 1 and 2, the familiarity misattribution hypothesis proposed by Bernstein et al. (2002; 2004) for the revelation effect for autobiographical memory judgments was tested by presenting a word in the LEI as an anagram. According to the familiarity misattribution hypothesis, manipulating fluency causes a subjective sense of familiarity, which in turn would be misattributed to past experience. Another condition of Experiment 1 and 2 was to present an unrelated anagram preceding the LEIs to test the global matching hypothesis and criterion-shift hypothesis. It has been found that different mechanisms underlie the revelation effect if the revealed item is the same as the recognized item and if the revealed item is not the same as the recognized item (Verde & Rotello, 2004; Major & Hockley, 2007). If the revealed item is the same, the revelation effect is the result of a combination of a decrement to familiarity accompanied by an adoption of a liberal bias (Verde and Rotello; 2004, Major and Hockley; 2007; Bernstein et.al, 2009). If the revealed item is different, on the other hand, it is only because of adoption of a liberal bias (Verde and Rotello; 2004, Major and Hockley; 2007, Bernstein et al., 2009). According to

the global matching hypothesis, an increase in activation of traces after a revelation task would cause an increase in confidence levels due to the addition of this activation to the activation of the recognized items (Westerman & Greene; 1996). Experiment 1 used a translation of the LEI used in Bernstein et al.'s (2004) study as the material. A modified LEI was constructed based on data collected by a questionnaire for selecting LEI sentences for Experiment 2.

In Experiments 3 and 4, the familiarity misattribution hypothesis that was proposed for the explanation of repetition priming studies in episodic memories (Jacoby & Whitehouse, 1989; Whittlesea, Jacoby & Girard, 1990) and for the revelation effect for autobiographical memory judgments (Bernstein et al., 2002; 2004) was tested for autobiographical memory judgments. In addition, the importance of fluency attributions according to familiarity misattribution hypothesis for autobiographical memory judgments was investigated by manipulating the awareness of the source of fluency. Subliminal and supraliminal primes were used for the unaware and aware conditions in Experiments 3 and 4, respectively.

3.2 EXPERIMENT 1

The first aim of Experiment 1 was to replicate Bernstein and others' (2002) finding that a revelation effect was possible in answering a LEI. In addition, a condition in which participants solved unrelated anagrams before seeing each LEI item was used. The replication was desirable because the data were collected from a sample that came from a different population that spoke a different language. The LEI was translated to Turkish for use with a sample of Turkish university students. Replicating Bernstein and colleagues' findings would not only show that the LEI worked in a similar way with a Turkish sample, it would also strengthen the support for the familiarity misattribution hypothesis that they proposed to explain their results. On the other hand, the addition of a condition in which anagrams were presented before rather than inside the LEI items, would test whether finding a revelation effect with an unrelated revelation task (Westerman & Greene, 1996; 1998; Verde & Rotello, 2004; Major & Hockley, 2007) would generalize to autobiographical memory. Observing such an effect would give support to the

global matching hypothesis. By the time we have conducted our research by using unrelated anagrams preceding the LEI items, Bernstein et al. (2009) published their research using this condition for autobiographical memories. They have proposed that the revelation effect for unrelated anagrams could be explained by an adoption of a more liberal criterion. Therefore, observing a revelation effect when unrelated anagrams are presented before LEIs would give support to both the global matching hypothesis and an adoption of a more liberal criterion hypothesis.

In Experiment 1 half the participants responded to LEI questions, half of which contained an anagram. Unrelated anagrams were presented before half of the LEI items for the other half of the participants. Higher ratings of confidence for sentences with anagrams than for sentences without anagrams would mean a revelation effect for autobiographical memories. Finding a revelation effect with anagrams in the LEI sentences would support the familiarity misattribution explanation. On the other hand, a revelation effect with unrelated anagrams presented before the LEI items would provide support for the global matching and an adoption of a more liberal criterion hypothesis.

3.2.1 METHOD

3.2.1.1 Design

The design was a 2(presence of anagram) x 2 (position of anagram) x 2 (counterbalancing group) factorial design. The data were analyzed in a 2x2x2 ANOVA in which counterbalancing group and position of anagram were between-participants variables and presence of anagram was a within-participant variable.

3.2.1.2 Participants

The participants were Middle East University students or graduates who participated voluntarily. A total of 92 participants were tested, 46 for each group. The participants' age range was 18 to 35. The mean of age of participants was 25.

3.2.1.3 Materials

The material used for this study was a Turkish translation of the LEI statements used in Bernstein and others' (2002) study. Both the translated LEI and the original are given in Appendix B. Minor changes were made in the translation so that the events would be appropriate for Turkey and the conditions of Turkey approximately 15 years ago. The anagrams in the LEIs were the Turkish counterparts of the words used as anagrams in Bernstein et al. (2004)'s study.

For the condition when anagrams were presented in the LEI items, there were 15 sentences in the training phase, which preceded the 48 LEI items in the experimental phase. The sentences in the training phase of this condition were constructed to give little contextual information for the solution of the anagram. An example for the training phase sentences was "[ndamıaşay] yönlendirildiniz. [2 3 1 5 7 4 6 9 8]", which was found to be "Danışmaya yönlendirildiniz" after solving the anagram.

For the condition when unrelated anagrams were presented before the LEI items, the training phase consisted of 15 anagrams. The training phase was followed by the experimental phase in which the same 48 LEI items with anagrams in them were used, only, all words were intact in this case. The anagrams in the training phase and the experimental phase were chosen from among the most frequent eight letter words of a dictionary of word frequency of written Turkish (Göz, 2003). All the infinitives, which were the first 20 most frequent words, were excluded. This elimination was done because infinitives in Turkish ended with the same suffix "-mek" or "-mak".

The anagram solution rule was the same rule as used in Bernstein et al. (2002), which was [2 3 1 5 7 4 6 9 8]. This rule indicated that the second letter of the anagram was the first letter of the desired word and the third letter of the anagram was the second letter of the word and the first letter of the anagram was the third letter of the word and so on. For example, if the anagram and the rule was given as: [tisyaosn] [2 3 1 5 7 4 6 9 8]. The target word was "istasyon". The same rule was given to all the anagrams in the training phase and the experiment phase.

Bernstein and others' (2002) LEI was divided into two for counterbalancing purposes. The first half of the LEI (see Appendix B) was presented with an anagram to one group of participants while the second half of the LEI was given with an anagram to the second group of participants. The sentences were ordered randomly for each participant in the experiment phase.

3.2.1.4 Procedure

Each participant was tested individually in the Cognitive Science Psychology Laboratory. The instructions were presented to the participants on an instruction sheet and anything that was not understood was explained by the experimenter. The participants were given a sheet of paper to write the solutions of the anagrams and all the other responses were to be given using the keyboard.

The participants were assigned randomly to one of the two groups that differed in the placement of the revelation task at the time they responded to the LEI items. Each group was further divided into two parts in order to counterbalance the LEI items that involved the revelation task and those that did not.

Participants completed the training phase followed by the experiment phase. They wrote the solutions to the anagrams on a response sheet during both phases of the experiment. They indicated whether the event that was described by the sentence had happened to them before age of 10 by using an 8-point scale during the experiment phase. They were to enter a digit between 1 to 8 from the keyboard: "1" indicated they were absolutely sure that the event did not happen to them before age of 10 and "8" indicated they were absolutely sure that the event happened to them before age of 10. After entering a value between 1 and 8 the prompt "Press any key on the keyboard to proceed to the next question" was seen. The participants were told that if they wanted to take a break or ask a question they should do it only when this prompt was on the screen. The experiment phase consisted of 48 LEI items. The experiment was carried on by using Super Lab Pro for Windows Software.

3.2.2 RESULTS and DISCUSSION

The average ratings for LEI items with and without anagrams were calculated for each participant. Average ratings for all groups in the experiment for these two conditions are given in Table 1. These ratings were analyzed in a 2x2x2 ANOVA. (The complete ANOVA table is given in Appendix J.) The only significant effect in the 2x2x2 ANOVA was the interaction of presence of anagram and the counterbalancing group, $F(1,88) = 52.07$, $p<.001$, $\eta^2=.372$. Tukey's Honestly Significant difference based on the error term of the interaction was .266, which indicated that there was no significant effect of revelation for either counterbalancing list. There was a significant revelation effect for one counterbalancing group only.

In order to see whether the revelation effect was observed with an anagram in the sentence and with an anagram before the sentence, the data from those two conditions were analyzed in separate ANOVAs. For the case when anagrams were presented in the sentence, there was a significant interaction of the presence of the anagram and the counterbalancing group, $F(1,44) = 29.68$, $p<.001$, $\eta^2=.403$. Tukey's HSD value based on the error term of the interaction was .386, which indicated that there was a significant revelation effect for the second list and there was no significant effect for the first list. For the case when anagrams were presented before the sentence, there was a significant of the presence of the anagram and the counterbalancing group, $F(1,44) = 22.50$, $p<.001$, $\eta^2=.338$. Tukey's HSD value based on the error term of the interaction was .266, which indicated that there was no significant effect of the revelation effect for neither the first nor the second list when the anagram was presented before the LEI items.

Table 1

Means (Standard Deviations) for Confidence Levels for Sentences with and without Anagrams in or before Sentences for Experiment 1

	Anagram in the Sentence		Anagram Before the Sentence		Mean	
	ANAG	**NO ANAG**	**ANAG**	**NO ANAG**	**ANAG**	**NO ANAG**
Group 1	3.890 [a] (.633)	3.208 [b] (.620)	4.026 [a] (.791)	3.600 [b] (.579)	3.958 [a] (.712)	3.404 [b] (.626)
Group 2	3.605 [b] (.852)	4.035 [a] (.963)	3.536 [b] (1.130)	4.051 [a] (.886)	3.570 [b] (.990)	4.043 [a] (.915)
Mean	3.747 (.756)	3.621 (.904)	3.781 (.996)	3.825 (.775)	3.764 (.880)	3.723 (.843)

Note: a indicates the confidence ratings mean for the sentences in the first list and b indicates the confidence ratings mean for the sentences in the second list

Failure to observe a revelation effect in Experiment 1 did not give a chance to test specific hypotheses about the causes of the revelation effect. The selection of the material was made through a more systematic procedure in Experiment 2 in an attempt to obtain interpretable results about the revelation effect.

3.3 EXPERIMENT 2

This experiment was conducted for two reasons: first to repeat Experiment 1 with LEI items screened according to some criteria that we expected would eliminate those items not likely to be affected by manipulations at the time the participants were questioned. The second purpose of this experiment was to test if the revelation effect found on autobiographical memories (Bernstein et al., 2002; 2004) is really due to a misattribution of familiarity caused by fluency as proposed by Bernstein et al. (2002, 2004) by examining the difficulty ratings of the anagrams presented in the training and experiment. We hypothesized that the half of the LEI items that led to a revelation effect should have been rated easier than the other half of the LEI items and the training phase sentences. We also expected that the rated difficulty should be positively correlated with the LEI ratings.

Because a revelation effect could not be found in the first experiment replicating the study of Bernstein et al. (2002), it was questioned if there was a problem with the material or method of the first experiment. If there was a problem with the material used as LEI, then it would be proper to find a way to select the material by a questionnaire. Therefore, a questionnaire was prepared to select an appropriate LEI for further research.

An examination of the confidence ratings for the occurrence of events described by the sentences in Experiment 1 revealed that for some of the sentences almost all of the participants gave a confidence rating of 1 or 8. That is, either most participants were certain that such an event happened to them or they were certain that such an event never happened to them. The memory judgments for the events described by the LEI items were simply not susceptible to the effects of retrieval manipulations. Therefore, a questionnaire was prepared to select the LEI items such that the participants would not give confidence ratings on the extremes. The events described by the LEI items had to be plausible but vague and not too salient. Therefore, to ensure the plausibility condition, participants were asked to rate the possibility that the event would happen to a child before the age of ten. Impossible events and events sure to happen to any child had to be eliminated. In addition, to ensure the vagueness condition, participants were asked to rate the possibility that the event would be remembered if it were to happen to a child before the age of ten. Events that were either unforgettable or impossible to remember if they happened should not be included.

3.3.1 METHOD

3.3.1.1 Design

The design was a 2(presence of anagram) x 2 (position of anagram) x 2 (counterbalancing group) factorial design. The data were analyzed in a 2x2x2 ANOVA in which counterbalancing group and position of anagram were between-participants variables and presence of anagram was a within-participant variable. For the follow-up study, the rated difficulty levels of the anagrams for the exercise

sentences, first list sentences and second list sentences were compared by a One-Way-ANOVA.

3.3.1.2 Participants

The participants were Atilim University or Middle East Technical University students or graduates who participated in the study voluntarily or for course credit. A total of 92 participants were tested, 46 for the condition when the anagram was given in the sentence and 46 for the condition when unrelated anagrams were presented before the sentences. The mean age of the participants was 23. In addition, 895 university students or graduates responded to a questionnaire that was used to select appropriate LEI items to be used in this experiment.

Fifty five Atilim University students participated in the follow-up study that examined the difficulty levels of anagrams used in Experiment 1. Sixty one Atilim University students participated in the study that examined the difficulty levels of anagrams used in Experiment 2.

3.3.1.3 Materials

The 163 sentences used as a questionnaire to select LEI items to be used in this study are given in Appendix C. The sentences were constructed by asking informally to a group of people what kind of events could have happened to a child before the age of ten. Three questions accompanied each of the 163 sentences. The questions asked for ratings of the probability of occurrence of the events for children who were younger than 10 years old, and the probability of remembering those events if they happened. The first question was "Did the event described by this sentence occur to you before the age of ten?", the second question was "What is the probability that such an event would have occurred to a child before the age of ten?" and the third question was "What would be the probability that you would remember this event if it occurred to you before the age of ten?"

Participants had to rate the first question on an 8-point scale 1 indicating that "I am sure that the event did not occur before the age of ten" and 8 indicating that "I am sure that the event did occur before the age of ten". They had to rate the second

and third questions on an 11-point scale. For the second question, the rating 0 indicated that “The probability of occurrence is zero” and the rating 10 indicated that “The probability of occurrence is 100%”. For the third question, the rating 0 indicated that “The probability of remembering is 0%” and the rating 10 indicated that “The probability of remembering is 100%”.

For the first question, which measured the confidence in the occurrence of the event, to select enough LEI items to be used in the main experiment, the number of participants who rated the questions as either 1 or 8 was set to maximum 380, which is 42.5% of the participants. For the second and third questions, which measured the probability of occurrence and remembering respectively, the mean of the rating should be between 4 and 7. Sixty six sentences that satisfied the following criteria were selected: to begin with, sentences that satisfied all three criteria were included. Then, the sentences that satisfied the first and the second or the first and the third criteria were added to these. Then the sentences that satisfied the first criterion only, and finally the sentences that satisfied both the second and third criteria were added. The 66 sentences selected from the questionnaire were divided into two lists randomly, such that each list contained an equal number of sentences that satisfied each of the combinations of the described conditions for selection.

The selected sentences are given in Appendix D. One of the words chosen in each sentence was replaced by its anagram. The LEI items with anagrams underlined are given in Appendix D. For the condition in which unrelated anagrams were presented before the LEIs, the anagrams in the training phase and the experimental phase were chosen from among the most frequent eight letter words of a dictionary of word frequency of written Turkish (Göz, 2003). All the infinitives, which were the first 20 most frequent words, were excluded. This elimination was done because infinitives in Turkish ended with the same suffix “-mek” or “-mak”.

For the follow-up study, the exercise and experiment sentences that were used for examining the difficulty levels of anagrams used in Experiment 1 are given in Appendix F. The exercise and experiment sentences that were used for examining the difficulty levels of anagrams used in Experiment 2 are given in Appendix G.

3.3.1.4 Procedure

The procedure was the same as the procedure of Experiment 1 except for the replacement the anagram solving rule, which was thought to be very easy [2 3 1 5 7 4 6 8] by a moderately harder rule [3 7 2 4 1 6 5 8].

For both conditions when the anagram was presented in or before the LEI items, counterbalancing was established the same way as it was in Experiment 1. The participants were randomly assigned to one of the conditions. Forty six of the participants were assigned to the condition in which anagrams were presented in the LEI sentences and the other 46 to the condition in which unrelated anagrams were presented before the LEI items, so each counterbalancing condition had 23 participants.

For the follow-up study, the explanations on how to solve the anagrams were given in the instruction sheet and it was also explained by the experimenter. Participants were told to rate the difficulty level of each anagram in the answer sheet after they solved the anagram and then to rate their confidence that the event occurred. Difficulty levels of the anagrams were to be rated on a 10-point scale; "1" indicated that for the participant the anagram was very easy to solve and "10" indicated that for the participants the anagram was very difficult to solve.

The instructions about how to fill in the questionnaire is given in Appendix F and Appendix G for Experiment 1 and for Experiment 2 respectively. The answer sheet for the questionnaires is given in Appendix I.

3.3.2 RESULTS and DISCUSSION

The average ratings for LEI items with and without anagrams were calculated for each participant. Average ratings for all groups in the experiment for these two conditions are given in Table 2. These ratings were analyzed in a 2x2x2 ANOVA. (The complete ANOVA table is given in Appendix K.) The significant effects in the ANOVA were the main effect of the presence of the anagram, $F(1,88)=6.31$, $p<.05$, $\eta^2=.067$, the interaction of presence of anagram and the counterbalancing group, $F(1,88)= 12.04$, $p<.001$, $\eta^2=.120$, and the triple interaction $F(1, 88) = 5.75$, $p<.05$, $\eta^2= .061$.

Table 2

Means (Standard Deviations) for Confidence Levels for Sentences with and without Anagrams in or before Sentences for Experiment 2

	Anagram in the Sentence		Anagram Before the Sentence		Mean	
	ANAG	**NO ANAG**	**ANAG**	**NO ANAG**	**ANAG**	**NO ANAG**
Group 1	3.951 [a] (,991)	4.600 [b] (1,025)	4.592 [a] (1,200)	4.799 [b] (1,288)	4.271 [a] (1,136)	4.700 [b] (1,155)
Group 2	4.928 [b] (1,196)	4.737 [a] (1,109)	4.654 [b] (,793)	4.708 [a] (,888)	4.791 [b] (1,013)	4.722 [a] (,994)
Mean	4.439 (1,193)	4.668 (1,058)	4.623 (1,006)	4.753 (1,095)	4.531 (1,101)	4.711 (1,072)

Note: a indicates the confidence ratings mean for the sentences in the first list and b indicates the confidence ratings mean for the sentences in the second list

The main effect of presence of anagram indicated that participants gave higher confidence ratings for sentences without an anagram (M=4.711) when compared to confidence ratings for sentences with an anagram (M=4.532). The ratings with anagrams in the LEI sentences and anagrams before the LEI sentences were analyzed in separate 2x2 ANOVAs. For the case when anagrams were presented in the sentence there was a significant interaction of the presence of the anagram and the counterbalancing group, $F(1, 44) = 16.79$, $p<.001$, $\eta^2=.276$. Tukey's HSD value based on the error term of the interaction was .389, which indicated that there was a significant effect of revelation for the first list and there was no significant effect for the second list. Solving an anagram in the sentence led to lower ratings compared to no anagrams for sentences in the first list, which was a reverse revelation effect, but there were no significant differences for sentences in the second list. For the case when anagrams were presented before the sentence, there was no significant interaction of the presence of the anagram and the counterbalancing group, $F(1, 44) = .059$, $p=.447$, $\eta^2=.013$.

The average difficulty ratings of the training, the first list and the second list sentences were compared in a one-way ANOVA. The average difficulty ratings of the training, first list and second list sentences for Experiment 1 and Experiment 2

are given in Table 3. For the material of both experiments, there were significant differences in the difficulties of the anagrams, $F(2,60)= 10.30$, $p<.01$, for Experiment 1, $F(2, 78) = 9.17$, $p<.01$, for Experiment 2. Dunnett's post-hoc test, which was used because variances were not equal, revealed that exercise sentences were found to be harder than both lists. However, there was no difference between the difficulty levels of the anagrams in the first list and the second list. These findings could not explain the absence of a revelation effect for one list and a reverse revelation effect for the other list.

Table 3

Means (Standard Deviations) for Difficulty Ratings of the Training, First list and Second List Sentences for Experiment 1 and Experiment 2

	Experiment			
List	Experiment 1		Experiment 2	
	Anagram Difficulty	Number of items	Anagram Difficulty	Number of items
Training Sentences	1.766 (.351)	15	1.915 (.380)	15
List 1	1.382 (.299)	24	1.623 (.473)	33
List 2	1.343 (.271)	24	1.434 (.185)	33

The correlations between LEI ratings in Experiment 1 and Experiment 2 and the subjective rating of anagram difficulty were calculated to see if the subjective difficulty levels of the anagrams, that is, how fluently the anagrams were solved, were related to the confidence level ratings of the LEI items. The results showed that there was no significant correlation between the confidence ratings when anagrams were given in LEI items and the subjective level of difficulty, ($r= .041$). Furthermore, the correlation between responses to LEI items presented without an

anagram in the case they were accompanied by sentences that contained anagrams and in the case they were accompanied by sentences preceded by anagrams was .754. This correlation should be larger since there is no difference in the LEIs except for the other half of the LEI items with which they were presented.

The results we obtained indicate that the revelation effect could not be obtained for autobiographical memories in Turkish when anagram solving was used as a revelation task. This could suggest that anagram solving was not an appropriate revelation task for the revelation effect to be observed in Turkish. One of the reasons could be that anagram solving in Turkish was not perceived as difficult enough to result with a sense of unexpected fluency, which would cause heightened familiarity. In further studies revelation tasks other than anagram solving could be used to test for misattribution of familiarity caused by fluency.

3.4 EXPERIMENT 3

The aim of this experiment was to test the familiarity misattribution hypothesis with an approach other than the revelation effect, which was subliminal repetition priming. Our hypothesis was that participants would give higher confidence ratings for sentences, which were preceded by primes that matched the verbs of the sentences when compared to sentences, which were preceded by irrelevant prime verbs. This hypothesis was based on the familiarity misattribution caused by fluency approach (Jacoby & Whitehouse, 1989; Whittlesea, 1993; Whittlesea, Jacoby & Girard, 1990). Since the participants were exposed to primes subliminally, they would process the sentences that contain the primes as verbs more fluently, but they would misattribute this fluency to the actual occurrence of the events. To the researchers' knowledge, the effect of subliminal priming on autobiographical memory has not been used in previous research. The expected result of greater confidence ratings for sentences preceded by the same primes compared to sentences preceded by unrelated primes, would show that the fluency generated by subliminal primes could also be misattributed to past experience for autobiographical memories.

3.4.1 METHOD

3.4.1.1 Design

The design was a 2 (matching between the prime with the verbs of the sentence) x 2 (counterbalancing group) factorial design. The data were analyzed in a 2x2 mixed ANOVA in which the matching of the prime with the verbs of the sentence was a within-participants variable and counterbalancing was between-participants variable.

3.4.1.2 Participants

The participants were Atilim University students who volunteered to participate. A total of 80 participants were tested. The participants' age range was 17 to 26. The mean age of the participants was 22. All participants were tested individually.

3.4.1.3 Materials

The LEI items used for this study were selected from the LEI items used in Experiment 2. There were some sentences, which ended with the same verbs. Therefore, one of each pair of sentences, which had the same verb ending was discarded. After removing 10 sentences from the LEI used in Experiment 2, all of the sentences ended with distinct verbs and 56 sentences were used in this study. The material used for this study is given in the Appendix H.

3.4.1.4 Procedure

Participants were first exposed to a verb before the presentation of each LEI item for 35 ms between a premask and a postmask, which consisted of &&&&&&&&&&&, presented for 75 ms. The verb was either the same as the verb of the LEI item or an unrelated verb that did not match the verb of that sentence. The sentences primed by related and unrelated verbs were counterbalanced across participants. The same counterbalancing that was used in Experiment 2 was applied. After the presentation of each prime between masks a sentence was displayed on the screen. The participants were to give a confidence rating for the occurrence of the

event described in the sentence. They were to enter a digit between 1 to 8 from the keyboard: "1" indicated that they were absolutely sure that the event did not happen to them before age of 10 and "8" indicated that they were absolutely sure that the event happened to them before age of 10.

3.4.2 RESULTS and DISCUSSION

The average ratings for LEI items after identical primes and unrelated primes were calculated for each participant. Average ratings for all groups in the experiment for these two conditions are given in Table 4. These ratings were analyzed in a 2x2 ANOVA. (The complete ANOVA table is given in Appendix L.) The significant effects in the ANOVA were the match of the prime main effect, $F(1,78)= 6,620$, $p<.05$, $\eta^2=.078$, and the interaction of the match of the prime and the counterbalancing group, $F(1,78)= 5,215$, $p<.05$, $\eta^2=.063$. The main effect of the prime indicated that participants gave higher confidence ratings for sentences when the prime was the same as the verb of the sentence ($M= 4,668$) when compared to confidence ratings for sentences with unrelated primes ($M= 4,466$). Tukey's HSD based on the error term of the interaction was .293. The difference between responses after identical primes and unrelated primes did not reach significance for either one of the counterbalancing lists taken singly by this value.

Table 4

Means for Confidence Levels for Sentences preceded by Same or Unrelated Primes

	Same Prime	Unrelated Prime	Mean
Group 1	4,783 [a] (,884)	4,401[b] (1,025)	4,592
Group 2	4,530 [b] (1,058)	4,553 [a] (1,186)	4,542
Mean	4.668 (,976)	4,466 (1,103)	

Note: a indicates the confidence ratings mean for the sentences in the first list and b indicates the confidence ratings mean for the sentences in the second list

These results indicate that when the participants were unaware of the source of fluency, which was caused by being exposed to subliminal primes, they misattributed the familiarity caused by this fluency (Jacoby & Whitehouse, 1989; Whittlesea, 1993; Whittlesea, Jacoby & Girard, 1990) to the occurrence of the events described by the sentences. These results were important for autobiographical memory research since they provided further support to the other studies (Bernstein et al., 2004), which showed that autobiographical beliefs about the occurrence of events in distant past are subject to distortion without the person's awareness.

3.5 EXPERIMENT 4

People do not misattribute familiarity due to fluency to past experience and they correctly attribute it to the source of fluency if people are aware of the source of the fluency according to the familiarity misattribution hypothesis. Fluency was manipulated in a way that the source of fluency was made obvious to the participants in this experiment in order to test a further prediction of this hypothesis. Primes were presented for 200 ms; hence, they were not subliminal any more. We expected that, with primes exposed for 200 ms, just like Jacoby and Whitehouse's (1989) findings for episodic memories, average confidence levels would be the same regardless of the relation of the prime to the sentence because the participants were aware of the source of the familiarity, which was seeing the verb as a prime before the sentence. Therefore, they would not misattribute this familiarity to the occurrence of the event. Such results would be the first replication of the effects of sub- and supraliminal priming on judgments of episodic recognition (Jacoby & Whitehouse, 1989; Whittlesea, 1993; Whittlesea, Jacoby & Girard, 1990) with autobiographical memories for the first time.

3.5.1 METHOD

The design was a 2 (matching of the prime with the verbs of the sentence) x 2 (counterbalancing group) factorial design. The data were analyzed in a 2x2 mixed ANOVA in which the matching of the prime with the verbs of the sentence was a within-participants variable and counterbalancing was between-participants variable.

The participants were Atilim University students who participated voluntarily. A total of 80 participants were tested. The participants' age range was 18 to 25. The mean age of the participants was 23. All participants were tested individually. The materials used were the same as the materials used in Experiments 3, which are given in Appendix H. The procedure was the same as the procedure used in Experiment 3, except that the participants were exposed to the primes for 200 ms instead of 35 ms.

3.5.2 RESULTS and DISCUSSION

The average ratings for the LEI items after identical primes and unrelated primes were calculated for each participant. Average ratings for all groups in the experiment for these two conditions are given in Table 5. These ratings were analyzed in a 2x2 ANOVA. (The complete ANOVA table is given in Appendix M.) There were no significant effects in the ANOVA. The results for the match of the prime main effect is, $F(1,78)= 1.208$, $p=.28$, $\eta^2=.015$, and the interaction of the match of the prime and the counterbalancing group is, $F(1,78)= .750$, $p=.39$, $\eta^2=.010$.

Table 5

Means for Confidence Levels for Sentences preceded by Same or Unrelated Primes

	Same Prime	Unrelated Prime	Mean
Group 1	4,563 [a] (,937)	4,584 [b] (,986)	4,574
Group 2	4,681 [b] (,823)	4,854 [a] (1,178)	4,768
Mean	4,622 (,878)	4,719 (1,088)	

Note: a indicates the confidence ratings mean for the sentences in the first list and b indicates the confidence ratings mean for the sentences in the second list

The absence of the main effect of the match of the prime indicated that participants did not give higher confidence ratings for sentences when the prime was the same as the verb of the sentence when they were aware of the presentation of the prime (*M*= 4,622) compared to confidence ratings for sentences with unrelated primes (*M*= 4,719).

The results were consistent with the proposed hypothesis, which stated that if the participants were aware of the source of fluency, they would not misattribute the familiarity caused by this fluency to past experience (Jacoby & Whitehouse, 1989; Whittlesea, 1993; Whittlesea, Jacoby & Girard, 1990). These results are important since they show that the familiarity misattribution account proposed for episodic memories held for autobiographical beliefs about the occurrence of the events also. That is, if people process information about events that could have happened to them more fluently without being aware of the source of fluency, they incorrectly attribute this fluency to having experienced that event in the past. This illusion can be eliminated by making the source of fluency available to people.

CHAPTER 4

GENERAL DISCUSSION

The present study involved manipulations done at retrieval to find out if they would affect participants' confidence judgments about autobiographical memories using a LEI. The manipulations were using a revelation task and repetition priming. The revelation task consisted of solving an anagram that could be solved either as a word of an LEI item or as an unrelated word before the item. For the repetition priming task, either the verb of the sentence or a different verb was presented as a prime between masks before the presentation of the LEI items either subliminally or supraliminally.

Revelation was one of the manipulations used in order to alter fluency in the experiments reported in this thesis. The revelation effect for autobiographical memories using an anagram in the sentence had been already observed by Bernstein et al. (2002; 2004). In both Experiment 1 and 2 of the present study we could not find a revelation effect; in other words failed to replicate Bernstein et al.'s (2002; 2004) findings.

There may be several reasons why we did not find a revelation effect. First, it can be because of the content of the LEI used. After conducting Experiment 1 by using the same LEI as Bernstein et al. (2004) used, we considered the possibility that the inconsistent results we obtained could be because the majority of the of LEI items were rated at either end of the scale by most of the participants. The LEI ratings indicated that the participants were confident about the occurrence or the non-occurrence of the events. However, Bernstein and others (personal communication) had also found that for many of the LEI items their participants'

responses were at the extremes. Even selecting LEI items that were rated at medium values of plausibility and confidence in Experiment 2 did not produce a revelation effect. Therefore, we can suggest that the absence of the revelation effect may not be due to the LEI items used.

Bernstein et al. (2004) proposed that when the exercise sentences were removed from the study, the revelation effect disappeared, because the subjective feeling of familiarity caused by more fluent processing during the experiment phase compared to the exercise phase was eliminated. We found that the participants found the anagrams in the exercise phase more difficult compared to exercise phase sentences, as would be expected. However, a revelation effect correlated with this difference was not observed. Maybe the difficulty ratings were not indicative of an unexpected fluency because an inspection of the subjective difficulty ratings revealed that for most of the participants, only the first three of the exercise sentences were found difficult. And this may not be enough to cause an expectation that anagram solving is a difficult task, because there was not a sudden change in subjective difficulty of anagram solving when they encountered the experiment phase. However, we do not know how difficult Bernstein et al.'s (2002, 2004) participants found the exercise sentences, because there was not a measurement of subjective difficulty of anagram solving in their studies; Bernstein et al. (2002, 2004) just inferred the difficulty of the exercise sentences, by removing them. Possibly their participants found all of the exercise sentences difficult, and for them there was a sudden change in the difficulty level of anagram solving when they passed on to the experiment phase, which caused a revelation effect.

A second possibility is that, for fluent processing to cause a subjective feeling of familiarity and consequently for familiarity misattribution to operate, the participants should not be aware of the source of fluency (Bernstein et al., 2004; Jacoby and Whitehouse, 1989, Whittlesea, 1993; Whittlesea, Jacoby & Girard, 1990). A revelation effect may not have been observed because our participants were aware of the source of fluency. In other words, in the experiment phase when they solved the anagrams fluently, they may have concluded that these anagrams could be solved very easily since the sentences had contextual cues. Therefore, our

participants presumably did not misattribute this subjective familiarity arising from the fluency to the occurrence of the events (Bernstein et al., 2004; Jacoby and Whitehouse, 1989, Whittlesea, 1993; Whittlesea, Jacoby & Girard, 1990).

As a third possibility, anagram solving may not be an appropriate task to bring out a revelation effect for autobiographical memories in Turkish. Turkish is a post-agglutinative language with determined suffixes to form new words (Kornfilt, 1997). Also, since the role of the Turkish words in the sentence depends on the suffixes they have, according to the role of the word the corresponding suffix can be found very easily by a native speaker. Due to these properties, the anagrams in Turkish were presumably solved more easily than their counterparts in English. Therefore, anagram solving in Turkish may be an easier task compared to English. As was proposed by Bernstein et al. (2002, 2004, 2009), anagram solving first should be experienced as dysfluent and a nonconscious expectation, suggesting that anagram solving is a hard task should be formed. However, due to the fluent processing of Turkish anagrams, this nonconscious expectation may not emerge at all. Therefore, Turkish participants may not have an unexpected fluent processing for the anagrams in the experiment phase, since they already have an expectation that anagram solving is an easy task.

As was mentioned in Bernstein et al. (2002) the effect was a small effect, Bernstein et al. (2002) reported that the increase in confidence level was 0.28 on an 8-point scale corresponding to Cohen's d = .33, which is a small to medium effect size. Due to this weakness of the effect it may be arising due to certain conditions, therefore, could be replicated in the same laboratory (Bernstein et al. 2002; 2004; 2009). And the revelation effect presumably could not be replicated in our laboratory due to the absence of these certain conditions and reasons not defined, since apart from Bernstein et al. (2002; 2004; 2009), there is no other reports of finding and replication of a revelation effect for ABM.

The second manipulation we used in order to manipulate fluency was repetition priming. Fluent processing created by subliminal primes was expected to be misattributed to past experience, which in turn caused familiarity, because its source was not known (Jacoby & Whitehouse, 1989; Whittlesea, 1993; Whittlesea,

Jacoby & Girard, 1990). Subliminally presented primes that matched the verbs of the sentences caused an increase in the confidence levels of the judgment of the occurrence of the childhood event described by the LEI item compared to the non-match primes. This finding indicates that familiarity misattribution caused by fluency can also be found for episodic memories, which are connected to the highly structured autobiographical knowledge base composed of the personal semantic knowledge (Conway and Playdell-Pierce, 2000; Conway, 2005; Cabeza & Jacques, 2007; Kopelman, 1994; Kopelman, Wilson & Baddeley, 1989; Levine, 2004; Murphy et al., 2008). Accordingly, the results of the present study showed that fluency misattributions in episodic memory judgments (Jacoby & Whitehouse, 1989; Whittlesea, 1993; Whittlesea, Jacoby & Girard, 1990) can be extended to episodic memories (Bernstein et al., 2002; 2004; 2009; Garry et al., 1996; Sharman et al., 2004). Finding similar results for recognition decisions for both recent and remote episodic memories, point out that the same processes may be acting for both of them. According to the dual process model of recognition these processes are recollection and familiarity.

The results we obtained also replicated previous findings, which indicated that fluency itself was not sufficient to cause a memory illusion (Jacoby and Whitehouse, 1989, Whittlesea, 1993; Whittlesea, Jacoby & Girard, 1990; Bernstein et al., 2004). The source of the sense of subjective familiarity that accompanies fluent processing should not be obvious so that it would be misattributed to past experience. Otherwise, it could be attributed to its correct source (Jacoby and Whitehouse, 1989, Whittlesea, 1993; Whittlesea, Jacoby & Girard, 1990; Bernstein et al., 2004). Decisions we make about our memories are sometimes the results of nonconscious processing, which causes misattributions and the state of awareness during making these decisions affects the final outcome (Jacoby, Kelley & Dywan, 1989; Kelley & Rhodes, 2002; Jacoby and Whitehouse, 1989; Whittlesea, 1993; Whittlesea, Jacoby & Girard, 1990; Bernstein et al., 2004).

Another important implication of the results of the present study is that people are using fluency without being aware of using it as a kind of source to take advantage of when they are making any kind of judgment, such as a memory

judgment (Jacoby & Whitehouse, 1989; Whittlesea, 1993;) or a judgments about fame (Jacoby et al., 1989), beauty (Reber et al., 1998), distance (Alter and Oppenheimer, 2008), repetition (Whittlesea, Jacoby & Girard, 1990) or harmfulness (Song & Schwarz, 2009). When people are asked to make a memory judgment, whether it taps episodic memory for a list learned recently or the episodic memory component of ABM using LEIs for distant childhood memories, they nonconsciously use the fluency of processing as a source available for their memory judgments. When something is processed fluently before making a memory judgment, the first thing a person attributes this fluency to, albeit nonconsciously due to the processing of the automatic component of recognition, which is familiarity, but subjective familiarity in this case, is a past experience of the same event.

One conclusion we can derive from our results using LEI studies is that people should not be so confident about their memories because confidence levels about memories can be altered by factors such as fluency. Imagination inflation studies conducted by Garry, Manning, Loftus, and Sherman (1996); Sharman, Garry and Beuke (2004); Sharman and Barnier (2008) are examples to the increase in confidence judgments for distant childhood memories. Sharman et al. (2004) suggested that the increase in confidence judgments in imagination inflation was caused by more fluent processing of the imagined events as an explanation of the imagination inflation effect. As consistent with the proposed explanation for the revelation effect found for ABMs (Bernstein et al., 2002; 2004), Sharman et al. (2004) proposed that the sense of familiarity resulting from increased fluency was further misattributed to the occurrance of the events described by the LEI items.

Response to the LEI measures autobiographical belief. Findings with the LEI shed light on the recognition judgments and the role of belief for the most specific level of ABM in SMS model (Conway, 2005), which are distant episodic memories. This is also consistent with Mendelsohn et al.'s (2009) findings about distant memories. According to Mendelsohn et al (2009) recognition judgments for remote memories depend on personal-semantic knowledge rather than vivid recollection of events. Therefore, for remote memories, ABM retrieval becomes to depend on

personal schemata, which are more dependent on familiarity instead of vivid sensory details corresponding to recollection.

A facilitation effect that results from subliminal priming in autobiographical memory judgments brings a different insight to our knowledge about ABM, because it points out that when people are making a memory decision about their remote past experiences, they may base this decision more on the familiarity of the event, compared to recollection. Actually this suggestion points out that when people are making recognition judgments about their distant past, they may base this judgment more on the belief of the occurrence of the event compared to vivid recollection of the instance.

Further studies may be conducted on revelation effect for autobiographical memories. A revelation effect was not found for autobiographical memories by using anagram solving as the revelation task despite considerable effort. To test if anagram solving in Turkish was not an appropriate revelation task to cause a revelation effect for autobiographical memories, other revelation tasks such as presenting the letters of a word one by one or rotated words can be used. (Watkins and Peynircioğlu, 1990; Peynircioglu and Tekcan, 1993)

Further studies should be conducted to obtain converging evidence on the effect of familiarity misattribution on autobiographical memory retrieval. For example, sentences can be shown to participants with either heavy or light masks affecting the perceptual clarity of the sentence (Whittlesea, 1990). If the sentences with a heavy mask that are harder to read are given a lower rating compared to the sentences, which can be read easily, it would show that the proposed explanation of familiarity misattribution caused by fluency for autobiographical memories can be replicated. To test the importance of awareness in misattributions, another study can be conducted by informing the participants that some of the sentences are heavily masked while some of them are lightly masked. If the difference in confidence ratings disappears for heavily masked and lightly masked sentences, it would further be used as a proof of our hypothesis stating that when the participants are aware of the source of the fluency they no longer misattribute it to past experience; instead they correctly attribute it to the perceptual presentation of the sentences.

To find further evidence for the role of familiarity in ABM recognition, a remember/know procedure may be applied by using LEI studies. Rajaram (1993) has found that repetition priming using words increased the know responses compared to unrelated primes but did not affect the remember judgments in an episodic memory task. Rajaram (1996) concluded that an increase in know judgments corresponds to familiarity resulting from fluency. Similarly in the present study, by using a LEI, we have shown that there was an increase in confidence levels for the LEI items after the presentation of the same primes compared to different primes. We proposed that this increase was because of the subjective familiarity arising from fluent processing. Our results indicate that, similar to recognition judgments of recent episodic memories, recognition judgments of distant episodic memories, which are a part of the autobiographical knowledge base (Conway, 2005) are affected by familiarity. By conducting a study using a LEI and applying the remember/know procedure, consistent with Rajaram's (1996) findings, an increase in know judgments would be expected for items that shows an increase in confidence judgments, indicating the role of subjective familiarity in ABM recognition judgments.

To select an appropriate LEI to be used in the present study, an extensive questionnaire was administered to select a LEI. This is a contribution of the present study to memory research that can be conducted in Turkey, using a Turkish LEI.

As a concluding remark, misattribution of fluency can be one of the causes of false memories. Finding a fluency effect for autobiographical memories is especially important, since it shows that people's confidence judgments or beliefs about their memories can be changed by retrieval manipulations. The results of Experiment 3 and 4 showed that when people were not aware of the source of fluency, they could misattribute the familiarity caused by fluent processing to past occurrence. However, when the source of the fluency was obvious they did not make this misattribution. The implications of the results of the study is significant, since it shows that people's ratings of confidence in the occurrence of an event can be manipulated with the ease of processing of the memories to be remembered. However, there is one important factor for this manipulation to increase the

participants' confidence level for the occurrence of events, the participants must not be aware of the source of the fluency.

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APPENDICES

APPENDIX A: THEORETICAL BACKGROUND FOR SDT

According to the dual-process models of recognition, a person produces a positive or a negative recognition response by using one or both of two processes: familiarity and recollection (Yonelinas, 2002). Recollection is conscious recovery of an item, it is accompanied by detailed information such as when and how it was encoded, while familiarity is the assessment of processing fluency. Recollection can be described as a high-threshold retrieval process while familiarity can be described by signal detection theory (Yonelinas, 2002).

In a standard recognition memory test, first, participants are presented with a study list; let us assume a study list of 100 items, which are called “targets”. Then, a recognition test is given, in which there are the 100 targets and 100 more new items that were not presented in the study list. These new items are called “lures” or “foils”. The participants are required to recognize the study list items among all the 200 items. The participants make “old” judgments to the study list items and “new” judgments to lures. As presented in Table A1, if they correctly respond “old” to a study list item, that corresponds to a “hit”; if they correctly reject a lure, that corresponds to a “correct rejection”; if they incorrectly accept a lure as a target, that corresponds to a “false alarm” and if they incorrectly reject a target as a lure, that corresponds to a “miss”.

Table A1

The Stimulus-Response Matrix

	Respond Present Respond "Old"	Respond Absent Respond "New"
Stimulus Present or Target	HIT	MISS
Stimulus Absent or Foil	FALSE ALARM	CORRECT REJECTION

According to the SDT, the probability distributions of memory strength for targets and lures may be presented as in Figure A1:

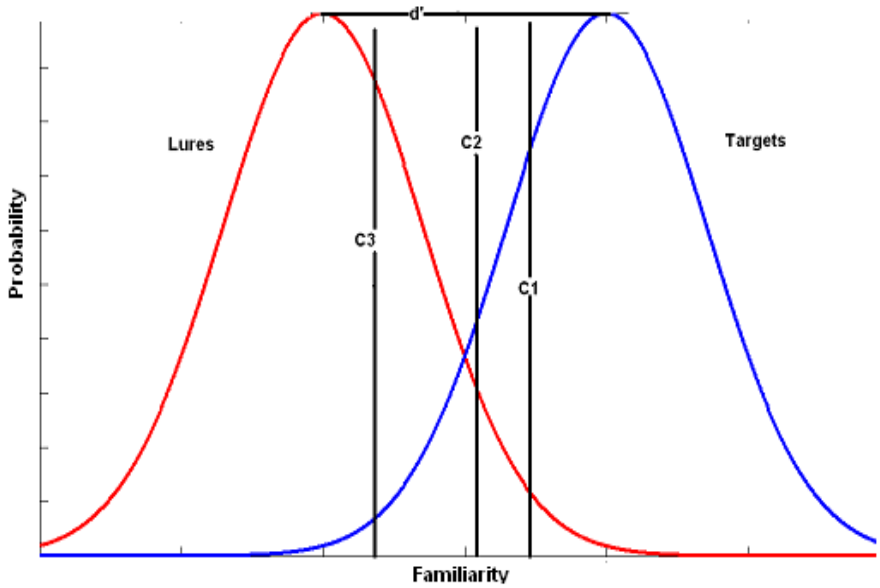

Figure A1. Signal Noise Distribution for the equal variance Gaussian case.

According to SDT models to account for the familiarity of recognition, there are two components that affect the recognition judgment. One component is the change in memory sensitivity or in other words familiarity distributions. The other component is the decision process, which changes according to the criterion that is set to give an old decision.

In signal detection model with normal distributions of equal standard deviations, *d'* is a discrimination index that measures the distance between the means of old and new distributions in units of standard deviation of the normal distributions. β and *C* are two measures of bias. β is the likelihood ratio that locates the decision criterion by the ratio of the heights of the old and new distributions corresponding to the targets and lures in Figure 1, and *C* is the intersection measure that locates the criterion by its distance from the midpoint of the means of the two distributions. A β value of less than one or a *C* value of less than zero indicates a liberal bias.

Discirimation index *d*' corresponds to memory sensitivity, that is, how well old items can be distinguished from new items in the recognition test. Let us consider the change in the output of old judgments as *d*' changes. If the distribution of the targets moves to the left closer to the distribution of lures or the distribution of the lures moves to the right closer to the distribution of targets in Figure 1, it would mean a decrease in d', which corresponds to a decrement in familiarity in recognition memory, the targets become harder to be discriminated from the lures such that the target distribution becomes similar to noise distribution, and there is a decrease in signal to noise ratio. On the other hand, if the target distribution moves to the right or if the lure distribution moves to the left, *d*' would increase, which would correspond to an increase in familiarity, such that the targets would be more easily discriminated from the lures.

If there is no change in the distributions of the targets and lures, it means that the change in the output of "old" judgments correspond to a criterion shift. If the participants adopt a liberal bias, the probability that they will judge an item as old will increase. Therefore, there will be an increase in both hits and false alarms in this case. However, if the participants adopt a more stringent criterion, the probability

that they will respond to an item as old will decrease, accompanied with a decrease in both hits and false alarms. Accordingly a shift from C2 to C1 in Figure 1 corresponds to adoption of a more stringent response bias, while a shift from C2 to C3 would correspond to adoption of a more lenient response bias.

In standard recognition memory tests, the participants respond to the tested items as old or new, and these kinds of tests are referred to as “yes-no” recognition tests. On the other hand, if the participants are given some choices among which they can choose the target word, which is called a forced choice tests. For instance if the participants are given two choices among which they can choose the studied item are called two-alternative-forced-choice (2-AFC) test. According to the SDT, forced choice tests differ from standard yes-no recognition tests due to their criterion-free nature. Participants in forced choice tests make their judgments according to the relative familiarity of the tested items. For example, in a 2-AFC test, the item that seems more familiar among the two choices would be given an old judgment.

APPENDIX B: LIFE EVENT INVENTORY FOR EXPERIMENT 1

Translated from Bernstein et al. (2004)

1. Hayvanat bahçesinde bir zürafa gördünüz.
2. Lunaparkta çarpışan arabalara bindiniz.
3. Bir yaz kampına katıldınız ve hasta oldunuz.
4. İlk defa harçlık aldınız.
5. Saçınıza sakız yapıştı.
6. Duvara pastel boyalarla resim yaptınız.
7. Birisinin kucağında otururken araba sürdünüz.
8. Bir düğüne katıldınız.
9. Sinemada uyuyakaldınız.
10. Eviniz soyuldu.
11. Top oynarken bir pencere camı kırdınız.
12. Yapmadığınız bir şeyin suçunu kendi üzerinize aldınız.
13. İlkokulda okumayı söktüğünüz için kırmızı kurdela kazandınız.
14. Manavda parasını ödemeden üzüm yediniz.
15. İtfaiyeyi gereksiz yere aradığınız için başınız derde girdi.
16. Bir köpek tarafından kovalandınız.
17. Annenize pasta pişirmesinde yardım ettiniz.
18. Güneş tutulmasına şahit oldunuz.
19. Anne babanız için bir yemek pişirdiniz.
20. Bir ağaçta mahsur kaldınız ve inmek için yardım almanız gerekti.
21. Parkta meşhur bir futbolcudan imza aldınız.
22. Gece geç vakitte hastaneye gitmek zorunda kaldınız.
23. Ayağınıza bir cam parçası saplandı.
24. Komşularınıza bir eşek şakası yaptınız.

25. Bisikletten düşüp burnunuzu kanattınız.

26. O kadar çok güldünüz ki, neredeyse boğuluyordunuz (katılıyordunuz).

27. Parmağınıza bir çekiçle vurdunuz.

28. Bir alışveriş merkezinde bir saati aşkın bir süre kayboldunuz.

29. Bir otoparkta 100 bin lira buldunuz.

30. Ocakta elinizi yaktınız.

31. Bir yabancıdan bozuk para istediniz.

32. Uçabildiğinizi hayal ettiniz.

33. Bir lunaparkta oyncak hayvan kazandınız.

34. Büyüyünce astronot olmak istediniz.

35. Meşhur bir televizyon karakteriyle bir otelde el sıkıştınız.

36. Bütün gece ayakta kaldınız.

37. Kafanızı çarpıp yaptığınız işi bırakmak zorunda kaldınız.

38. Ev hayvanınız evden kaçtı.

39. Küçük bir araba kazası geçirdiniz.

40. Bir deprem hissettiniz.

41. Gece evden kaçarken yakalandınız.

42. İnsan üstü güçleriniz olduğuna inandınız.

43. Stadyumda bir 1. Lig futbol maçı izlediniz.

44. Okul kafeteryasında yediklerinizden zehirlendiniz.

45. Bir doğumgünü partisinde bir içecek döktünüz.

46. Bir cankurtaran tarafından denizden çıkarıldınız.

47. Okulda yaramazlık yaptınız ve aileniz müdürle konuşmak zorunda kaldı.

48. Kardeşinizin yüzüne vurdunuz.

LIFE EVENT INVENTORY

Taken from Bernstein et al. (2004)

1. Saw a giraffe at the zoo
2. Won a blue ribbon at the fair
3. Went away for summer camp and got sick

4. Received your first allowance
5. Got chewing gum stuck in your hair
6. Wrote on the wall with crayons
7. Drove a car while sitting on someone's lap
8. Participated in a wedding
9. Fell asleep at the movies
10. Had your house robbed
11. Broke a window playing ball
12. Took the blame for something you did not do
13. Won a spelling bee at school
14. Ate grapes from grocery store before paying for them
15. Got in trouble for calling 911
16. Chased by a dog
17. Helped mother bake a pie
18. Witnessed a solar eclipse
19. Cooked a meal for your parents
20. Were stuck in a tree and had to get help down
21. Got autograph of a famous athlete at the park
22. Had to go to the hospital late at night
23. Got a sliver of glass in your foot
24. Played a practical joke on your neighbor
25. Fell off bicycle and got a bloody nose
26. Laughed so hard that you almost choked
27. Hit your finger with a hammer
28. Got lost in shopping mall for more than an hour
29. Found a 10$ bill in a parking lot
30. Burned your hand on the stove
31. Asked a stranger for spare change
32. Dreamed that you could fly
33. Won a stuffed animal at the carnival game
34. Wanted to be an astronaut when you grew up

35. Shook hands with favorite TV character at a theme resort
36. Stayed up all night
37. Hit your head and had to stop what you were doing
38. Had a pet run away from home
39. Got into a minor car accident
40. Felt an earthquake
41. Got caught sneaking out late at night
42. Thought you had super human powers
43. Saw a major league ball game
44. Got food poisoning from the school cafeteria
45. Spilled a drink at a birthday party
46. Had a lifeguard pull you out of the water
47. Got in trouble at school and had your parents speak with principal
48. Hit sibling in the face

APPENDIX C: QUESTIONNAIRE FOR SELECTING THE LIFE EVENT INVENTORY

Yaşınız:

Cinsiyetiniz:

AÇIKLAMALAR

Aşağıda yaşamış olabileceğiniz bazı olaylardan söz eden cümleler okuyacaksınız.

Her cümlenin altında

i) 10 yaşından önce sizin başınıza geldi mi?

ii) 10 yaşından küçük bir çoçuğun başına gelme olasılığı nedir?

iii) 10 yaşından önce böyle bir olay başınıza gelseydi hatırlanma olasılığı ne olurdu?

soruları bulunmaktadır.

Bu sorulara cevaplarınızı aşağıdaki cevap seçeneklerinden birini işaretleyerek belirtiniz.

Bu seçenekler arasında

i) "10 yaşından önce sizin başınıza geldi mi?" sorusu için

"1" 10 yaşımdan önce kesinlikle başıma **gelmedi.** ***ye karşılık gelmektedir.***

"8" 10 yaşımdan önce kesinlikle başıma **geldi.** ***ye karşılık gelmektedir.***

"2 ile 7 arasındaki değerler" Başınıza gelip gelmediğinden kesin emin olmadığınız olaylar için bu değerleri kullanınız. Olayın başınıza geldiğinden ne kadar eminseniz o kadar büyük bir sayı işaretleyiniz.

ii) "10 yaşından küçük bir çocuğun başına gelme olasılığı nedir?" sorusu için:

"0": %0 Başına gelme olasılığı hiç yoktur. ***a karşılık gelmektedir.***

"1": %10

"2": %20

"3": %30

"4": %40

"5": %50

"6": %60

"7": %70

"8": %80

"9": %90

"10": %100 Başına gelme olasılığı %100 dür. ***e karşılık gelmektedir.***

iii) "10 yaşından önce böyle bir olay başınıza gelseydi hatırlanma olasılığı ne olurdu?" sorusu için:

"0": %0 Hatırlanma olasılığı %0 dır. ***a karşılık gelmektedir.***

"1": %10

"2": %20

"3": %30

"4": %40

"5": %50

"6": %60

"7": %70

"8": %80

"9": %90

"10": %100 Hatırlanma olasılığı %100 dür. ***e karşılık gelmektedir.***

SORULAR (TEST)

1. Hayvanat bahçesinde bir zürafa gördünüz.

10 yaşından önce sizin başınıza geldi mi?

1 2 3 4 5 6 7 8

10 yaşından küçük bir çocuğun başına gelme olasılığı nedir?

0 1 2 3 4 5 6 7 8 9 10

10 yaşından önce böyle bir olay başınıza gelseydi hatırlanma olasılığı ne olurdu?

0 1 2 3 4 5 6 7 8 9 10

2. Lunaparkta çarpışan arabalara bindiniz.

3. Bir yaz kampına katıldınız ve hasta oldunuz.

4. İlk defa harçlık aldınız.

5. Saçınıza sakız yapıştı.

6. Duvara pastel boyalarla resim yaptınız.

7. Birisinin kucağında otururken araba sürdünüz.

8. Bir düğüne katıldınız.

9. Sinemada uyuyakaldınız.

10. Eviniz soyuldu.

11. Top oynarken bir pencere camı kırdınız.

12. Yapmadığınız bir şeyin suçunu kendi üzerinize aldınız.

13. İlkokulda okumayı söktüğünüz için kırmızı kurdela kazandınız.

14. Manavda parasını ödemeden üzüm yediniz.

15. İtfaiyeyi gereksiz yere aradığınız için başınız derde girdi.

16. Bir köpek tarafından kovalandınız.

17. Annenize pasta pişirmesinde yardım ettiniz.

18. Güneş tutulmasına şahit oldunuz.

19. Anne babanız için bir yemek pişirdiniz.

20. Bir ağaçta mahsur kaldınız ve inmek için yardım almanız gerekti.

21. Parkta meşhur bir futbolcudan imza aldınız.

22. Gece geç vakitte hastaneye gitmek zorunda kaldınız.

23. Ayağınıza bir cam parçası saplandı.

24. Komşularınıza bir eşek şakası yaptınız.

25. Bisikletten düşüp burnunuzu kanattınız.

26. O kadar çok güldünüz ki, neredeyse boğuluyordunuz (katılıyordunuz).

27. Parmağınıza bir çekiçle vurdunuz.

28. Bir alışveriş merkezinde bir saati aşkın bir süre kayboldunuz.

29. Bir otoparkta 100 bin lira buldunuz.

30. Ocakta elinizi yaktınız.

31. Bir yabancıdan bozuk para istediniz.

32. Uçabildiğinizi hayal ettiniz.

33. Bir lunaparkta oyuncak hayvan kazandınız.

34. Büyüyünce astronot olmak istediniz.

35. Meşhur bir televizyon karakteriyle bir otelde el sıkıştınız.

36. Bütün gece ayakta kaldınız.

37. Kafanızı çarpıp yaptığınız işi bırakmak zorunda kaldınız.

38. Ev hayvanınız evden kaçtı.

39. Küçük bir araba kazası geçirdiniz.

40. Bir deprem hissettiniz.

41. Gece evden kaçarken yakalandınız.

42. İnsan üstü güçleriniz olduğuna inandınız.

43. Stadyumda bir 1. Lig futbol maçı izlediniz.

44. Okul kafeteryasında yediklerinizden zehirlendiniz.

45. Bir doğumgünü partisinde bir içecek döktünüz.

46. Bir cankurtaran tarafından denizden çıkarıldınız.

47. Okulda yaramazlık yaptınız ve aileniz müdürle konuşmak zorunda kaldı.

48. Kardeşinizin yüzüne vurdunuz.

49. Sınıf arkadaşınızın kalemini beğenip izinsiz aldınız.

50. Annenizin yaptığı pastayı misafirler gelmeden yediniz.

51. Korku filmi seyredip gece karanlıkta kalmaktan korktunuz.

52. Babanızın cüzdanından habersiz para aldınız.

53. Babanızın hesabına yazdırıp bakkaldan veresiye alışveriş yaptınız.

54. Yazın arkadaşlarınızla kamp ateşi yaktınız.

55. Arkadaşınızı öğretmene şikayet ettiniz.

56. Yaramazlık yaptığınız için anneniz (ya da babanız) kulağınızı çekti.

57. Ailecek arabayla Akdeniz sahillerine gittiniz.

58. Evdeki çiçeklerin yapraklarını kopardınız.

59. Evde top oynadığınız için komşudan şikayet geldi.

60. Bahçede dört yapraklı yonca aradınız.

61. Tanımadığınız birisinin bahçesinden meyve kopardınız.

62. Merdivenlerden düşüp bacağınızı morartınız.

63. Okul bahçesinde arkadaşınızı kovalarken düştünüz.

64. Sahilden denizkabuğu topladınız.

65. Kiraz yerken çekirdeğini yuttunuz.

66. Şehirlerarası bir yolculuk yaparken arabanız bozuldu.

67. Bir ses kaydı yaptınız.

68. Paranızı kaybedip ağladınız.

69. Pantolonunuzun arkası yırtıldığı için çok utandınız.

70. Üzerinize sıcak çay döküp yandınız.

71. Radyoyu kurcalarken bozdunuz.

72. Birbirinin eşi olmayan farklı renk çoraplar giyip okula gittiniz.

73. Evinizde beslemek için civciv aldınız.

74. Sağınızla solunuzu karıştırırdınız.

75. Beslenme çantanızı evde unutup aç kaldınız.

76. Karlı bir günde yolda kayıp düştünüz.

77. Güneşte fazla kalığınız için başınıza güneş geçti.

78. Bir yerde kilitli kalıp çıkamadınız.

79. Sınıfça bir çocuk oyununa gittiniz.

80. Salıncaktan düşüp yaralandınız.

81. Pantolonunuzun paçalarını çamur yaptınız.

82. Evde yalnızken dış kapıyı açık bıraktınız.

83. Bıçakla elinizi kestiniz.

84. Evde bir eşyayı kırıp suçu kardeşinizin üstüne attınız.

85. Bir böcek öldürüp sonradan pişmanlık duydunuz.

86. Bir elektronik eşyayı bozup babanızdan sakladınız.

87. Makasla saçınızı kestiniz.

88. Sabah kalktığınızda yatağa çiş yaptığınızı gördünüz.

89. Birisi için yapılan doğumgünü pastasını parmaklayıp, bozdunuz.

90. Kısık ateşte pişmesi gereken bir yemeğin altını açıp yaktınız.

91. Çok sıcak bir yemeği soğumadan yiyip ağzınızı yaktınız.

92. Haşlanmış, sıcak bir yumurtayı alıp elinizi yaktınız.

93. Babanızın eve getirdiği iş ile ilgili bir evrakı renkli kalemlerle boyadınız.

94. Ütü masasının metal yerinde duran ütüyü çamaşırın üstüne koyup, çamaşırı yaktınız.

95. Tül perdeyi hızla asılıp kornejiyle birlikte yere düşürdünüz.

96. Annenize limon sıkmasında yardım etmek isterken sıkılmış bütün limonu döktünüz.

97. Tavada kızaran balıklara bakmak isterken, tavanın sapından tutup, bütün balıkları yere döktünüz.

98. Bir kediyi sevmek isterken kuyruğunu çektiğiniz için kedi tarafından tırmalandınız.

99. Lavaboda elinizi yıkamak isterken bütün üstünüzü ıslattınız.

100. Babanız arkadaşlarıyla rakı içerken, rakıyı su zannedip içtiniz.

101. Burun deliğinize leblebi sokup çıkaramadınız.

102. Ev ödevinizi yapmadığınız için öğretmeniniz tarafından cezalandırıldınız.

103. Balkondan oyuncaklarınızı aşağıya attınız.

104. Hasta numarası yapıp okula gitmek istemediniz.

105. Beden dersi için hazırladığınız eşofmanları evde unuttunuz.

106. Ödev yapmamak için bahaneler uydurdunuz.

107. Yukarı çıkan yürüyen merdivenlerden aşağıya inmeye çalıştınız.

108. İğne yapacağını düşündüğünüz için doktora gitmek istemediniz.

109. İlaçları şeker zannedip yediniz.

110. Portakalı çekirdeğiyle yediğiniz için içinizden portakal ağacı çıkacağını zannetiniz.

111. Bütün biberleri acı zannedip hiç biber yemediniz.

112. Başınıza naylon torba geçirip nefessiz kaldınız.

113. Kardeşiniz hastalandığı için telaşlanıp ağladınız.

114. Uyuyan kardeşinizi dürtüp onu uyandırdınız.

115. Ayakkabı boyasıyla ayakkabılarınızı boyamaya çalışırken üstünüzü başınızı boyadınız.

116. Gece kabus görerek uyanıp annenizin babanızın odasına gittiniz.

117. Yolda yürürken bilerek su birinkitilerine bastınız.

118. Oyuncak arabanızın tekerleğini kırdınız.

119. Şeker kabındaki şekerle tuz kabındaki tuzu karıştırdınız.

120. Şeker ölçeğini çaya batırıp ıslattınız.

121. Bardakları birbirine vurup kırdınız.

122. Dolapların içine girip saklandınız.

123. Arkadaşınızın sandalyesini çekip düşmesine sebep oldunuz.

124. Markette anneniz ya da babanız istediğiniz şeyi almadığı için huysuzluk yaptınız.

125. Yolda karşıdan karşıya geçerken annenizin elini bırakıp koşmaya başladınız.

126. Şişirilmiş bir balona toplu iğne batırıp patlattınız.

127. Oyuncaklarınızla konuşurdunuz.

128. Duvardaki bir çerçeveyi uzanıp düşürdünüz.

129. Bir sokak kedisi beslediniz.

130. Hayvanat bahçesinde bir maymuna çekirdek verdiniz.

131. Rüyanızda lunaparkta bir dönme dolaba bindiniz.

132. Evde kovalamaca oynarken bir eşya kırdınız.

133. Babanızın verdiği harçlıkla arkadaşlarınıza da yiyecek aldınız.

134. Bir masal okuyup yattığınızda rüyanızda o masalla ilgili birşeyler gördünüz.

135. Lunaparkta bir oyuncağa korkuğunuz için son anda binmekten vazgeçtiniz.

136. Oyuncak ayınızın tüylerini yoldunuz.

137. Okulda ezberlediğiniz şiiri okurken yarısını unuttunuz.

138. Evdeki duvarlara kalemle resim yaptınız.

139. Suluboya yaparken ellerinizi ve üstünüzü boyadınız.

140. Kıyafetinizi çıkarırken açamayınca düğmelerini kopardınız.

141. Puzzle'in parçalarını kaybettiniz.

142. Tenefüste oynarken arkadaşınızı itip düşürdünüz.

143. Parkta oynarken kuşların yanına gidip onları kaçırdınız.

144. Kardeşinize vurduğunuz için babanızdan azar işittiniz.

145. İlk defa uçurtma uçurdunuz.

146. Okulda arkadaşınızın saçına sakız yapıştırdınız.

147. Gizli gizli sigara içtiniz.

148. Parkta oynarken toprak yediniz.

149. Arkadaşınıza bilerek su yerine içki verdiniz.

150. Misafirlikte kırdığınız eşyayı sakladınız.

151. Balkondan aşağıya insanların kafasına tükürüp kaçtınız.

152. Prize parmağınızı sokmaya çalıştınız.

153. Kardeşiniz uyurken onun yüzünü boyadınız.

154. Annenizin sakladığı çikolataları arayıp, bulup hepsini yediniz.

155. Sevdiğiniz birşeyi başkası için de ayırdınız.

156. Misafirliğe gittiniz evde ikramları toptan tükettiğiniz için anneniz tarafından azarlandınız.

157. Odada yalnızken yeni doğmuş bir bebeği hırpaladınız.

158. Bir yere gitmek için evden çıktınız ve kayboldunuz.

159. Kapıyı çarpıp kapı camını kırdınız.

160. Kazağınızı çıkarırken boynunuza takıldığı için boğulacağınızı zannettiniz.

161. Denizde arkadaşınızla şakalaşırken boğulma tehlikesi geçirdiniz.

162. Balık yerken kılçığını yuttunuz.

163. Yolda yürürken karıncaları ezdiğinizi farkettiniz.

APPENDIX D: LIFE EVENT INVENTORY FOR EXPERIMENT 2

1. Annenize pasta pişirmesinde yardım ettiniz.
2. Bahçede dört yapraklı yonca aradınız.
3. Evde yalnızken dış kapıyı açık bıraktınız.
4. Şeker kabındaki şekerle tuz kabındaki tuzu karıştırdınız.
5. Duvardaki bir çerçeveyi uzanıp düşürdünüz.
6. Kıyafetinizi çıkarırken açamayınca düğmelerini kopardınız.
7. Kazağınızı çıkarırken boynunuza takıldığı için boğulacağınızı zannettiniz.
8. Yapmadığınız bir şeyin suçunu kendi üzerinize aldınız.
9. Parmağınıza bir çekiçle vurdunuz.
10. Radyoyu kurcalarken bozdunuz.
11. Bir elektronik eşyayı bozup babanızdan sakladınız.
12. Balkondan aşağıya insanların kafasına tükürüp kaçtınız.
13. Sevdiğiniz birşeyi başkası için de ayırdınız.
14. O kadar çok güldünüz ki, neredeyse boğuluyordunuz (katılıyordunuz).
15. Evdeki çiçeklerin yapraklarını kopardınız.
16. Bir böcek öldürüp sonradan pişmanlık duydunuz.
17. Balkondan oyuncaklarınızı aşağıya attınız.
18. Yolda karşıdan karşıya geçerken annenizin elini bırakıp koşmaya başladınız.
19. Saçınıza sakız yapıştı.
20. Ayağınıza bir cam parçası saplandı.
21. Sınıfça bir çocuk oyununa gittiniz.
22. Evde bir eşyayı kırıp suçu kardeşinizin üstüne attınız.
23. Kardeşiniz hastalandığı için telaşlanıp ağladınız.
24. Okulda ezberlediğiniz şiiri okurken yarısını unuttunuz.
25. Tül perdeyi hızla asılıp kornejiyle birlikte yere düşürdünüz.
26. Pantolonunuzun arkası yırtıldığı için çok utandınız.

27. Lavaboda elinizi yıkamak isterken bütün üstünüzü ıslattınız. OR

28. Sinemada uyuya kaldınız.

29. Bir otoparkta 100 bin lira buldunuz.

30. Sınıf arkadaşınızın kalemini beğenip izinsiz aldınız.

31. Kısık ateşte pişmesi gereken bir yemeğin altını açıp yaktınız.

32. Portakalı çekirdeğiyle yediğiniz için içinizden portakal ağacı çıkacağını zannetiniz.

33. Ocakta elinizi yaktiniz.

34. Kafanızı çarpıp yaptığınız işi bırakmak zorunda kaldınız.

35. Beslenme çantanızı evde unutup aç kaldınız.

36. Ayakkabı boyasıyla ayakkabılarınızı boyamaya çalışırken üstünüzü başınızı boyadınız.

37. Bardakları birbirine vurup kırdınız.

38. Rüyanızda lunaparkta bir dönme dolaba bindiniz.

39. Puzzle'in parçalarını kaybettiniz.

40. Bir ağaçta mahsur kaldınız ve inmek için yardım almanız gerekti.

41. Bir ses kaydı yaptınız.

42. Bir yerde kilitli kalıp çıkamadınız.

43. Arkadaşınızın sandalyesini çekip düşmesine sebep oldunuz.

44. Prize parmağınızı sokmaya çalıştınız.

45. Bir yere gitmek için evden çıktınız ve kayboldunuz.

46. Annenizin yaptığı pastayı misafirler gelmeden yediniz.

47. Güneşte fazla kaldığınız için başınıza güneş geçti.

48. Haşlanmış, sıcak bir yumurtayı alıp elinizi yaktınız.

49. Oyuncak arabanızın tekerleğini kırdınız.

50. Bir masal okuyup yattığınızda rüyanızda o masalla ilgili birşeyler gördünüz.

51. Tenefüste oynarken arkadaşınızı itip düşürdünüz.

52. Gece geç vakitte hastaneye gitmek zorunda kaldınız.

53. Evde top oynadığınız için komşudan şikayet geldi.

54. Salıncaktan düşüp yaralandınız.

55. Ev ödevinizi yapmadığınız için öğretmeniniz tarafından cezalandırıldınız.

56. Lunaparkta bir oyuncağa korkuğunuz için son anda binmekten vazgeçtiniz.
57. Evdeki duvarlara kalemle resim yaptınız.
58. Annenizin sakladığı çikolataları arayıp, bulup hepsini yediniz.
59. Bütün biberleri acı zannedip hiç biber yemediniz.
60. Makasla saçınızı kestiniz.
61. Parkta oynarken kuşların yanına gidip onları kaçırdınız.
62. Manavda parasını ödemeden üzüm yediniz.
63. Bir doğumgünü partisinde bir içecek döktünüz.
64. Birbirinin eşi olmayan farklı renk çoraplar giyip okula gittiniz.
65. Yukarı çıkan yürüyen merdivenlerden aşağıya inmeye çalıştınız.
66. Oyuncak ayınızın tüylerini yoldunuz.

APPENDIX E: ANAGRAMS USED BEFORE THE LEI

[3 7 2 4 1 6 5 8]

word	anagram	frequency
karışmak	şrkıamak [3 7 2 4 1 6 5 8]	195
evlenmek	nleeemvk [3 7 2 4 1 6 5 8]	193
yüzünden	nzyüedün [3 7 2 4 1 6 5 8]	192
bozulmak	lzbuamok [3 7 2 4 1 6 5 8]	186
uygulama	lguumaya [3 7 2 4 1 6 5 8]	181
görüşmek	şrgüemök [3 7 2 4 1 6 5 8]	180
yaklaşık	akylışak [3 7 2 4 1 6 5 8]	180
tüketici	tkteciüi [3 7 2 4 1 6 5 8]	179
uğraşmak	şruaamğk [3 7 2 4 1 6 5 8]	172
sıcaklık	kcsaılık [3 7 2 4 1 6 5 8]	171
kapanmak	npkaamak [3 7 2 4 1 6 5 8]	165
öğretmen	tröeemğn [3 7 2 4 1 6 5 8]	311
güzellik	lzgeilük [3 7 2 4 1 6 5 8]	161
bilimsel	mlbiesil [3 7 2 4 1 6 5 8]	154
standart	dasnratt [3 7 2 4 1 6 5 8]	153
hastalık	ashtılak [3 7 2 4 1 6 5 8]	418
insanlık	nsiaılnk [3 7 2 4 1 6 5 8]	119
kurulmak	lrkuamuk [3 7 2 4 1 6 5 8]	374
davranış	avdrınaş [3 7 2 4 1 6 5 8]	365
hakkında	ıkhkdnaa [3 7 2 4 1 6 5 8]	360
ekonomik	ooenimkk [3 7 2 4 1 6 5 8]	342
kullanım	alklınum [3 7 2 4 1 6 5 8]	318
beklenti	ekbltnei [3 7 2 4 1 6 5 8]	105
ortalama	ltoamara [3 7 2 4 1 6 5 8]	135
yalnızca	ılynczaa [3 7 2 4 1 6 5 8]	278
itibaren	aiibertn [3 7 2 4 1 6 5 8]	129
temizlik	zmtiilek [3 7 2 4 1 6 5 8]	120
belediye	dlbeyiee [3 7 2 4 1 6 5 8]	247
kesilmek	lskiemek [3 7 2 4 1 6 5 8]	243
eleştiri	teeşrili [3 7 2 4 1 6 5 8]	112
yönetici	tnyeciöi [3 7 2 4 1 6 5 8]	237

word	anagram	frequency
başarılı	rşbalıaı [3 7 2 4 1 6 5 8]	232
doğrultu	uğdrtlou [3 7 2 4 1 6 5 8]	111
politika	tlpikioa [3 7 2 4 1 6 5 8]	221
karanlık	nrkaılak [3 7 2 4 1 6 5 8]	213
gazeteci	tzgeceai [3 7 2 4 1 6 5 8]	208
mücadele	dcmaleüe [3 7 2 4 1 6 5 8]	204
özgürlük	rgöüülzk [3 7 2 4 1 6 5 8]	202
sağlıklı	ığsllkaı [3 7 2 4 1 6 5 8]	198
çocukluk	kcçuulok [3 7 2 4 1 6 5 8]	133
açıklama	lıakmaça [3 7 2 4 1 6 5 8]	132
kırılmak	lrkıamık [3 7 2 4 1 6 5 8]	145
yitirmek	rtyiemik [3 7 2 4 1 6 5 8]	131
korunmak	nrkuamok [3 7 2 4 1 6 5 8]	144
herhalde	arhhdlee [3 7 2 4 1 6 5 8]	142
bakılmak	lkbıamak [3 7 2 4 1 6 5 8]	141
otomatik	aoomittk [3 7 2 4 1 6 5 8]	141
çoğunluk	nğçuulok [3 7 2 4 1 6 5 8]	138

APPENDIX F: FOLLOW-UP STUDY (EXPERIMENT 1)

Yaşınız:

Cinsiyetiniz:

AÇIKLAMALAR

Aşağıdaki cümlelerde, bir kelimenin harflerinin sırasının değiştirilmesiyle oluşturulmuş bir harf dizisi (anagram) göreceksiniz. Bu anagramı yanında verilen kurala göre çözünüz.

Bu anagramın çözümü için verilen kural [2 3 1 5 7 4 6 8] ise verilen anagramın 2inci harfi çözümün 1inci harfi; anagramın 3üncü harfi çözümün 2inci harfi; anagramın 1inci harfi çözümün 3üncü harfi; anagramın 5inci harfi çözümün 4üncü harfi; anagramın 7inci harfi çözümün 5inci harfi; anagramın 4üncü harfi çözümün 6ıncı harfi; anagramın 6ıncı harfi çözümün 7inci harfi; anagramın 8inci harfi çözümün 8inci harfi olacaktır.

Örnek: [tisyaosn] [2 3 1 5 7 4 6 8] = istasyon

Bu anagramı çözüp anlamlı bir kelime şekline getirince, çözümleri ve çözdüğünüz anagramı ne kadar zor bulduğunuzu (anagram zorluk derecesi) her cümlenin altında verilmiş yerlere yazınız.

Anagram zorluk derecesi için cevabınızı aşağıdaki cevap seçeneklerinden birini işaretleyerek belirtiniz:

"**1" = Çok Kolay**

"10" = Çok Zor

"2 ile 9 arasındaki değerler" Anagram zorluk derecesi artıkça büyük bir sayı değeri kullanınız.

Anagramı çözüp zorluk derecesini de belirledikten sonra, cümlenin belirttiği olayın 10 yaşından önce sizin başınıza gelip gelmediğini aşağıdaki cevap seçeneklerinden birini işaretleyerek belirtiniz:

“1” 10 yaşımdan önce kesinlikle başıma **gelmedi.** ***ye karşılık gelmektedir.***

“8” 10 yaşımdan önce kesinlikle başıma **geldi.** ***ye karşılık gelmektedir.***

“2 ile 7 arasındaki değerler” Başınıza gelip gelmediğinden kesin emin olmadığınız olaylar için bu değerleri kullanınız. Olayın başınıza geldiğinden ne kadar eminseniz o kadar büyük bir sayı işaretleyiniz.

1. [ndamıaşay] yönlendirildiniz. [231574698]
2. [kmaeal] okudunuz. [231564]
3. [skaaayba] gittiniz. [23157468]
4. [üöremkc] gördünüz. [2315746]
5. Bir [rkuğbaa] incelediniz. [2315746]
6. [kçedierk] yediniz. [23157468]
7. [eamylait] oldunuz. [23157468]
8. Arkadaşınızla [lanmaaş] yaptınız. [2315746]
9. Bir [sgörtie] yaptınız. [2315746]
10. [zyağlaı] gittiniz. [2315746]
11. [vnesriem] katladınız. [23157468]
12. [onbyada] düþtünüz. [3 7 2 4 1 6 5]
13. [röğmeetin] öptünüz. [231574698]
14. [nmaldion] çaldınız. [23157468]
15. [lpantuouz] kaybettiniz. [231574698]
16. Hayvanat bahçesinde bir [rzüaaf] gördünüz. [231564]
17. Lunaparkta [rçaşpaın] arabalara bindiniz. [23157468]
18. Bir yaz [mkanpaı] katıldınız ve hasta oldunuz. [2315746]
19. İlk defa [rhaıçkl] aldınız. [2315746]
20. Saçınıza [ksazı] yapıştı. [23154]
21. Duvara [spalte] boyalarla resim yaptınız. [231564]
22. Birisinin kucağında [uotrrkune] araba sürdünüz. [231574698]

23. Bir [ğdüeün] katıldınız. [231564]
24. [Nsiaedma] uyuya kaldınız. [23157468]
25. Eviniz [ysoduul]. [2315746]
26. Top oynarken bir [npercee] camı kırdınız. [2315746]
27. Yapmadığınız bir şeyin [çsuuun] kendi üzerinize aldınız. [231564]
28. İlkokulda okumayı söktüğünüz için kırmızı [rkuldee] kazandınız. [2315746]
29. [Nmadaav] parasını ödemeden üzüm yediniz. [2315746]
30. İtfaiyeyi gereksiz yere [aarğdıınz] için başınız derde girdi. [231574698 10]
31. Bir köpek tarafından [vkoaanlıdnzı]. [231574698 10 12 11]
32. Annenizin pasta pişirmesine [ryamdı] ettiniz. [231564]
33. Güneş [ttumualısan] şahit oldunuz. [231574698 11 10]
34. Anne babanız için bir yemek [şpidiirinz]. [231574698 10]
35. Bir ağaçta [hmarsu]kaldınız ve inmek için yardım almanız gerekti. [231564]
36. Parkta meşhur bir futbolcudan [zima] aldınız. [2314]
37. Gece geç vakitte [shanteaey] gitmek zorunda kaldınız. [231574698]
38. Ayağınıza bir cam [rpasçıa] saplandı. [2315746]
39. Komşularınıza bir [eeşk] şakası yaptınız. [2314]
40. Bisikletten düşüp burnunuzu [nkataıtınz]. [231574698 10]
41. O kadar çok [lgündüüz] ki, neredeyse katılıyordunuz. [23157468]
42. Parmağınıza bir [kçelieç] vurdunuz. [2315746]
43. Bir [ıaleşvrşi] merkezinde bir saati aşkın bir süre kayboldunuz. [231574698]
44. Bir otoparkta [zcüand] buldunuz. [231564]
45. Ocakta elinizi [kyantıız]. [23157468]
46. Bir yabancıdan [zboku] para istediniz. [23154]
47. Uçabildiğinizi [yhala] ettiniz. [23154]
48. Lunaparkta [uoyankc] hayvan kazandınız. [2315746]
49. Büyününce [tasnroot] olmak istediniz. [23157468]
50. Meşhur bir televizyon karakteriyle bir [eotdel] el sıkıştınız. [231564]
51. Bütün bir gece [uuydmıaınz]. [231574698 10]
52. [fkaıaznı] çarpıp yaptığınız işi bırakmak zorunda kaldınız. [23157468]
53. Ev hayvanınız [devne] kaçtı. [23154]

54. Küçük bir araba [zkaıas] geçirdiniz. [231564]

55. Bir [pdemre] hissettiniz. [231564]

56. Gece evden [çkakaern] yakalandınız. [23157468]

57. İnsan üstü [çgürlieinz] olduğuna inandınız. 231574698 10]

58. Stadyumda bir 1. Lig [tfulbo] maçı izlediniz. [231564]

59. Okulda [fkaeertayad] yediklerinizden zehirlendiniz. [231574698 11 10]

60. Bir doğumgünü partisinde bir içecek [kdöntüüz]. [23157468]

61. Bir [ncarkturana] tarafından denizden çıkarıldınız. [231574698 11 10]

62. Okulda [ryaaazmılk] yaptınız ve aileniz müdürle konuşmak zorunda kaldı. [231574698 10]

63. [Rkaşdieinzni] yüzüne vurdunuz. [231574698 10 12 11]

APPENDIX G: FOLLOW-UP STUDY (EXPERIMENT 2)

Yaşınız:

Cinsiyetiniz:

AÇIKLAMALAR

1. Aşağıdaki cümlelerde, bir kelimenin harflerinin sırasının değiştirilmesiyle oluşturulmuş bir harf dizisi (anagram) göreceksiniz. Bu anagramı yanında verilen kurala göre çözünüz.
2. Bu anagramın çözümü için verilen kural [3 7 2 4 1 6 5 8] ise verilen anagramın 3üncü harfi çözümün 1inci harfi; anagramın 7inci harfi çözümün 2inci harfi; anagramın 2inci harfi çözümün 3üncü harfi; anagramın 4üncü harfi çözümün 4üncü harfi; anagramın 1inci harfi çözümün 5inci harfi; anagramın 6ıncı harfi çözümün 6ıncı harfi; anagramın 5inci harfi çözümün 7inci harfi; anagramın 8inci harfi çözümün 8inci harfi olacaktır.

   Örnek: stiaoysn [3 7 2 4 1 6 5 8] = istasyon
3. Bu anagramı çözüp anlamlı bir kelime şekline getirince, çözümü anketle birlikte size verilen cevap kağıdında "ÇÖZÜM" sütununa yazınız.
4. Çözdüğünüz anagramı ne kadar zor bulduğunuzu (anagram zorluk derecesi) cevap kağıdındaki 10 dereceli ölçekteki uygun seçeneği işaretleyerek (yuvarlak içine alarak) belirtiniz.

   1 = Çok Kolay

   10 = Çok Zor

   "2 ile 9 arasındaki değerler" Anagram zorluk derecesi artıkça büyük bir sayı değeri kullanınız.
5. **Anagramı çözüp zorluk derecesini de belirledikten sonra, cümlenin belirttiği olayın 10 yaşından önce sizin başınıza gelip gelmediğini** cevap

"1" 10 yaşımdan önce kesinlikle başıma **gelmedi.** ***ye karşılık gelmektedir.***

"8" 10 yaşımdan önce kesinlikle başıma **geldi.** ***ye karşılık gelmektedir.***

"2 ile 7 arasındaki değerler" Başınıza gelip gelmediğinden kesin emin olmadığınız olaylar için bu değerleri kullanınız. Olayın başınıza geldiğinden ne kadar eminseniz o kadar büyük bir sayı işaretleyiniz.

6. Cevap kağıdında yaptığınız işaretlemeleri kaydırmadığınızdan emin olunuz.

Katılımınız için şimdiden teşekkür ederim.

1. [şndıamaay] yönlendirildiniz. [3 7 2 4 1 6 5 9 8]
2. [aamkel] okudunuz. [3 2 4 1 6 5]
3. [bskayaaa] gittiniz. [3 7 2 4 1 6 5 8]
4. [cüömker] gördünüz. [3 7 2 4 1 6 5]
5. Bir [arkbağu] incelediniz. [3 7 2 4 1 6 5]
6. [rkçiedek] yediniz. [3 7 2 4 1 6 5 8]
7. [iealaymt] oldunuz. [3 7 2 4 1 6 5 8]
8. Arkadaşınızla [şlaaamn] yaptınız. [3 7 2 4 1 6 5]
9. Bir [esgtirö] yaptınız. [3 7 2 4 1 6 5]
10. [ızylağa] gittiniz. [3 7 2 4 1 6 5]
11. [evnrisem] katladınız. [3 7 2 4 1 6 5 8]
12. [onbyada] düştünüz. [3 7 2 4 1 6 5]
13. [tröeemğin] öptünüz. [3 7 2 4 1 6 5 9 8]
14. [onmdilan] çaldınız. [3 7 2 4 1 6 5 8]
15. [olptunauz] kaybettiniz. [3 7 2 4 1 6 5 9 8]
16. Annenize pasta [rşpiemiisned] yardım ettiniz. [3 7 2 4 1 6 5 9 8 10 12 11]
17. Bahçede dört [apyrlkaı] yonca aradınız. [3 7 2 4 1 6 5 8]
18. Evde [ılynkzane] dış kapıyı açık bıraktınız. [3 7 2 4 1 6 5 9 8]

19. Şeker kabındaki şekerle tuz kabındaki tuzu [şrkıtadrızın]. [3 7 2 4 1 6 5 9 8 10 13 12 11]

20. Duvardaki bir [erççeveiy] uzanıp düşürdünüz. [3 7 2 4 1 6 5 9 8]

21. Kıyafetinizi çıkarırken açamayınca [eğdmelüirin] kopardınız. [3 7 2 4 1 6 5 9 8 11 10]

22. Kazağınızı çıkarırken [uybnunoaz] takıldığı için boğulacağınızı zannettiniz. [3 7 2 4 1 6 5 9 8]

23. Yapmadığınız bir şeyin [uusçun] kendi üzerinize aldınız. [3 2 4 1 6 5]

24. Parmağınıza bir [çkçiele] vurdunuz. [3 7 2 4 1 6 5]

25. Radyoyu [arkcalukrne] bozdunuz. [3 7 2 4 1 6 5 9 8 11 10]

26. Bir [teekorlink] eşyayı bozup babanızdan sakladınız. [3 7 2 4 1 6 5 9 8 10]

27. Balkondan aşağıya insanların [sfkanıaa] tükürüp kaçtınız. [3 7 2 4 1 6 5 8]

28. Sevdiğiniz birşeyi [aşbkısa] için de ayırdınız. [3 7 2 4 1 6 5]

29. O kadar çok [ülgdünüz] ki, neredeyse boğuluyordunuz (katılıyordunuz). [3 7 2 4 1 6 5 8]

30. Evdeki çiçeklerin [apyrlkaraıın] kopardınız. [3 7 2 4 1 6 5 9 8 10 12 11]

31. Bir böcek öldürüp sonradan [aşpmlnikı] duydunuz. [3 7 2 4 1 6 5 9 8]

32. [olbkdnana] oyuncaklarınızı aşağıya attınız. [3 7 2 4 1 6 5 9 8]

33. Yolda karşıdan karşıya geçerken annenizin elini bırakıp [aşkmayo] başladınız. [3 7 2 4 1 6 5]

34. Saçınıza [ıaskz] yapıştı. [3 2 4 1 5]

35. Ayağınıza bir cam [arpçısa] saplandı. [3 7 2 4 1 6 5]

36. Sınıfça bir çocuk [uuonany] gittiniz. [3 7 2 4 1 6 5]

37. Evde bir eşyayı kırıp suçu [erkdişainzni] üstüne attınız. [3 7 2 4 1 6 5 9 8 10 12 11]

38. Kardeşiniz [ashtaladnıığ] için telaşlanıp ağladınız. [3 7 2 4 1 6 5 9 8 10 12 11]

39. Okulda ezberlediğiniz şiiri okurken [sryınıaı] unuttunuz. [3 7 2 4 1 6 5 8]

40. Tül perdeyi hızla asılıp [erknijolye] birlikte yere düşürdünüz. [3 7 2 4 1 6 5 9 8 10]

41. Pantolonunuzun arkası [ırytdlığıı] için çok utandınız. [3 7 2 4 1 6 5 9 8 10]

42. Lavaboda elinizi yıkamak [rtieeksn] bütün üstünüzü ıslattınız. [3 7 2 4 1 6 5 8]

43. [mnsedaia] uyuya kaldınız. [3 7 2 4 1 6 5 8]

44. Bir [aoopkrtat] 100 bin lira buldunuz. [3 7 2 4 1 6 5 9 8]

45. Sınıf [dkaaşarnıınız] kalemini beğenip izinsiz aldınız. [3 7 2 4 1 6 5 9 8 10 13 12 11]

46. Kısık ateşte [eşpmisi] gereken bir yemeğin altını açıp yaktınız. [3 7 2 4 1 6 5]

47. Portakalı [rkçiedeiğyel] yediğiniz için içinizden portakal ağacı çıkacağını zannetiniz. [3 7 2 4 1 6 5 9 8 10 12 11]

48. Ocakta [iienizl] yaktınız. [3 7 2 4 1 6 5]

49. Kafanızı çarpıp [ıpytığaınz] işi bırakmak zorunda kaldınız. [3 7 2 4 1 6 5 9 8 10]

50. Beslenme [ançtınaız] evde unutup aç kaldınız. [3 7 2 4 1 6 5 9 8]

51. Ayakkabı boyasıyla ayakkabılarınızı boyamaya [şlçırıaekn] üstünüzü başınızı boyadınız. [3 7 2 4 1 6 5 9 8 10]

52. Bardakları [irbbirien] vurup kırdınız. [3 7 2 4 1 6 5 9 8]

53. Rüyanızda [pnlarautka] bir dönme dolaba bindiniz. [3 7 2 4 1 6 5 9 8 10]

54. Puzzle'in [arpçalaırın] kaybettiniz. [3 7 2 4 1 6 5 9 8 11 10]

55. Bir ağaçta [samhru] kaldınız ve inmek için yardım almanız gerekti. [3 2 4 1 6 5]

56. Bir ses [dakyı] yaptınız. [3 2 4 1 5]

57. Bir yerde [tlkiili] kalıp çıkamadınız. [3 7 2 4 1 6 5]

58. Arkadaşınızın [ansdylaseiin] çekip düşmesine sebep oldunuz. [3 7 2 4 1 6 5 9 8 10 12 11]

59. Prize [arpmığaınız] sokmaya çalıştınız. [3 7 2 4 1 6 5 9 8 11 10]

60. Bir yere gitmek için evden çıktınız ve [oykbdlanuzu]. [3 7 2 4 1 6 5 9 8 11 10]

61. Annenizin yaptığı [asptıya] misafirler gelmeden yediniz. [3 7 2 4 1 6 5]

62. Güneşte fazla [ılkdığaınz] için başınıza güneş geçti. [3 7 2 4 1 6 5 9 8 10]

63. Haşlanmış, sıcak bir [rmyuatuıy] alıp elinizi yaktınız. [3 7 2 4 1 6 5 9 8]

64. Oyuncak arabanızın [rkteeleiğin] kırdınız. [3 7 2 4 1 6 5 9 8 11 10]

65. Bir masal okuyup [ıtytığaınzad] rüyanızda o masalla ilgili birşeyler gördünüz. [3 7 2 4 1 6 5 9 8 10 12 11]

66. [fntesüeet] oynarken arkadaşınızı itip düşürdünüz. [3 7 2 4 1 6 5 9 8]

67. Gece geç vakitte [ashtenaey] gitmek zorunda kaldınız. [3 7 2 4 1 6 5 9 8]

68. Evde top oynadığınız için [umkşadon] şikayet geldi. [3 7 2 4 1 6 5 8]

69. [nlsıacatkna] düşüp yaralandınız. [3 7 2 4 1 6 5 9 8 11 10]

70. Ev ödevinizi yapmadığınız için öğretmeniniz [frtanıaadn] cezalandırıldınız. [3 7 2 4 1 6 5 9 8 10]

71. Lunaparkta bir oyuncağa [trkkğuonuzu] için son anda binmekten vazgeçtiniz. [3 7 2 4 1 6 5 9 8 11 10]

72. Evdeki [rvdaaluar] kalemle resim yaptınız. [3 7 2 4 1 6 5 9 8]

73. Annenizin sakladığı [lkçotailaaır] arayıp, bulup hepsini yediniz. [3 7 2 4 1 6 5 9 8 10 12 11]

74. Bütün biberleri acı [enznidap] hiç biber yemediniz. [3 7 2 4 1 6 5 8]

75. Makasla [nçsızıaı] kestiniz. [3 7 2 4 1 6 5 8]

76. Parkta oynarken [aşklırun] yanına gidip onları kaçırdınız. [3 7 2 4 1 6 5 8]

77. Manavda parasını [eeömeddn] üzüm yediniz. [3 7 2 4 1 6 5 8]

78. Bir [mğduügoün] partisinde bir içecek döktünüz. [3 7 2 4 1 6 5 9 8]

79. Birbirinin eşi olmayan farklı renk [prçaalor] giyip okula gittiniz. [3 7 2 4 1 6 5 8]

80. Yukarı çıkan [yryüneü] merdivenlerden aşağıya inmeye çalıştınız. [3 7 2 4 1 6 5]

81. Oyuncak [ıanızyn] tüylerini yoldunuz. [3 7 2 4 1 6 5 8]

APPENDIX H: MATERIAL FOR EXPERIMENT 3

&&&&&&&&&&&&&&

1. kalmak

&&&&&&&&&&&&&&

Kafanızı çarpıp yaptığınız işi bırakmak zorunda kaldınız.

2. aç kalmak

Beslenme çantanızı evde unutup aç kaldınız.

3. boyamak

Ayakkabı boyasıyla ayakkabılarınızı boyamaya çalışırken üstünüzü başınızı boyadınız

4. kırmak

Bardakları birbirine vurup kırdınız

5. binmek

Rüyanızda lunaparkta bir dönme dolaba bindiniz.

6. kaybetmek

Puzzle'in parçalarını kaybettiniz.

7. gerekmek

Bir ağaçta mahsur kaldınız ve inmek için yardım almanız gerekti.

8. yapmak

Bir ses kaydı yaptınız.

9. çıkamamak

Bir yerde kilitli kalıp çıkamadınız.

10. sebep olmak

Arkadaşınızın sandalyesini çekip düşmesine sebep oldunuz.

11. çalışmak

Prize parmağınızı sokmaya çalıştınız.

12. kaybolmak

Bir yere gitmek için evden çıktınız ve kayboldunuz.

13. yemek

Annenizin yaptığı pastayı misafirler gelmeden yediniz.

14. geçmek

Güneşte fazla kaldığınız için başınıza güneş geçti.

15. kırmak

Oyuncak arabanızın tekerleğini kırdınız.

16. görmek

Bir masal okuyup yattığınızda rüyanızda o masalla ilgili birşeyler gördünüz.

17. düşürmek

Tenefüste oynarken arkadaşınızı itip düşürdünüz.

18. gelmek

Evde top oynadığınız için komşudan şikayet geldi.

19. yaralanmak

Salıncaktan düşüp yaralandınız.

20. cezalandırılmak

Ev ödevinizi yapmadığınız için öğretmeniniz tarafından cezalandırıldınız.

21. vazgeçmek

Lunaparkta bir oyuncağa korktuğunuz için son anda binmekten vazgeçtiniz.

22. resim yapmak

Evdeki duvarlara kalemle resim yaptınız.

23. kesmek

Makasla saçınızı kestiniz.

24. kaçırmak

Parkta oynarken kuşların yanına gidip onları kaçırdınız.

25. dökmek

Bir doğumgünü partisinde bir içecek döktünüz.

26. gitmek

Birbirinin eşi olmayan farklı renk çoraplar giyip okula gittiniz.

27. çalışmak

Yukarı çıkan yürüyen merdivenlerden aşağıya inmeye çalıştınız.

28. yolmak

Oyuncak ayınızın tüylerini yoldunuz.

****

1. içmek

Annenize pasta pişirmesinde yardım ettiniz.

2. okumak

Bahçede dört yapraklı yonca aradınız.

3. yazmak

Evde yalnızken dış kapıyı açık bıraktınız.

4. bakmak

Şeker kabındaki şekerle tuz kabındaki tuzu karıştırdınız.

5. eklemek

Duvardaki bir çerçeveyi uzanıp düşürdünüz.

6. gerekmek

Kazağınızı çıkarırken boynunuza takıldığı için boğulacağınızı zannettiniz.

7. konuşmak

Parmağınıza bir çekiçle vurdunuz.

8. sormak

Radyoyu kurcalarken bozdunuz.

9. anlatmak

Bir elektronik eşyayı bozup babanızdan sakladınız.

10. oturmak

Balkondan aşağıya insanların kafasına tükürüp kaçtınız.

11. getirmek

Sevdiğiniz birşeyi başkası için de ayırdınız.

12. tutmak

O kadar çok güldünüz ki, neredeyse boğuluyordunuz (katılıyordunuz).

13. verilmek

Evdeki çiçeklerin yapraklarını kopardınız.

14. taşımak

Bir böcek öldürüp sonradan pişmanlık duydunuz.

15. öğrenmek

Yolda karşıdan karşıya geçerken annenizin elini bırakıp koşmaya başladınız.

16. inanmak

Saçınıza sakız yapıştı.

17. kazanmak

Ayağınıza bir cam parçası saplandı.

18. artmak

Sınıfça bir çocuk oyununa gittiniz.

19. unutmak

Evde bir eşyayı kırıp suçu kardeşinizin üstüne attınız.

20. dinlemek

Kardeşiniz hastalandığı için telaşlanıp ağladınız.

21. hissetmek

Okulda ezberlediğiniz şiiri okurken yarısını unuttunuz.

22. izlemek

Tül perdeyi hızla asılıp kornejiyle birlikte yere düşürdünüz.

23. korumak

Pantolonunuzun arkası yırtıldığı için çok utandınız.

24. korkmak

Lavaboda elinizi yıkamak isterken bütün üstünüzü ıslattınız.

25.dolaşmak

Sinemada uyuya kaldınız.

26. çevirmek

Bir otoparkta 100 bin lira buldunuz.

27. kurtulmak

Sınıf arkadaşınızın kalemini beğenip izinsiz aldınız.

28. davranmak

Ocakta elinizi yaktınız.

&&&&&&&&&&&&&&

1. içmek

&&&&&&&&&&&&&&

Kafanızı çarpıp yaptığınız işi bırakmak zorunda kaldınız.

2. okumak

Beslenme çantanızı evde unutup aç kaldınız.

3. yazmak

Ayakkabı boyasıyla ayakkabılarınızı boyamaya çalışırken üstünüzü başınızı boyadınız.

4. bakmak

Bardakları birbirine vurup kırdınız.

5. eklemek

Rüyanızda lunaparkta bir dönme dolaba bindiniz.

6. başarmak

Puzzle'in parçalarını kaybettiniz.

7. götürmek

Bir ağaçta mahsur kaldınız ve inmek için yardım almanız gerekti.

8. yaşamak

Bir ses kaydı yaptınız.

9. konuşmak

Bir yerde kilitli kalıp çıkamadınız.

10. sormak

Arkadaşınızın sandalyesini çekip düşmesine sebep oldunuz.

11. anlatmak

Prize parmağınızı sokmaya çalıştınız.

12. oturmak

Bir yere gitmek için evden çıktınız ve kayboldunuz.

13. getirmek

Annenizin yaptığı pastayı misafirler gelmeden yediniz.

14. tutmak

Güneşte fazla kaldığınız için başınıza güneş geçti.

15. taşımak

Oyuncak arabanızın tekerleğini kırdınız.

16. düşünmek

Bir masal okuyup yattığınızda rüyanızda o masalla ilgili birşeyler gördünüz.

17. öğrenmek

Tenefüste oynarken arkadaşınızı itip düşürdünüz.

18. kazanmak

Evde top oynadığınız için komşudan şikayet geldi.

19. artmak

Salıncaktan düşüp yaralandınız.

20. unutmak

Ev ödevinizi yapmadığınız için öğretmeniniz tarafından cezalandırıldınız.

21. dinlemek

Lunaparkta bir oyuncağa korktuğunuz için son anda binmekten vazgeçtiniz.

22. hissetmek

Evdeki duvarlara kalemle resim yaptınız.

23. korkmak

Makasla saçınızı kestiniz.

24. çevirmek

Parkta oynarken kuşların yanına gidip onları kaçırdınız.

25. kurtulmak

Bir doğumgünü partisinde bir içecek döktünüz.

26. davranmak

Birbirinin eşi olmayan farklı renk çoraplar giyip okula gittiniz.

27. saymak

Yukarı çıkan yürüyen merdivenlerden aşağıya inmeye çalıştınız.

28. uzanmak

Oyuncak ayınızın tüylerini yoldunuz.

****

1. yardım etmek

Annenize pasta pişirmesinde yardım ettiniz.

2. aramak

Bahçede dört yapraklı yonca aradınız.

3. bırakmak

Evde yalnızken dış kapıyı açık bıraktınız.

4. karıştırmak

Şeker kabındaki şekerle tuz kabındaki tuzu karıştırdınız.

5. düşürmek

Duvardaki bir çerçeveyi uzanıp düşürdünüz.

6. zannetmek

Kazağınızı çıkarırken boynunuza takıldığı için boğulacağınızı zannettiniz.

7. vurmak

Parmağınıza bir çekiçle vurdunuz.

8. bozmak

Radyoyu kurcalarken bozdunuz.

9. saklamak

Bir elektronik eşyayı bozup babanızdan sakladınız.

10. kaçmak

Balkondan aşağıya insanların kafasına tükürüp kaçtınız.

11. ayırmak

Sevdiğiniz birşeyi başkası için de ayırdınız.

12. boğulmak

O kadar çok güldünüz ki, neredeyse boğuluyordunuz (katılıyordunuz).

13. koparmak

Evdeki çiçeklerin yapraklarını kopardınız.

14. duymak

Bir böcek öldürüp sonradan pişmanlık duydunuz.

15. başlamak

Yolda karşıdan karşıya geçerken annenizin elini bırakıp koşmaya başladınız.

16. yapışmak

Saçınıza sakız yapıştı.

17. saplanmak

Ayağınıza bir cam parçası saplandı.

18. gitmek

Sınıfça bir çocuk oyununa gittiniz.

19. atmak

Evde bir eşyayı kırıp suçu kardeşinizin üstüne attınız.

20. ağlamak

Kardeşiniz hastalandığı için telaşlanıp ağladınız.

21. unutmak

Okulda ezberlediğiniz şiiri okurken yarısını unuttunuz.

22. düşürmek

Tül perdeyi hızla asılıp kornejiyle birlikte yere düşürdünüz.

23. utanmak

Pantolonunuzun arkası yırtıldığı için çok utandınız.

24. ıslatmak

Lavaboda elinizi yıkamak isterken bütün üstünüzü ıslattınız.

25. uyuyakalmak

Sinemada uyuya kaldınız.

26. bulmak

Bir otoparkta 100 bin lira buldunuz.

27. almak

Sınıf arkadaşınızın kalemini beğenip izinsiz aldınız.

28. yakmak

Ocakta elinizi yaktınız.

APPENDIX I: THE ANSWER SHEET FOR THE QUESTIONNAIRE OF DIFFICULTY LEVELS OF THE ANAGRAMS

		ANAGRAM ZORLUK DERECESİ											10 YAŞINDAN ÖNCE BAŞINIZA GELDİ Mİ?							
		Çok Kolay				Orta Derecede Zor					Çok Zor		Kesinlikle Geli Medi							Kesinlikle Geldi
	Çözüm	1	2	3	4	5	6	7	8	9	10		1	2	3	4	5	6	7	8
1		1	2	3	4	5	6	7	8	9	10	1	1	2	3	4	5	6	7	8
2		1	2	3	4	5	6	7	8	9	10	2	1	2	3	4	5	6	7	8
3		1	2	3	4	5	6	7	8	9	10	3	1	2	3	4	5	6	7	8
4		1	2	3	4	5	6	7	8	9	10	4	1	2	3	4	5	6	7	8
5		1	2	3	4	5	6	7	8	9	10	5	1	2	3	4	5	6	7	8
6		1	2	3	4	5	6	7	8	9	10	6	1	2	3	4	5	6	7	8
7		1	2	3	4	5	6	7	8	9	10	7	1	2	3	4	5	6	7	8
8		1	2	3	4	5	6	7	8	9	10	8	1	2	3	4	5	6	7	8
9		1	2	3	4	5	6	7	8	9	10	9	1	2	3	4	5	6	7	8
10		1	2	3	4	5	6	7	8	9	10	10	1	2	3	4	5	6	7	8
11		1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8
12		1	2	3	4	5	6	7	8	9	10	12	1	2	3	4	5	6	7	8
13		1	2	3	4	5	6	7	8	9	10	13	1	2	3	4	5	6	7	8
14		1	2	3	4	5	6	7	8	9	10	14	1	2	3	4	5	6	7	8
15		1	2	3	4	5	6	7	8	9	10	15	1	2	3	4	5	6	7	8
16		1	2	3	4	5	6	7	8	9	10	16	1	2	3	4	5	6	7	8
17		1	2	3	4	5	6	7	8	9	10	17	1	2	3	4	5	6	7	8
18		1	2	3	4	5	6	7	8	9	10	18	1	2	3	4	5	6	7	8
19		1	2	3	4	5	6	7	8	9	10	19	1	2	3	4	5	6	7	8
20		1	2	3	4	5	6	7	8	9	10	20	1	2	3	4	5	6	7	8
21		1	2	3	4	5	6	7	8	9	10	21	1	2	3	4	5	6	7	8
22		1	2	3	4	5	6	7	8	9	10	22	1	2	3	4	5	6	7	8

Note: There are 81 questions in the first questionnaire and 63 questions in the second questionnaire.

APPENDIX J: THE COMPLETE ANOVA TABLE FOR EXPERIMENT 1

Table A2

The Complete ANOVA Table for Experiment 1

Source	Type III Sum of Squares	df	Mean Square	F	p	Partial Eta Squared	Observed Power(a)
presence of anagram	0.076	1	.076	.326	.570	.004	.087
presence of anagram * position of anagram	0.331	1	.331	1.423	.236	.016	.219
presence of anagram * counterbalancing group	12.120	1	12.120	52.027	.000	.372	1.000
presence of anagram * position of anagram * counterbalancing group	0.083	1	.083	.356	.553	.004	.091
Error(presence of anagram)	20.5	88	.233				
position of anagram	0.646	1	.646	.570	.452	.006	.116
counterbalancing group	0.727	1	.727	.641	.425	.007	.124
position of anagram * counterbalancing group	0.924	1	.924	.859	.357	.010	.150
Error	99.752	88	1.134				

APPENDIX K: THE COMPLETE ANOVA TABLE FOR EXPERIMENT 2

Table A3

The Complete ANOVA Table for Experiment 2

Source	Type III Sum of Squares	df	Mean Square	F	p	Partial Eta Squared	Observed Power(a)
presence of anagram	1.487	1	1.487	6.311	.014	.067	.700
presence of anagram * position of anagram	0.112	1	.112	.474	.493	.005	.105
presence of anagram * counterbalancing group	2.837	1	2.837	12.041	.001	.120	.929
presence of anagram * position of anagram * counterbalancing group	1.355	1	1.355	5.751	.019	.061	.660
Error(presence of anagram)	20.738	88	.236				
position of anagram	0.831	1	.831	.402	.528	.005	.096
counterbalancing group	3.378	1	3.378	1.635	.204	.018	.244
position of anagram * counterbalancing group	3.756	1	3.756	1.817	.181	.020	.266
Error	181.860	88	2.067				

APPENDIX L: THE COMPLETE ANOVA TABLE FOR EXPERIMENT 3

Table A4

The Complete ANOVA Table for Experiment 3

Source	Type III Sum of Squares	*df*	Mean Square	*F*	*p*	Partial Eta Squared	Observed Power(a)
matching of the prime	1.638	1	1.638	6.620	.012	.078	.719
matching of the prime * counterbalancing group	1.291	1	1.291	5.215	.025	.063	.616
Error(prime)	19.302	78	.247				
counterbalancing group	0.102	1	.102	.053	.819	.001	.056
Error	150.669	78	1.932				

APPENDIX M: THE COMPLETE ANOVA TABLE FOR EXPERIMENT 4

Table A5

The Complete ANOVA Table for Experiment 4

Source	Type III Sum of Squares	*df*	Mean Square	*F*	*p*	Partial Eta Squared	Observed Power(a)
matching of the prime	.376	1	.376	1.207	.275	.015	.192
matching of the prime * counterbalancing group	.233	1	.233	.746	.390	.009	.137
Error(prime)	24.320	78	.312				
counterbalancing group	1.502	1	1.502	.912	.343	.012	.156
Error	128.442	78	1.647				

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Inan, A.B., Tekman, H.G. (2008). Revelation Effect on Autobiographical Memories, Poster presented at the 29th International Congress of Psychology, Berlin, Germany.