THE EFFECTS OF EMOTIONAL VALENCE AND EMOTIONAL AROUSAL ON EVENT-BASED PROSPECTIVE MEMORY IN YOUNG ADULTS

ÖYKÜ AYDIN

JULY 2023

ÇANKAYA UNIVERSITY

GRADUATE SCHOOL OF SOCIAL SCIENCES

DEPARTMENT OF PYSCHOLOGY
MASTER'S THESIS IN
PSYCHOLOGY

THE EFFECTS OF EMOTIONAL VALENCE AND EMOTIONAL AROUSAL ON EVENT-BASED PROSPECTIVE MEMORY IN YOUNG ADULTS

ÖYKÜ AYDIN

JULY 2023

ABSTRACT

THE EFFECTS OF EMOTIONAL VALENCE AND EMOTIONAL AROUSAL ON EVENT-BASED PROSPECTIVE MEMORY IN YOUNG ADULTS

AYDIN, Öykü
M.A. in Psychology

Supervisor: Assoc. Prof. Dr. Hande KAYNAK ÇELİK
July 2023, 103 pages

The main aim of the current study was to examine the effects of emotional valence and emotional arousal on event-based prospective memory (EB-PM) among young adults. A total of 63 young adults aged between 18 to 30 participated in the study. The study was conducted in two sessions. In the first online session, participants filled out an online survey that included a Demographical Information Form and the Beck Depression Inventory (BDI). Participants for the second experimental session was recruited from young adults who did not report any psychiatric or neurological disorder within the past six months, did not have intense fears for specific contents (e.g., snakes, dogs, heights, etc.), and got scores of 16 and below from the BDI. The second session consisted of a computer-based EB-PM task in which participants' PM performance was measured for pictures from different emotional categories (i.e., positive-high arousal, positive-low arousal, neutral, negative-high arousal, and negative-low arousal) selected from the International Affective Picture System (IAPS). Within the EB-PM task, a PM task was embedded in a 1-back working memory task, and both correct responses and reaction times were recorded. Besides, the Positive and Negative Affect Schedule (PANAS) and Coding Test were applied as filler tasks between the instructions and the EB-PM task. Moreover, a recognition task and Post-Experimental Questionnaire was administered at the end of the EB-PM task. The results showed that the main effects of both emotional valence and emotional arousal, as well as their interaction, on PM accuracy were significant. Moreover, the main effects of both dimensions on reaction times in the PM task were significant. However, the interaction effect of these dimensions on reaction times was not significant. In addition, the correlation between PM task performance and 1-back working memory task performance was significant in terms of reaction times, but no correlation was found for accuracy. Regarding the PANAS scores, only the negative affect scores were negatively correlated with overall PM accuracy. No other correlations between PANAS scores and PM task performance were found. The findings from the current study were evaluated and discussed in relation to the relevant literature.

Keywords: Prospective Memory, Emotion, Valence, Arousal

ÖZET

GENÇ YETİŞKİNLERDE DUYGUSAL DEĞERLİK VE DUYGUSAL UYARILMIŞLIK BOYUTLARININ OLAY TEMELLİ İLERİYE YÖNELİK BELLEK PERFORMANSI ÜZERİNDEKİ ETKİSİ

AYDIN, Öykü
Psikoloji Yüksek Lisans Tezi

Danışman: Doç. Dr. Hande KAYNAK ÇELİK
Temmuz 2023, 103 sayfa

Mevcut araştırmanın temel amacı genç yetişkinlerde duygusal değerliğin ve duygusal uyarılmışlığın olay temelli ileriye yönelik bellek (OT-İYB) üzerindeki etkisini incelemektir. Araştırmaya, 18-30 yaş aralığında toplamda 63 genç yetişkin katılmıştır. Araştırma iki aşamadan oluşmuştur. İlk aşamada katılımcılar, Demografik Bilgi Formu ve Beck Depresyon Envanteri (BDE)'ni içeren çevrim-içi anketi tamamlamışlardır. İkinci aşamaya katılan katılımcılar, son altı ay içerisinde herhangi bir psikiyatrik veya nörolojik rahatsızlık geçirmemiş, belirli içeriklere (örn., yılan, köpek, yükseklik vs.) yönelik şiddetli korkusu olmayan ve BDE'den 16 ve altında puan alan genç yetişkinler arasından seçilmiştir. Araştırmanın ikinci aşaması, Uluslararası Duygusal Resim Sistemi (IAPS)'nden farklı duygu kategorileri (olumlu-yüksek uyarılmışlık, olumlu-düşük uyarılmışlık, nötr, olumsuz-yüksek uyarılmışlık ve olumsuz-düşük uyarılmışlık) dikkate alınarak seçilen resimler için İYB performansının incelendiği bilgisayar temelli bir OT-İYB görevinden oluşmuştur. OT-İYB görevi içerisinde, İYB görevi ile 1-geri çalışma belleği görevi eş zamanlı olarak sunulmuştur ve doğru tepkiler ile tepki süreleri kaydedilmiştir. Ayrıca, yönergeler ile OT-İYB görevi arasında ara görevler olarak Pozitif ve Negatif Duygu Ölçeği (PNDÖ) ile Şifre Testi sunulmuştur. Ek olarak katılımcılar, OT-İYB görevinden sonra tanıma testi ve Deney Sonrası Tarama Soruları'nı tamamlamışlardır. Sonuçlar, İYB doğru tepki oranları üzerindeki duygusal değerlik ve duygusal uyarılmışlığın temel etkileri ile bu iki boyutun etkileşim etkisinin anlamlı olduğunu göstermektedir. Ayrıca, bu iki boyutun İYB tepki süreleri üzerindeki temel etkileri de anlamlıdır. Öte yandan, bu boyutların tepki süreleri üzerindeki etkileşim etkisi anlamlı değildir. Ek olarak, İYB görevi ile 1-geri çalışma belleği görevi arasında tepki süreleri açısından anlamlı bir ilişki bulunmuşken, bu ilişki doğru tepki oranları açısından incelendiğinde anlamlı değildir. PNDÖ puanları incelendiğinde, yalnızca negatif duygu durum puanları ile toplam İYB doğru tepki oranları arasında negatif yönde anlamlı bir ilişki bulunmuştur. PNDÖ puanları ile İYB performansı arasında başka anlamlı bir ilişki bulunamamıştır. Araştırmadan elde edilen bulgular ilgili alan yazın kapsamında değerlendirilmiş ve tartışılmıştır.

Anahtar Kelimeler: İleriye Yönelik Bellek, Duygu, Değerlik, Uyarılmışlık

To the memory of my grandparents and my beloved uncle Ercan Aydın…

ACKNOWLEGEMENTS

First and foremost, I would like to express my sincere gratitude to my dear supervisor, Assoc. Prof. Hande Kaynak Çelik for her endless patience, guidance, and support throughout my education. She is not only a great academician but also an inspiring person. It is definitely a privilege to be one of her students. She taught me more than the cognitive psychology. The most important of all, she showed and taught me how to be a proper academician. Everything she taught will be with me for the rest of my life. I cannot thank enough to her for all I mentioned and for everything I have not been able to count yet.

I also want to thank my jury members, Assoc. Prof. Erol Özçelik and Assist. Prof. Burcu Ayşen Ürgen for their valuable suggestions and feedbacks.

Psychology is a discipline that open to misinformation and unethical behaviors. I am grateful to all the professors who guide me to gain the accurate knowledge and ethical values throughout my education.

Master's was a process with ups and downs. People who helped me to survive this process are worth the world to me. At this point, special thanks to my amazing friends; Betül Beyza Cengil, Hazal Hiçcan, Su Tunçol, and my fantastic colleagues; Cemilenur Talay, Cemre Gürses, Deniz Çelik, and Feyza Demir. They have always supported me both academically and emotionally. They have believed in me even when I cannot believe in myself. They made me feel like I was never alone. Sharing this journey with them is one of the most incredible experiences in my life. They made unbearable times bearable. I'm very lucky to have them in my life. Without them, I wouldn't have been able to get through this process.

I want to thank my parents Hasan Aydın and Tülin Aydın for their patience and support. They have always tried to understand what I'm trying to do and also learned so much from my journey. Moreover, I want to thank my wonderful sister Sesil Aydın. She has been always by my side and believed in me. We've been through a lot, and she has been always there for me.

Finally, I would like to thank TUBITAK-BIDEB (2210-A) for supporting me financially throughout my education. Moreover, this thesis study was funded by TUBITAK-ARDEB 1002 [Project No: 221K318]. I would like to thank TUBITAK for making this study possible with the financial and institutional support they provided.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS AND ABBREVIATIONS

BDI	: Beck Depression Inventory
EB-PM	: Event-Based Prospective Memory
IAPS	: International Affective Picture System
PAMT	: Preparatory Attentional and Memory Theory
PANAS	: Positive and Negative Affect Schedule
PEQ	: Post-Experimental Questionnaire
PM	: Prospective Memory
SAM	: Self-Assessment Manikin
SPSS	: Statistical Package of Social Sciences
TB-PM	: Time-Based Prospective Memory

CHAPTER I

INTRODUCTION

1.1 BACKGROUND OF PROSPECTIVE MEMORY

Memory is a crucial cognitive process that involves the encoding, storage and retrieval of information. Although we often associate memory with recalling past events, it has also vital functions such as remembering when and what to do in the future. Therefore, memory serves as a bridge which connects the past, present and future.

Temporally, memory processes are classified as retrospective memory and prospective memory (Eysenck 2014: 362). Namely, prospective memory focuses on remembering future tasks, whereas retrospective memory pertains to remembering past events. In one sense, the function that serves as a bridge connects the present to the future is called prospective memory. On the other hand, the function that serves as a bridge connects the past to the present is called retrospective memory. In the content of the current thesis, prospective memory processes were evaluated.

Prospective memory (PM) is defined as remembering to perform a planned action at some point in the future (McDaniel and Einstein 2007). In other words, PM involves “remembering to remember” (Cohen and Hicks 2017: 1; Schonfield and Stones 1979). All of the actions performed in everyday life can be considered as output of the PM processes. Remembering to take medications after dinner or remembering to buy bread when you see the market are examples of PM tasks. As PM involves remembering the planned actions in the future, PM failures may be embarrassing and it also may cause vital problems. For instance, forgetting best friend’s birthday party may be embarrassing, whereas forgetting to take medications may cause health issues. Hence, PM processes are crucial for both one’s social life and physiological health.

Two distinct types of PM have been defined in the relevant literature: time-based PM (TB-PM) and event-based PM (EB-PM) (Conte and McBride 2018: 936;

Einstein and McDaniel 1990: 724). TB-PM refers to remembering to perform a planned action after a period of time or at a specific time in the future. For example, remembering to send an e-mail at 1 p.m. or remembering to take the cake out of the oven after 30 minutes are TB-PM tasks. TB-PM processes rely on monitoring and controlling time to perform the planned action (Block and Zakay 2006: 28). On the other hand, EB-PM is defined as remembering to perform an action when a specific event occurs or a specific cue is displayed. Considering our daily actions, remembering to buy milk when you see the supermarket or remembering to submit your assignment when you open the computer correspond to event-based PM. Unlike the TB-PM, EB-PM processes rely on external cues or events. In other words, one needs to encounter an event or specific reminder cue to carry out an EB-PM task (Conte and McBride 2018: 936). In laboratory experiments, remembering to press a key every three minutes can be an example of time-based PM, whereas remembering to press a key when a target stimulus appears can be an example of event-based PM.

The PM processes consist of two separate components, namely retrospective and prospective components (Walter and Bayen 2016: 325). The prospective component of PM involves remembering that there is an action planned to perform in the future (Schnitzspahn et al. 2012: 500; Walter and Bayen 2016: 325). On the other hand, the retrospective component of PM is responsible for knowing what and when to perform an action (Cona et al. 2015: 1; Walter and Bayen 2016: 325). In other words, the retrospective component of PM comprises recognition memory that refers to discriminating the target events/cues from the distractor events/cues (Smith 2003: 352; Walter and Bayen 2016: 326). For instance, in the study of Altgassen et al. (2010: 1060), remembering to press a specific key whenever one sees one of the PM targets during the ongoing task pertains to the prospective component of PM, whereas remembering the specific pictures studied earlier to press the specific key whenever one of them is presented corresponds to the retrospective component of PM. To assess the retrospective component of PM, in addition to the PM task, researchers have used a recognition task in which participants are asked to differentiate the stimuli they studied previously from distractor stimuli (e.g., Altgassen et al. 2010: 1060; Rendell et al. 2012: 742; Schnitzspahn et al. 2012: 503). Moreover, in a real-life condition, remembering that there is something to do at 1 p.m. refers to the prospective component of PM. On the other hand, remembering that this action is sending an e-mail is part of retrospective component of PM. As Einstein and McDaniel (1990: 721) indicated, both of the components must be successfully processed in order to complete a PM task successfully. Therefore, studies that examine the PM processes must take both components into account to understand processes properly.

Kliegel and his colleagues (2002) proposed a process model of PM, which is depicted in Figure 1. The model consists of four stages. The first stage, intention formation, involves creating a plan for the action to be performed in the future. This stage requires explicit planning. Second stage is the intention retention, which refers to the process of keeping the planned action in mind during a time delay while ongoing activities take place. This phase does not require executive processes and is part of retrospective component of PM (Einstein and McDaniel 1996). The next stage of prospective remembering is intention initiation, which involves monitoring the environment and deciding whether the conditions are proper to perform the planned action. This requires detecting and recognizing the relevant time or event and retrieving the planned action. This model indicates that successful intention initiation demands monitoring processes, inhibition, and cognitive flexibility (Kliegel et al. 2002: 306). The final stage of the process model of prospective remembering is intention execution, in which a person performs the planned action itself.

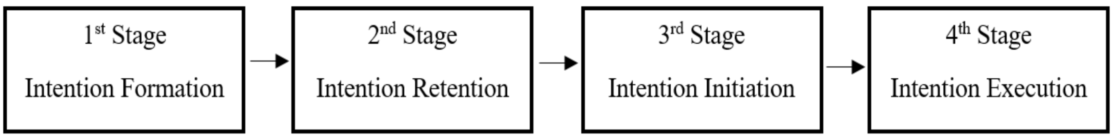

Figure 1: Process Model of Prospective Memory

Source: Kliegel et al. (2002: 307)

PM processes include several distinct cognitive processes such as working memory and attention (Hostler et al. 2018: 1578). Most of the PM studies have been widely used working memory tasks (e.g., 1-back task) as ongoing tasks (e.g., Altgassen et al. 2010: 1060; Cona et al. 2015: 4; Henry et al. 2015: 4; Xian et al. 2020: 3). Therefore, these procedures are anticipated to exhibit a correlation between PM task performance and ongoing task.

1.1.1 Theories of Prospective Memory

1.1.1.1. Multiprocess Theory

The Multiprocess Theory of PM, proposed by McDaniel and Einstein (2000), suggested that several mechanisms play roles in the PM processes. The nature of the action determines whether automatic and controlled processes are relied on to remember the planned actions in the future. These processes are explained by Attentional Monitoring and Spontaneous Retrieval theories. According to the theory of Attentional Monitoring, cognitive resources are necessary for remembering and performing the planned action (McDaniel and Einstein 2000: 131). On the other hand, the theory of Spontaneous Retrieval suggests that monitoring the external cues and using the cognitive resources are not necessary to perform the planned action. As information related to planned action can be retrieved spontaneously (McDaniel and Einstein 2000: 131).

Multiprocess Theory of PM suggests that the kind of processing used during a PM task can vary on certain factors. One such factor is the focality of the cues used in the PM task. Focal cues are related to the ongoing task, whereas non-focal cues are not. For instance, asking participants to respond whenever they encounter the target stimulus during a working memory task is a focal cue. On the other hand, asking participants to respond whenever they encounter the stimulus from a specific category can be a non-focal cue. If the cues used in a PM task are focal, then spontaneous retrieval processes are activated, but if the cues are non-focal, then attentional monitoring processes are needed during the PM task for successful performance. In other words, the theory indicates that the cue and the ongoing task should be related to be remembered and performed automatically (McDaniel and Einstein 2000: 135). Other factors that affect the processing of the PM are the perceived importance and difficulty of the task. PM performance improves as the perceived importance increases. If the task is important, attentional monitoring processes are more likely to be used to ensure success. On the contrary, less important tasks might be processed automatically (McDaniel and Einstein 2000: 133). In a similar fashion, if a PM task is perceived as difficult, one is more likely to monitor the environment attentively, whereas an automatic process is active for easier tasks (McDaniel and Einstein 2000: 131).

1.1.1.2. Preparatory Attentional and Memory Theory

According to Preparatory Attentional and Memory Theory (PAMT), successful performance in PM tasks requires source demanding preparatory attentional processes, which are not automatic and involve active external monitoring, regardless of the content of the task (Smith 2003: 349; Smith and Bayen 2004: 756). PAMT suggests that PM processes require two tasks to perform simultaneously. When one is busy with two tasks simultaneously, one monitors the environment for the PM cues attentively. Therefore, cognitive resources of the ongoing task are affected by this monitoring process. In other words, since the PM task requires attentional monitoring, it competes for cognitive resources with the ongoing task, leading to interruptions and potentially resulting in more errors and longer reaction times in the ongoing task (Einstein et al. 2008: 873; Smith 2003: 349).

PAMT is in line with the theory of Attentional Monitoring of the Multiprocess Theory. Both of the theories indicate that monitoring processes required for PM tasks decrease the cognitive resources allocated to the ongoing task. On the other hand, Unlike PAMT, Multiprocess Theory suggests that when the spontaneous retrieval processes are active, the presence of the PM task does not affect the cognitive resources allocated to the ongoing task. In this respect, PAMT and Multiprocess Theory differ in the impact of spontaneous retrieval processes on cognitive resources.

1.1.2 Assessment of Prospective Memory

Various procedures have been developed in the studies investigating PM processes, depending on the variables being examined such as, emotion. Generally, these studies are classified as laboratory and non-laboratory paradigms. Early PM studies were mostly conducted outside of the laboratory (e.g., Marsh et al. 1998; Maylor 1990). This kind of PM assessment closely simulates daily life PM tasks. For instance, in a study, participants were asked to call the experimenter at specified times as a TB-PM task (Maylor 1990: 475). In this case, participants were required to complete the PM task while they were engaging their own daily life tasks. Even though it ensures the naturalistic conditions, non-laboratory paradigms have also some limitations. Especially, it becomes impossible to control participants' behaviors other than the content of the PM task. Besides, it is also hard to understand the nature of participants' PM performance. For example, the kind of strategies used to perform the task remains unclear. Because of the limitations in settings outside the laboratory, most e PM studies have been conducted with laboratory paradigms (e.g., Altgassen et al. 2010; Ballhausen et al. 2015; Xian et al. 2020). During daily life tasks, people engage in several actions simultaneously. Therefore, planned actions supposed to be remembered during the day are always accompanied with other actions. For instance, one can remember to take medications while reading a book. As a result, laboratory studies typically involve participants performing two tasks simultaneously to efficiently assess PM processes. Starting from this point of view, in several PM studies, researchers design an experimental procedure that requires participants to perform two tasks at the same time course (e.g., Altgassen et al. 2010; Cona et al. 2015). A typical experimental paradigm of PM includes a PM task embedded in an ongoing task (Einstein and McDaniel 1990: 718, 2005). For example, in a study by Altgassen et al (2010: 1060), participants were asked to press a specified key whenever they saw one of the PM targets (EB-PM task), while also performing a 1-back visual working memory task (ongoing task). Ballhausen et al (2015: 548) conducted a similar study, where participants had to press a specific key whenever they saw a word belongs to the instructed semantic category (EB-PM task), while performing a word categorization task (ongoing task). In this paradigm, apart from the ongoing task and PM task, participants are given additional tasks to assess retrospective component of PM. In some studies, recognition tests are applied to assess retrospective component (e.g., Altgassen et al. 2010; Rendell et al. 2012; Schnitzspahn et al. 2012). To do so, both of the components of PM are assessed. By examining both the prospective and retrospective components, researchers can determine the source of the PM failures. This enables them to understand if the PM failures arise due to issues with prospective or retrospective component. As mentioned above, successful PM performance requires successful retrospective component. Accordingly, in most of the PM studies, recognition performance for PM targets has demonstrated a ceiling effect (e.g., Altgassen et al. 2010: 1060; Rendell et al. 2012: 745). In other words, nearly all participants recognize all the PM targets successfully.

Apart from the experimental paradigm, PM studies in laboratory settings also utilize standardized laboratory assessments of PM. Most commonly used standardized assessment is the Virtual Week (Rendell and Craik 2000). The Virtual Week is a board game designed as a simulation of daily PM tasks in a week (Monday to Sunday). Participants are required to pick up event cards consisting of tasks (for both TB-PM and EB-PM) and remember to perform these tasks when the appropriate times come. They are expected to complete the tasks with taking the virtual clock on the middle of the board into consideration. In the most of the studies, application duration of Virtual Week is approximately 1-hour, and a computerized version has been developed (Rendell and Craik 2009). A Turkish version of Virtual Week has also been developed by Pakyürek (2018).

1.2 EMOTION

Emotion is defined as physical and mental processes that comprise bodily responses (e.g., facial expression), subjective experience, motivation, evaluation, and appraisal (Smith and Kosslyn 2014: 340). In detail, emotion is a psychological mechanism that regulates physiological, cognitive, and motor responses when an event occurs, such as hearing some news (Shiota et al. 2017: 619).

The effects of emotion on memory processes are commonly studied by researchers because emotion have an impact on cognitive processes, including memory (e.g., Altgassen et al. 2010; Kapucu 2020; Kaynak and Gökçay 2017; Kensinger and Schacter 2016; Ochsner 2000). In general, previous studies have indicated that emotion affects both encoding (Murty et al. 2010: 3462) and retrieval (Maratos et al. 2000: 1464) of an event or a stimulus. The general notion from these studies indicated that emotional stimuli and events are more likely to be remembered than non-emotional ones (e.g., Kensinger and Schacter 2016: 622; May et al. 2015: 370; Ochsner 2000: 256). This suggests that emotions enhance memory (Kensinger and Schacter 2016: 622). Still, some studies have produced opposite results, suggesting that emotions do not enhance memory (e.g., Cona et al. 2015: 5). Considering the studies on emotion and PM specifically, this kind of discrepancy exists in the relevant literature. Factors such as methodology of the studies, types of manipulation have been suggested to explain the inconsistency in the findings of emotion-PM studies (Hostler et al. 2018: 1580), and these factors are detailed in the following section.

Even though several models and approaches have been proposed to define emotion in the relevant literature, the Circumplex Model is the most widely accepted and frequently used model (Russell 1980). The Circumplex Model defines emotion based on two separate dimensions: emotional valence and emotional arousal (Barrett and Russell 1999: 10; Russell 1980: 1164). The emotional valence dimension indicates how positive/pleasant or negative/unpleasant an object or event is, and the emotional arousal dimension is related to how intense an object or event is (Smith and Kosslyn 2014: 343). For example, a picture of a loved one can be considered as positively valenced, whereas a picture of war scene can be considered as negatively valenced. In a similar fashion, a picture of a crying baby has a high arousal level, whereas a picture of a mountain has a low arousal level. In the content of the Circumplex Model, emotional valence is located in one axis and emotional arousal is located in another axis, thereby emotions and emotional stimuli are positioned within a graphic framework (Smith and Kosslyn 2014: 343). In the current study, the Circumplex Model has been based to evaluate the effects of emotion on PM performance. By this means, effects of both dimension of emotion (i.e., emotional valence and arousal) and their interaction on EB-PM performance were examined.

1.2.1. Emotion and Prospective Memory

PM is a complex process that relies on various cognitive processes, including attention, working memory, and retrospective memory (Hostler et al. 2018: 1578). Because emotion can affect attention and memory processes (Kapucu 2020: 120), researchers have also explored how emotion influences PM performance. Even though general notion is that emotion enhances the PM performance (Hostler et al. 2018: 1578; Lui et al. 2021), previous studies have reported inconsistent findings. While some studies suggest that emotion improves PM performance (e.g., Altgassen et al. 2010; May et al. 2015; Yang et al. 2018), others have found that emotion impairs PM performance (e.g., Ballhausen et al. 2015; Walter and Bayen 2016). Besides, there also exist some studies showing that emotion has no effect on PM performance (e.g., Cona et al. 2015; Marsh et al. 2009). Considering emotional valence specifically, some studies showed that positive stimuli had an advantage over negative and neutral stimuli on PM (e.g., Altgassen et al. 2011; Hostler et al. 2018; Mioni et al. 2015; Rendell et al. 2011; Rummel et al. 2012). On the other hand, other studies indicated that negative stimuli improved the PM performance among young adults, as compared to positive and neutral stimuli (e.g., Hering et al. 2018: 10; Lui et al. 2021). In other words, young adults showed a negativity effect. Some of retrospective memory studies have been also indicated that young adults show a negativity effect, whereby they better remembered the negative information than positive information (Boğa et al. 2021; Charles et al. 2003; Ito and Cacioppo 2005; Kaynak and Gökçay 2017). Since the sample of the current study consisted of young adults, PM performance for negative PM targets was expected to be better than positive ones.

In a meta-analysis conducted by Hostler and colleagues (2018) with 27 experimental studies, the possible factors that may account for the inconsistent findings regarding the effects of emotion on PM performance have been investigated. One factor that was identified was the type of stimuli (i.e., pictures or words) used in the experiments, which can affect the results (Hostler et al. 2018: 1580). For example, apart from emotion, previous research has shown that PM performance is better for pictures than words (McDaniel et al. 1998: 125). Besides, pictures are better at eliciting emotional responses and accessing emotional information than words (De Houwer and Hermans 1994: 1). Despite this, some studies using words have showed substantial effects of emotion on PM (e.g., Altgassen et al. 2011; May et al. 2015). However, Hostler et al. (2018: 1580) argue that pictures are a more effective tool for examining the effects of emotion on the PM than words. Consequently, pictures were used as stimuli in the current study.

Another possible factor that influences the effects of emotion on PM is the kind of paradigm (i.e., focal, or non-focal) used in the PM study (Hostler et al. 2018: 1580). In a focal paradigm, PM cues are processed such that presentation of the cues automatically activates the PM task to be performed during the ongoing task (McDaniel and Einstein, 2000: 136). For instance, in a focal paradigm, participants are asked to press a specific key whenever they see the PM target pictures during the ongoing 1-back task, which automatically triggers the retrieval of the PM task to be performed (Altgassen et al. 2010: 1060). On the other hand, in a non-focal paradigm, detecting PM cues requires additional strategic cognitive resources that are not necessary for the ongoing task (McDaniel and Einstein, 2000: 136). For example, participants need to press a specific key whenever they encounter a word that belongs to a specific semantic category during the ongoing word categorization task (Ballhausen et al. 2015: 549). In this type of task, to detect PM cues, participants are supposed to use extra cognitive resources in addition to the ongoing task. In previous studies, negative stimuli have been found to increase PM performance in focal paradigms, while positive stimuli have greater benefits on PM performance in a focal paradigm than in a non-focal paradigm (Hostler et al. 2018: 1588). Keeping these findings in mind, in the current study, a focal cue paradigm was applied.

Another factor influencing the effects of emotion on PM performance is in which phase emotional valence is manipulated (i.e., encoding only, retrieval only, and both encoding and retrieval) (Hostler et al. 2018: 1579). In a PM task, the encoding phase refers to the formation of PM intention to be performed. On the other hand, the retrieval phase represents encountering the PM target and recognizing it to perform intended action accordingly. When emotion is manipulated only in the retrieval phase, as in studies like Ballhausen et al. (2015), instructions of the PM task are designed as including only the category of the PM targets, not emotional PM targets themselves. Thus, participants are encountered with emotional stimuli only when they recognize the PM target. In other respects, when emotion is manipulated only in the encoding phase, as in studies like Henry et al. (2015), instructions include emotional stimuli which are in the same category with the PM targets, but these stimuli are different from the actual PM targets. Hence, participants are encountered with emotional stimuli only in the encoding phase. Besides, some studies, like Altgassen et al. (2010), manipulate emotion in both encoding and retrieval phases. In these studies, emotional stimuli that are presented in the instructions are the same as PM targets presented in the PM task. Therefore, participants are exposed to emotional stimuli both when they encode them from instructions and retrieve them during the PM tasks. Previous studies showed that when emotional stimuli are presented both in encoding and retrieval phases, PM performance is found to be improved (Hostler et al. 2018: 1589). For this reason, in the current study, the instructions for PM task included the same PM targets as those presented during the PM task to manipulate emotion in both encoding and retrieval phases.

Apart from the phase of manipulation, methodology and cue focality of the studies, arousal levels of the stimuli are also considered as a factor that influences the effects of emotion on PM performance (Hostler et al. 2018: 1581). In earlier studies on emotion and PM studies arousal levels of stimuli were either controlled (e.g., Altgassen et al. 2010; Cona et al. 2015) or not controlled adequately (e.g., Graf and Yu, 2015; Henry et al. 2015). However, previous memory studies have indicated that arousal affects the memory performance, regardless of whether valence is controlled or not (e.g., Anderson et al. 2006; Buchanan et al. 2007; Kensinger 2009). Even though no previous studies have specifically examined the effects of the arousal dimension of emotion on PM, arousal may be an important factor that influences PM performance. In the current study, arousal levels of stimuli were manipulated in addition to valence levels to examine the effects of both arousal and valence dimensions of emotion on PM performance. The aim of the current study was to address the lack of attention given to the arousal dimension and interaction of both dimensions in the PM literature. Previous retrospective memory studies indicated that highly arousing stimuli were remembered better than neutral or moderately arousing ones (e.g., Buchanan et al. 2006; Kensinger and Corkin 2003; 2004), which may also be expected to be valid for PM.

Memory processes have been found to be affected by both valence and arousal dimensions of emotion. Moreover, prior studies have examined how these two dimensions interact and found that people tend to remember highly arousing positive and negative information better than neutral information (for a review, see Kensinger and Kark 2018: 3). However, there has been no research on how valence and arousal dimensions influence PM performance in an interactive way. In the light with previous emotion and memory literature, highly arousing positive and negative PM targets were expected to be remembered better than neutral PM targets.

Most of the experimental studies have been examined the effects of emotion on PM processes, by measuring the PM accuracy as dependent variable. In other words, they focused on how accurately participants performed the PM tasks. However, reaction time for the emotional PM targets have not been focus of the research. To our knowledge, no previous emotion-PM study has evaluated the changes in reaction time for the PM targets. Similar research on memory has found that reaction times for emotional stimuli, especially negative ones, were longer than neutral ones (e.g., Grissmann et al. 2017; Kensinger and Corkin 2003; Plancher et al., 2019). Besides, high arousal levels have been found to increase reaction times (e.g., Burt 2002; McKenna and Sharma 2004; Imbir 2016), indicating that processing emotional stimuli takes longer than neutral stimuli.

1.2.2. Current Mood States and Prospective Memory

Numerous research has indicated that an individual's mood state influence how well they remember emotional information (e.g., Josephson et al. 1996: 437). For instance, people who are in negative mood tend to remember negative stimuli better than positive ones, whereas who are in positive mood tend to remember positive stimuli better than negative ones (e.g., Bradley et al. 1994; Bower, 1981; Knight et al. 2002). This phenomenon is known as "mood-congruent memory". However, literature on EB-PM and mood interaction has produced mixed results. (McBride and Workman 2017: 232). For instance, in a study conducted by Rummel et al. (2012), participants' mood was manipulated in a controlled environment. Results showed that sad mood was associated with better PM performance for both negative and positive PM cues. Findings did not support the mood-congruency effect. On the other hand, studies investigating the effects of negative, positive, and neutral mood on overall PM performance showed a controversial pattern. Negative and positive mood states, as compared to neutral state, was found to impair the PM performance of young adults (Pupillo et al. 2020: 1; Schnitzspahn et al. 2014: 267). However, in another study (Pupillo et al. 2022: 186), positive mood state was found to be associated with better PM performance, whereas such association was not observed for negative affect. Aforementioned studies examined the effects of mood on PM performance using mood induction. In other words, participants' mood states were manipulated. Mostly, participants' mood states when they arrived in the laboratory have not been focus of the studies. Previous studies have also shown that people performed worse on working memory tasks when they were in a more negative affect (Brose et al. 2012: 605; Riediger et al. 2011: 656) and better when they were in a more positive affect (Brose and Ebner-Priemer 2015: 372). Since PM processes are associated with working memory, in the current study, negative affect was expected to be correlated with worse

PM performance, whereas positive affect was expected to be correlated with better PM performance.

1.3 PRESENT STUDY AND ITS SIGNIFICANCE

In the light of the relevant literature, the current study was aimed to examine the effects of emotional valence and emotional arousal on EB-PM performance in young adults, using a focal cue paradigm and manipulating emotion in both encoding and retrieval phases of the task. The main research question of the study was how emotionality affects the EB-PM performance. To answer this question, an EB-PM task was designed in which PM task embedded in a 1-back working memory task (ongoing task). The task included pictures from five different emotional categories, including positive-high arousal, positive-low arousal, neutral, negative-high arousal, negative-low arousal. As mentioned earlier, previous studies on PM have primarily focused on valence dimension of emotion, while ignoring the arousal dimension. Although research indicated that arousal plays a critical role in memory processes (Kensinger 2009: 101), no prior research has investigated the effects of arousal on EB-PM performance. Thus, the current study is expected to make a noteworthy contribution to PM literature by assessing both dimensions of emotion.

Participants' performance on PM task were analyzed in terms of both accuracy and reaction time. No previous research has explored the effects of emotion on reaction time within the PM task. So, the current study is the first to measure reaction times among PM task stimuli.

Besides, PM task performance and ongoing task performance were also compared. Additionally, performance on the recognition task which were applied after the EB-PM task, were evaluated. Within the PM paradigm, PANAS were applied in filler tasks. Apart from the main research question, the correlation between PANAS scores and PM task performance were also examined. The hypotheses for the current study are listed in Table 1.

Table 1: Summary of Hypotheses

Hypothesis 1–Effects of Emotional Valence on PM Accuracy
H1a. Scores of negatively valenced pictures would be higher than those of neutral pictures.
H1b. Scores of positively valenced pictures would be higher than those of neutral pictures.
H1c. Scores of negatively valenced pictures would be higher than those of positively valenced pictures.
Hypothesis 2 – Effects of Emotional Valence on PM Reaction Time
H2a. Reaction times for negatively valenced pictures would be longer than neutral pictures.
H2b. Reaction times for positively valenced pictures would be longer than neutral pictures.
H2c. Reaction times for negatively valenced pictures would be longer than positively valenced pictures.
Hypothesis 3 – Effects of Emotional Arousal on PM Accuracy
H3. Scores of pictures at high arousal levels would be higher than those of pictures at low arousal.
Hypothesis 4 – Effects of Emotional Arousal on PM Reaction Time
H4. Reaction times for pictures at high arousal levels would be longer than low arousal levels.
Hypothesis 5 – Interaction Effects of Emotional Valence and Arousal on PM Accuracy
H5a. Scores of negative high arousal pictures would be higher than those of neutral pictures.
H5b. Scores of positive high arousal pictures would be higher than those of neutral pictures.
H5c. Scores of negative high arousal pictures would be higher than those of positive high arousal pictures.
H5d. Scores of positive low arousal pictures would not differ from negative low arousal pictures.
Hypothesis 6 – Interaction Effects of Emotional Valence and Arousal on PM Reaction Time
H6a. Reaction times for positively valenced pictures at high arousal levels would be longer than neutral ones.
H6b. Reaction times for negatively valenced pictures at high arousal levels would be longer than neutral ones.
H6c. Reaction times for positive low arousal pictures would not differ from negative low arousal pictures.
Hypothesis 7 – Correlation Among Ongoing Task and PM Accuracy
H7. Overall ongoing task accuracy would be significantly correlated with overall PM accuracy.
Hypothesis 8 – Correlation Among Ongoing Task and PM Reaction Time
H8. Reaction times in the ongoing task would be significantly correlated with overall reaction times in the PM task.
Hypothesis 9 – Correlation Among PANAS Scores and PM Accuracy
H9a. Positive affect scores on PANAS would be positively correlated with overall PM accuracy.
H9b. Negative affect scores on PANAS would be negatively correlated with overall PM accuracy.
Hypothesis 10 – Correlation Among PANAS Scores and PM Reaction Time
H10a. Positive affect scores on PANAS would be negatively correlated with overall reaction times in the PM task.
H10b. Negative affect scores on PANAS would be positively correlated with overall reaction times in the PM task.
Hypothesis 11–Recognition Task Performance
H11. All participants would discriminate all PM targets from distractors.

CHAPTER II

METHOD

2.1 PARTICIPANTS

The present study was conducted in two sessions, including the first, the online survey session, and the second, the experimental session. A total of 135 young adults (n_{female} = 73, n_{male} = 62) whose ages ranged from 18 to 30 and who was undergraduate or graduate student at various faculties of Çankaya University voluntarily participated in the online survey session of the study. The main aim of the first session was to determine potential participants for the experimental session and to get demographical information about the participants. Participants who reported that they suffered from a psychiatric or neurological disorder within six months, who got a score above 16 from Beck Depression Inventory (BDI), and who had an extreme fear of specific creatures/objects (e.g., snakes, dogs, etc.) were excluded from the study. After the online survey session, which was the first session of the study, 50 young adults were excluded according to exclusion criteria, and 85 young adults were invited for the second session. Twenty-two young adults did not participate in the second session. Before data collection, G*Power 3.1.9.7 software (Faul et al. 2007) was used to detect the required number of participants. The minimum required sample size for the present study was determined as 34 while calculating with the test power of .80 (1- ß) and α value of .05, and a medium effect size of .25 (Cohen 1988). Accordingly, a total of 63 young adults (n_{female} = 34, n_{male} = 29) participated in both sessions. The number of excluded participants is shown with their reasons in Table 2. Demographic characteristics of participants who participated both sessions are presented in Table 3.

Table 2: The Number of Excluded Participants after the Online Survey Session

Exclusion Criteria	***n***
Psychiatric/Neurological Disorder	9
BDI Scores (>16)	22
Fear	9
BDI Scores + Fear	10
Other	22
Total	**72**

Table 3: Demographic Characteristics of the Participants

Variables	***n***	***%***
Age*	22.02 (2.41)	
Gender		
Female	34	54.0
Male	29	46.0
Marital Status		
Married	2	3.2
Single	39	61.9
In a relationship	22	34.9
Job		
Student	57	90.5
Psychologist	2	3.2
Research Assistant	1	1.6
Human Resources Specialist	1	1.6
Finance Specialist	1	1.6
Engineer	1	1.6
Grade		
1st grade	11	17.5
2nd grade	17	27.0
3rd grade	16	25.4
4th grade	9	14.3
Master	10	15.9
Faculty		
Art and Sciences	24	38.1
Engineering	23	36.5
Architecture	8	12.7
Economics and Administrative	8	12.7

*Mean (Standard Deviation)

In order to announce the study, the link to the online survey was shared via social media. Besides, posters with detailed information about the study and the QR code of the first session were hung in various places at Çankaya University. Thus, people interested in the study could scan the QR code of the online survey and participate in the first session. The first session of the study was conducted via the online survey, whereas the second session was conducted face-to-face in a room at

Çankaya University Psychology Department. Participants participated in the second session of the study individually. Moreover, participants who participated in both study sessions received ₺75 Trendyol Digital Shopping Coupon as an incentive. Incentives for the participants were funded by TÜBİTAK-ARDEB 1002 [Project no: 221K318].

2.2 MATERIALS

2.2.1. Online Survey Session

As the first session of the study, an online survey was created via Qualtrics online survey software. The survey consisted of a question on whether a participant was afraid of something and the intensity of the fear, whether they had any vision problem, Demographical Information Form, and the BDI, which are mentioned below.

In the experimental session of the study, pictures from various levels of valence and arousal were presented to the participants. Those pictures included some objects and creatures that might trigger people's fears. If participants had any specific extreme fears for objects/creatures included in the materials, it might affect their responses in terms of both accuracy and reaction time. Under these circumstances, it would be hard to understand whether participants' reactions differed because of their fears, emotional valence, or arousal. Therefore, it would become harder to efficiently examine the effects of emotion on PM. Hence, as in some of the previous studies (e.g., Cona et al. 2015: 3), the content of the pictures was determined, and participants who reported that they had extreme fears for those contents were excluded from the study and were not invited for the experimental session. Stimuli used in the experimental session included pictures of frog, snake, lizard, bee, dog, worm, turtle, fish, spider, bear, shark, roach, tiger, ocean, sea, butterfly, rabbit, owl, ferret and pictures that represents height. Participants answered the open-ended question, "Do you have any fears?". If they selected "yes", they indicated their fear by typing. Then, they were asked about the intensity of the fear. They specified it on a 7-point Likert scale (1 = least, 7 = highest). Five and above was determined as intense fear and, participants who reported intense fear for specified content of pictures were not invited to the experimental session.

Participants were also asked whether they had any vision problems. Participants were informed that if they had any vision problems, they had to wear contact lenses or glasses while participating in the experimental session. Besides, participants were asked whether they had suffered from any psychiatric or neurological disorder within the last six months. Participants who indicated a psychiatric or a neurological disorder were excluded from the study, and were not invited to the experimental session.

2.2.1.1. Demographic Information Form

In order to detect potential variables that could affect the main variables of the study, the demographic information form was created. The form included questions on age, date of birth, gender, marital status, job, department, and grade. Participants filled out the form via the online survey. The Demographic Information Form is shown in Appendix A.

2.2.1.2. Beck Depression Inventory (BDI)

BDI was developed by Beck et al. (1961) to screen the severity of depression symptoms. It is a multiple-choice, self-report inventory that consists of 21 items. Each item consists of four sentences related to the severity of symptoms of depression ranging from 0 = non-severe to 3 = severe. Therefore, scores one can obtain from BDI range from 0 to 63. Higher scores indicate more severe depression symptoms. Hisli (1989) conducted the reliability and validity study on the Turkish population. The split-half reliability coefficient was found to be 0.74, and concurrent validity was 0.74 and 0.63. Scores ranging from 0 to 9 indicate minimal depression, 10 to 16 indicate mild depression, 17 to 29 indicate a medium level of depression, and 30 to 63 indicate severe depression. Besides, 17 is determined as the cut-off score, and a score of 17 and above is stated as abnormal depression (Hisli 1989: 9). Hence, participants who got a score of 17 or higher from BDI were excluded and was not invited to the experimental session of the study. The BDI is shown in Appendix B. The mean, standard deviation, minimum and maximum scores obtained by BDI are presented in Table 4.

Table 4: Mean, Standard Deviation, Minimum and Maximum Scores Obtained by BDI, PANAS and Coding Test.

Variables	*M*	*SD*	Min.	Max.
BDI	7.38	4.51	0	16
PANAS				
Positive	34.97	6.23	21	47
Negative	18.71	5.68	10	35
Coding Test	54.27	7.96	37	70

M: Mean, *SD*: Standard Deviation, Min: Minimum, Max: Maximum

2.2.2. Experimental Session

PM performance was measured in the experimental session. In the experimental session, participants were required to complete a series of computer-based tasks, Positive and Negative Affect Schedule (PANAS), Coding Test, and Post-Experimental Questionnaire (PEQ).

2.2.2.1. Paper-and-Pencil Tests/Questionnaires

2.2.2.1.1. Positive and Negative Affect Schedule (PANAS)

Positive and Negative Affect Schedule (PANAS) was developed by Watson et al. (1988) to assess individuals' mood states. It includes ten positive and ten negative emotional states, which are evaluated on a 5-point Likert scale (1 = very slightly or not at all; 5 = extremely). Participants evaluated each emotional state based on how they have been feeling during the last two weeks. Therefore, the lowest score is 10, and the highest score is 50 for each affect. If the score of negative affect is higher than positive affect, the participant is considered in a negative mood state. Similarly, if the score of positive affect is higher than negative affect, the participant is considered in a positive mood state. The reliability and validity study for the Turkish population was conducted by Gençöz (2000). Cronbach alpha coefficients were .86 for the positive affect factor and .83 for the negative affect factor. Test-retest reliability coefficients for positive and negative affect factors were .40 and .54, respectively (Gençöz 2000: 22). In the content of the study, PANAS was administered to see whether the mood state was associated with any other variable. PANAS is shown in Appendix C. The mean, standard deviation, minimum and maximum scores obtained by PANAS are presented in Table 3.

2.2.2.1.2. Coding Test

Coding Test was developed by Randolph et al. (1998) in the content of Repeatable Battery for the Assessment of Neuropsychological Status (RBANS). In the relevant literature, there are several tests similar to the Coding Test (e.g., Sheridan et al. 2006). One of the first versions of the test was developed by Smith (1973). These tests were created to measure cognitive functioning, including attention, motor speed, visual scanning, and visual-spatial information processing speed (Sheridan et al. 2006: 23; Strauss et al. 2006: 622). The standardization study of Coding Test for the Turkish sample was conducted by Safaz and colleagues (2015). The test-retest reliability coefficient was found as .93 (Safaz et al. 2015: 243).

On the top of the test sheet, there are nine symbols matched with numbers from one to nine. Test items consist of 89 symbols and a blank under each symbol. Participants are required to write the matched number for each symbol as quickly and correctly as possible within 90 seconds. Each correct answer is 1 point. Therefore, maximum point a participant can get is 89. Higher scores indicate better cognitive functioning. In this study, Coding Test was administered as filler task, and to examine whether cognitive functioning and PM performance were correlated. Coding Test is presented in Appendix D. The mean, standard deviation, minimum and maximum scores obtained by Coding Test are shown in Table 3.

2.2.2.1.3. Post-Experimental Questionnaire (PEQ)

After the computer-based experimental tasks, participants filled out the Post-Experimental Questionnaire (PEQ). The questionnaire consisted of questions on instructions for EB-PM task. The main aim was to detect whether the PM failures were caused by participants' retrospective memory failures. In other words, the questionnaire was administered to examine the retrospective component of PM. PEQ included questions about the keys that participants were required to press during the task and the perceived importance of the tasks. Participants indicated the perceived importance by rating from 1 to 5. The PEQ is shown in Appendix E.

Results of the PEQ revealed that most of the participants understood the instructions for ongoing targets (95.2 %), ongoing non-targets (98.4 %) and PM targets (96.8 %). Besides, perceived importance of the ongoing task (M = 3.83, SD = .91) and the PM task (M = 4.30, SD = .78) were similar.

2.2.2.2. Computer-Based Experimental Tasks

EB-PM was assessed through computer-based experimental tasks. Einstein and McDaniel (1990: 718) indicated that PM performance must be recorded while one is engaging in another ongoing task. Accordingly, in this study, PM task was embedded in a 1-back working memory task. Consequently, a computer-based EB-PM, which included 1-back working memory task and PM task, was designed. Besides, a program for presenting to participants the PM targets and the recognition test was created.

All experimental tasks were designed via PsychoPy 2.0 software (Peirce et al. 2019). Throughout the computer-based tasks, pictures were presented in the same image size (0.8, 0.8) on the same background (0.95, 0.95, 0.95). Instructions on the tasks were also presented in the same height (0.05) and font (Times New Roman).

2.2.2.2.1. Stimuli Selection

Pictures used in the experimental tasks were selected from International Affective Picture System (IAPS) (Lang et al. 2008). IAPS was developed as a picture database to be used in experimental emotion studies (e.g., Altgassen et al. 2010; Cona et al. 2015; Xian et al. 2020). It consists of more than 1000 pictures classified in valence, arousal, and dominance levels (Lang et al. 2008). However, valence and arousal levels were considered in the content of this study. Pictures in IAPS were assessed using Self-Assessment Manikin (SAM; Lang 1980) scale, in which each picture was rated for valence, arousal, and dominance levels with the value ranging from 1 to 9. Normative ratings of IAPS have not been obtained for the Turkish sample. Therefore, normative ratings obtained from approximately 100 university students at the University of Florida (Lang et al. 2008) were used in this study.

A total of 155 colored pictures were selected from the IAPS to divide into five groups (i.e., PM targets, recognition task stimuli, practice trial stimuli, ongoing targets, and ongoing non-targets). Ten of the pictures were selected to be the PM targets, 10 of them were selected to be used in the recognition task, 10 of them were selected to be used in the practice trial, 80 of them were selected to be the ongoing non-targets, and 45 of them were selected to be the ongoing targets. These pictures were selected from five different emotional categories (i.e., positive-high arousal, positive-low arousal, neutral, negative-high arousal, and negative-low arousal). Apart from stimuli in the practice trial, which included only the neutral pictures, each group included an equal number of stimuli from each emotional category. Totally, 29 of these selected pictures were positive-high arousal, 29 of them were positive-low arousal, 39 of them were neutral, 29 of them were negative-high arousal, and 29 of them were negative-low arousal. The IAPS numbers of the pictures used in the study are listed in Appendix F. The maximum/minimum valence and arousal ratings of the pictures on a scale of 1-9 (1: highly negative/low arousal; 9: being highly positive/high arousal) are shown in Table 5.

Table 5: Valence and Arousal Ranges of Pictures Selected from Each Emotional Category

Emotional Category	***n***	**Valence**		**Arousal**	
		Min	**Max**	**Min**	**Max**
Positive-High Arousal	29	6.16	8.1	5.54	7.35
Positive-Low Arousal	29	6.84	8.06	2.67	4.37
Neutral	39	4.13	5.79	4.11	5.64
Negative-High Arousal	29	2.46	4.32	5.35	6.93
Negative-Low Arousal	29	1.95	4.25	2.63	4.53

Min: Minimum, Max: Maximum

All positive pictures (M = 7.25, SD = .41) were significantly different from negative pictures (M = 3.35, SD = .58) in terms of their valence levels, $t(114) = 42.06$, $p < .001$. Similarly, all high arousal pictures (M = 6.34, SD = .40) were significantly different from low arousal pictures (M = 3.85, SD = .46) in terms of their arousal levels, $t(114) = 30.82$, $p < .001$. Means and standard deviations of pictures from each emotional category and group of stimuli are shown in Table 6. Within each group of stimuli, statistical comparisons between emotional categories are presented in Table 7.

Table 6: Means and Standard Deviations of Pictures from Each Emotional Category and Group of Stimuli

	n	*M*	*SD*
PM Targets			
Valence			
Positive Valence	4	7.3	.31
Negative Valence	4	3.41	.52
Neutral Valence	2	5.01	.03
Arousal			
High Arousal	4	6.29	.24
Low Arousal	4	3.95	.21
Neutral Arousal	2	4.78	.21
Recognition Task Stimuli			
Valence			
Positive Valence	4	7.18	.14
Negative Valence	4	3.55	.53
Neutral Valence	2	4.92	.1
Arousal			
High Arousal	4	6.29	.19
Low Arousal	4	3.09	.29
Neutral Arousal	2	4.77	.75
Ongoing Task Stimuli			
Valence			
Positive Valence	50	7.25	.43
Negative Valence	50	3.33	.59
Neutral Valence	25	4.97	.42
Arousal			
High Arousal	50	6.34	.43
Low Arousal	50	3.91	.44
Neutral Arousal	25	4.76	.50
Practice Trial			
Valence			
Neutral Valence	10	5.23	.47
Arousal			
Neutral Arousal	10	4.7	.46

M: Mean, *SD*: Standard Deviation

Table 7: Independent Samples T-Test Results of Valence and Arousal Comparisons for Each Group of Stimuli

	t	*df*	*p*
PM Targets			
Valence			
Positive – Negative	12.88	6	< .001
Positive – Neutral	10.00	4	< .01
Negative – Neutral	4.09	4	< .05
Arousal			
High Arousal – Low Arousal	14.49	6	< .001
High Arousal – Neutral Arousal	7.43	4	< .01
Low Arousal – Neutral Arousal	4.49	4	< .05
Recognition Task Stimuli			
Valence			
Positive – Negative	13.24	6	< .001
Positive – Neutral	20.10	4	< .001
Negative – Neutral	3.43	4	< .05
Arousal			
High Arousal – Low Arousal	18.60	6	< .001
High Arousal – Neutral Arousal	4.30	4	< .05
Low Arousal – Neutral Arousal	4.30	4	< .05
Ongoing Task Stimuli			
Valence			
Positive – Negative	37.92	98	< .001
Positive – Neutral	21.82	73	< .001
Negative – Neutral	12.41	73	< .001
Arousal			
High Arousal – Low Arousal	28.22	98	< .001
High Arousal – Neutral Arousal	14.24	73	< .001
Low Arousal – Neutral Arousal	7.58	73	< .001

2.2.2.2.2. 1-Back Working Memory Task

The original N-Back Task was developed by Kirchner (1958). The task requires participants to detect whether the presented stimulus is the same as the N previous stimulus. For instance, in a 1-back task, participants are to detect whether the presented stimulus is the same as the previous one. In a 2-back task, participants are to detect whether the presented stimulus is the same as the presented two previous. Depending on the purpose of the studies, different types of stimuli (e.g., letters, pictures) have been used in N-back tasks (e.g., Altgassen et al. 2010; Amon and Bertenthal 2018; Lui et al. 2021). In the content of this study, a 1-back task that included pictures as stimuli was administered as an ongoing task. Therefore, participants were required to decide whether the picture they saw was the same as the picture they had seen previously. The pictures presented twice consecutively were named “ongoing targets”, and the pictures presented once were named “ongoing non-targets”. Apart from the EB-PM task, a practice trial of 1-back task, which included ten neutral pictures (two targets and eight non-targets), was also designed.

In the relevant literature, most studies (e.g., Altgassen et al. 2010: 1060; Cona et al. 2015: 4; Hering et al. 2018: 5; Xian et al. 2020: 3) indicated that they used 24% of all stimuli as ongoing targets. Thus, in this study, 80 ongoing non-targets and 45 ongoing targets, which were 25% of all stimuli presented in EB-PM task, were presented. 25% of stimuli were ongoing targets, instead of 24%, to present an equal number of ongoing task stimuli between PM targets. Both ongoing targets and ongoing non-targets included the equal number of pictures in five emotional categories. In the 1-back task, each picture was displayed for 3000 ms. in random order. Within this 3000 ms., participants were required to press “C” key if the picture was the same as the previous one and “N” key if the picture was not the same as the previous one. A blank screen was displayed for 1000 ms. between the pictures. Participants were instructed to make their responses as correctly and quickly as possible.

2.2.2.2.3. Presenting the Prospective Memory Target Pictures

In the PM task, a total of ten pictures (two pictures from each emotional category) were determined as the PM targets. Participants were required to learn these pictures before the EB-PM task. Hence, a program that included these pictures was created. Participants were instructed that they must memorize each picture in order to be successful in a subsequent task. They were free to examine the picture for as long as they needed. They quitted the program when they were sure that they could remember all of the pictures later. The duration that they studied the pictures was recorded.

2.2.2.2.4. Event-Based Prospective Memory (EB-PM) Task

In the content of the EB-PM task, a PM task was embedded in the 1-back working memory task. Participants completed the PM task and 1-back task simultaneously. The EB-PM task included 11 blocks. In order to equalize the number of pictures from each emotional category in ongoing targets, ongoing non-targets, and PM targets, the first block consisted of 21, and the last block consisted of 15 pictures. The rest of the blocks consisted of 16 pictures. Previous studies indicated that PM targets were presented in a specific order (e.g., Altgassen et al. 2010: 1060; Henry et al. 2015: 5). Accordingly, apart from the last block, each block ended with a PM target. Ten PM targets were displayed for every 15 stimuli in this study except from the first block. In other words, PM targets' positions in the experimental flow were fixed (i.e., 21st, 37th, 53rd, 69th, 85th, 101st, 177th, 133rd, 149th, 165th pictures). By this means, participants responded to approximately the equal amount of ongoing task stimuli between PM targets. The presentation order of PM targets changed randomly across participants. Besides, in the first block, there were five ongoing targets and ten ongoing non-targets. Other blocks consisted of four ongoing targets and seven non-targets. Apart from ten PM targets, stimuli were also presented in random order. In a similar fashion, all of the ongoing targets and non-targets were displayed randomly between each other. Additionally, in which order the ongoing targets and non-targets were presented was also randomly determined.

Consequently, 80 ongoing non-targets, 45 ongoing targets, and 10 PM targets were displayed in the EB-PM task. Ongoing targets were displayed twice consecutively, whereas ongoing non-targets and PM targets were displayed once. Hence, participants were presented 180 pictures throughout the EB-PM task. Each picture was displayed for 3000 ms. Between the pictures, a blank screen was displayed for 1000 ms. Meanwhile, participants were required to press as correctly and quickly as possible "C" key if the picture was the same as previous one, "N" key if the picture was not the same as the previous one, and "Q" key if the picture was one of the PM targets. An example block consisted 16 pictures is presented in Figure 2.

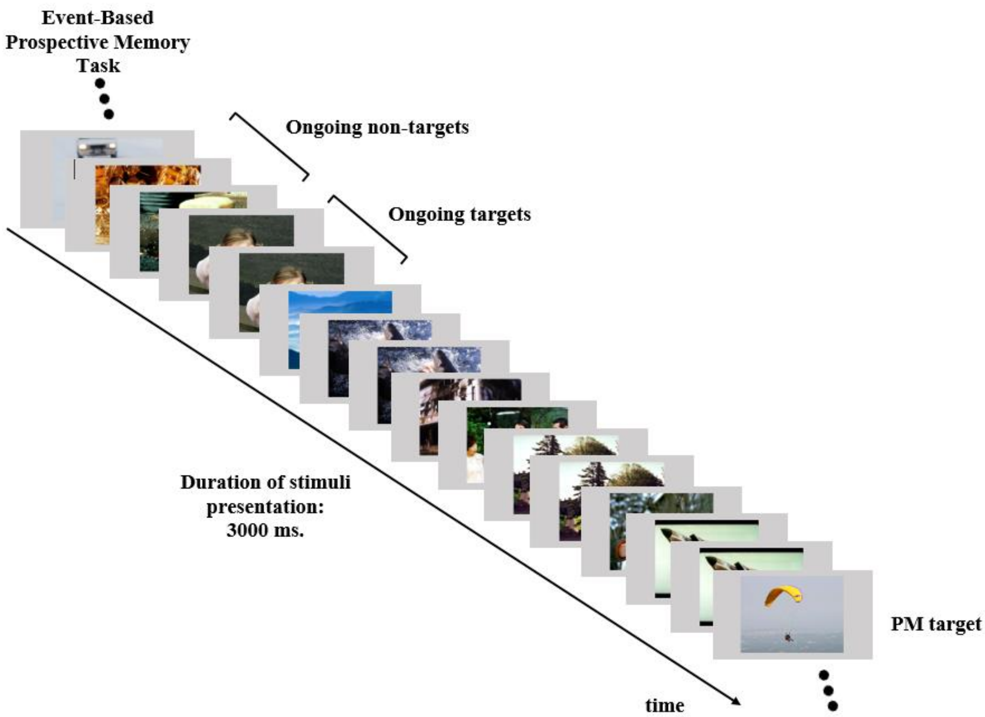

Figure 2: An Example Block from EB-PM Task

2.2.2.2.5. Recognition Test

To assess the retrospective component of EB-PM, a recognition test consisting of ten distractor pictures in addition to ten PM targets was administered. These distractor pictures included two pictures from each emotional category. Participants were instructed to press "C" key if the picture they were presented was one of the pictures they had studied before and "N" key if it was not one of the pictures they had studied. Twenty pictures were presented randomly across participants, and there was no specific duration for the pictures' presentation. Pictures were displayed until the participant made a response.

2.3. RESEARCH DESIGN

The experimental design of the study was 3 (valence: positive, negative, and neutral) x 2 (arousal: high and low) within-subjects. The independent variables of the study were emotional valence levels of the pictures and emotional arousal levels of the pictures. On the other hand, the dependent variables were reaction time and accuracy percentage depending on participants' responses in the EB-PM task. Each participant participated in each condition. Furthermore, in each condition, equal number of female and male participants were participated in the study. The experimental design of the study is presented in Table 8.

Table 8: Experimental Design of the Study

N = 63	**Valence**	**Positive**	**34 Female** **29 Male**
		Negative	
		Neutral	
	Arousal	**High**	
		Low	

2.4. PROCEDURE

Before starting the data collection, ethical approval was obtained from the Çankaya University Scientific Research and Publication Ethics Committee (16.09.2021, issue: E-90705970-605-87979). Ethical approval is shown in Appendix G. All of the participants were recruited from Çankaya University. The study was announced on social media and via posters, including detailed information about the study. The study was conducted in two sessions. The first session was the online survey session, and the second session was the experimental session. The experimental session was conducted face-to-face in a quiet room in the Çankaya University Psychology Department. Participants attended the second session individually.

For the first session, an online survey was created via Qualtrics online survey system to obtain demographical information of the participants and to determine the participants who would be invited for the second session. In the survey, participants were informed about the nature of the study via an informed consent form. The informed consent that participants were given in the online survey session is presented in Appendix H. In the following part of the survey, they filled out the Demographic Information Form and BDI. Participants who had no psychiatric/neurological disorder did not have one of the specific fears at an extreme level and got a score of 16 and below from BDI were invited for the second session. They were contacted through contact addresses they indicated in the survey (i.e., e-mail address or phone number). Appointments were made within ten days after they filled out the online survey.

The second session of the study was the experimental session. All of the participants participated in the same room. When the participants arrived in the room, they read and signed the informed consent that contained information about the nature of the study. Informed consent that was given in the experimental session is shown in Appendix I. Thereafter, the computer-based experimental tasks and filler tasks were applied. All of the computer-based tasks were presented via a 15.6-inch laptop computer. First, a practice trial of the 1-back working memory task was applied. In the practice trial, each picture was presented for 3000 ms., and a blank screen was displayed for 1000 ms. between the pictures. During each picture was on the screen, participants were required to press “C” key if the presented picture was the same as the previous one and “N” key if the presented picture was not the same as the previous one. After the practice trial, participants studied the PM targets. Ten PM targets were presented one by one. Participants were instructed to study the pictures until they became sure of they could remember them when they saw them later. The mean, standard deviation, minimum and maximum duration that participants studied the pictures are shown in Table 9.

Table 9: Mean, Standard Deviation, Minimum and Maximum Study Duration and Delay between Instructions and the EB-PM Task.

Variables	***M***	***SD***	**Min.**	**Max.**
Study Duration (sec.)	96.76	56.38	36	433
Delay (sec.)	503.43	16.79	458	551

M: Mean, *SD*: Standard Deviation, Min: Minimum, Max: Maximum

Once participants indicated they finished the studying, instructions for the EB-PM task in which they would be performing 1-back working memory task (ongoing task) and PM task simultaneously were given. Thereafter, participants were asked to repeat the instructions to ensure that they understood the tasks clearly. In order to give an approximately 8-minutes delay between the instructions and the EB-PM task, filler tasks were applied. Filler tasks were the PANAS and the Coding Test. Before and after each task, 90 seconds break was given. Application order of the filler tasks is presented in Figure 3. The mean, standard deviation, minimum and maximum duration of the delay are shown in Table 9.

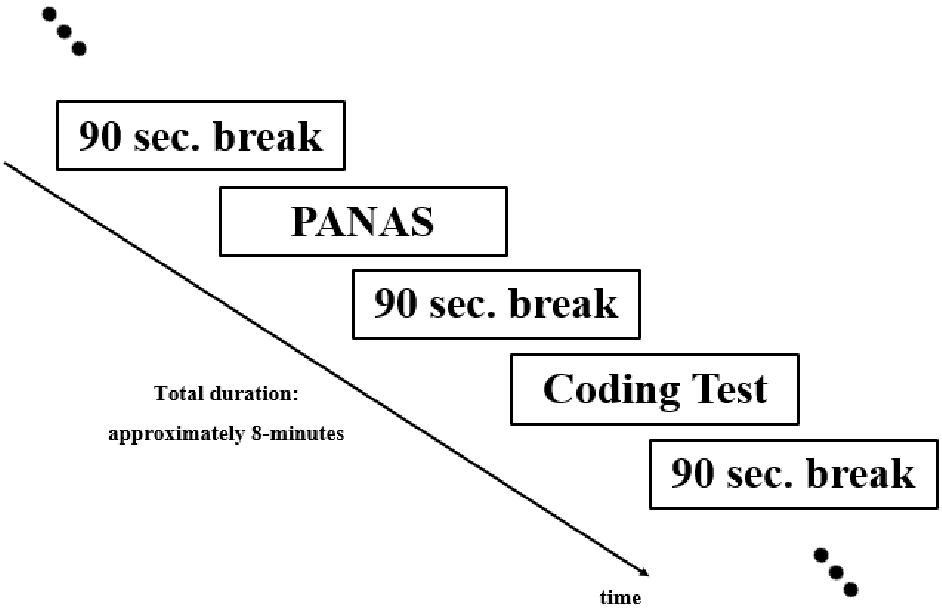

Figure 3: Application Order of the Filler Tasks

After the delay, participants performed the EB-PM task. Any reminders about the task's requirements were not given to the participants at the beginning of the task. They were told that they were continuing the computer-based experimental tasks. In the EB-PM, apart from the 1-back working memory task, participants were required to press "Q" key whenever they saw one of the PM targets. As in the practice trial, each picture was presented for 3000 ms., and a blank screen was displayed for 1000 ms. between the pictures. The EB-PM task lasted approximately 12 minutes. After they completed the EB-PM task, participants were given the recognition test. They were instructed that if the picture they saw was one of the pictures they had studied before, press the "C" key, and if it was not, press "N" key. Pictures were displayed on the screen until participants made a response. Instructions of the tasks in the experimental session is presented in Appendix J. Lastly, participants filled out the PEQ. At the end of the session, participants were thanked and dismissed. The experimental session lasted approximately 35 minutes. ₺75 Trendyol Digital Shopping Coupons were given to each volunteer who participated in both sessions.

CHAPTER III

RESULTS

In this section, the results of statistical analyses were reported. All of the analyses were conducted via the Statistical Package of Social Sciences (SPSS), Version 23 (IBM SPSS Statistics for Windows Version 23, IBM Corp.).

The main aim of the study was to investigate effects of emotional valence and emotional arousal on EB-PM performance. EB-PM performance were recorded as accuracy percentage and reaction time according to participants' responses in the PM task. Accuracy percentage and reaction time were calculated separately for the pictures from each emotional category (i.e., positive-high arousal, positive-low arousal, neutral, negative-high arousal, and negative-low arousal). In this respect, 3 (valence: positive, negative and neutral) x 2 (arousal: high and low) repeated measures ANOVA was conducted on accuracy percentage and reaction time separately. Moreover, bivariate correlations among ongoing task performance and PM task performance (in terms of both accuracy and reaction time) were conducted to examine whether performance on these two tasks were correlated with each other. Besides, bivariate correlations among PANAS scores and PM task performance were also evaluated. Additionally, results of recognition test in terms of mean, standard deviation, minimum and maximum scores were presented.

3.1 DATA PROCESSING AND DATA CLEANING

Before conducting ANOVA analyses, first, the assumption of normality was considered. According to central limit theorem; if the sample size of the study is large enough, the sampling distribution is assumed as normal distribution (Lumley et al. 2002: 151). In the large samples, parametric tests may be conducted, regardless of the normality assumption (Field 2013). In this case, large sample is usually expressed as sample size greater than 30. Since the sample of this study consisted of 63 participants, normality assumption was not considered as an issue. Besides, it is stated that in the studies with large samples, evaluating the outliers are more important that the normality assumption (Field 2013; Lumley et al. 2002: 156). Hence, secondly the outliers were examined. To do so, participants' overall EB-PM performance in terms of accuracy percentage and reaction time values were standardized. The z-values above and below 3.29 were indicated as outliers and must be removed from the data set (Tabachnick and Fidell 2013: 346). Accordingly, standardized (z-values) PM accuracy (%) and reaction time (ms.) values were examined. None of the participants' scores was above and below the 3.29. So, any data was not removed from the data set and analyses conducted with the 63 participants' scores.

Last, potential gender effects on PM performance were examined. Whether the PM task performance of female participants differed from male participants was analyzed through independent samples t-test. Results revealed that female and male participants did not differ in terms of both overall accuracy percentage ($p > .05$) and reaction time ($p > .05$). Therefore, gender was not considered as an independent variable in the further analyses.

3.2. RESULTS OF THE PM TASK PERFORMANCE

3.2.1. Results of Accuracy Percentage

In order to compare the effects of emotional valence (positive, negative and neutral) and arousal (high and low), a 3 x 2 repeated measures ANOVA was conducted on accuracy percentage in the PM task.

The results showed that there was a significant main effect of emotional valence on the PM accuracy ($F(2,124) = 6.02$, $p < .01$, $\eta p^2 = .088$). Accuracy percentage for negative pictures in the PM task ($M = 93.65$, $SE = 2.04$) was found to be significantly (marginal, $p = .062$) higher than the positive pictures ($M = 89.29$, $SE = 2.24$). Therefore, hypothesis 1c which indicated the scores of negative pictures would be higher than positive pictures, was supported. Similarly, accuracy percentage for neutral pictures in the PM task ($M = 96.03$, $SE = 2.06$) was significantly higher than the positive pictures ($p < .05$). So, hypothesis 1b which suggested the scores of positive pictures would be higher than neutral ones, was not supported. In contrast, results showed an opposite pattern. There was no significance difference between negative and neutral pictures. Hence, hypothesis 1a, which suggested the scores of negative pictures would be higher than neutral ones, was not supported.

The main effect of emotional arousal was also found to be significant ($F(1,62) = 9.35$, $p < .01$, $\eta p^2 = .131$). Results indicated that accuracy percentage for the pictures at low arousal levels ($M = 95.24$, $SE = 1.66$) was higher than the pictures at high arousal levels ($M = 90.74$, $SE = 2.16$). In hypothesis 3, it was suggested scores of pictures at high arousal levels would be higher than low arousal levels. Results showed an opposite pattern. So, hypothesis 3 was not supported. The main effects of emotional valence and emotional arousal are shown in Figure 4 and Figure 5, respectively.

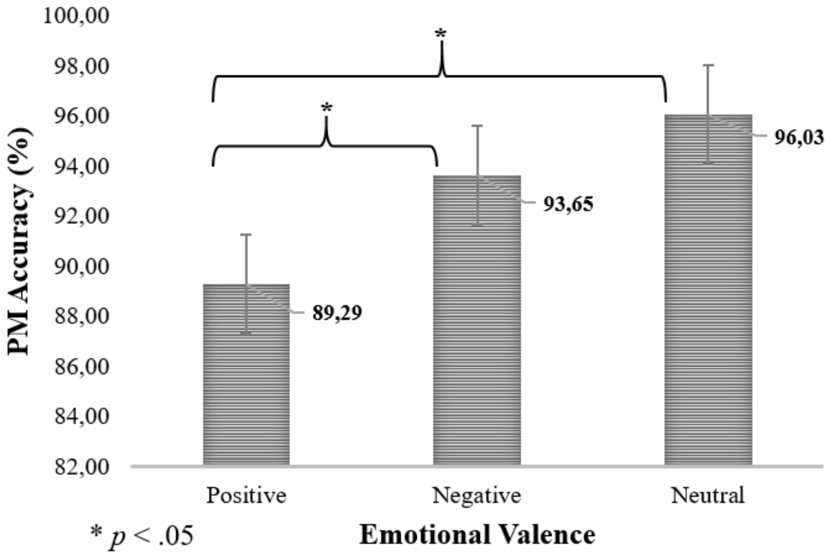

Figure 4: The Main Effect of Emotional Valence on Accuracy Percentage in the PM Task

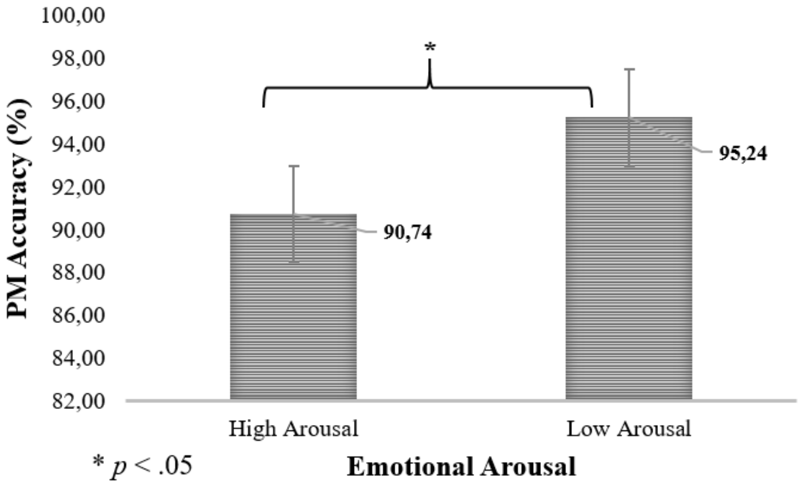

Figure 5: The Main Effect of Emotional Arousal on Accuracy Percentage in the PM Task

Besides, emotional valence and emotional arousal had a significant interaction effect on accuracy percentage ($F(2,124) = 6.79$, $p < .01$, $\eta_p^2 = .099$). The interaction effect is presented in Figure 6. As further analyses, to compare the accuracy percentage for pictures in each emotional category (i.e., positive-high arousal, positive-low arousal, neutral, negative-high arousal, and negative-low arousal), paired samples t-tests were conducted. A total of eight comparisons were examined. In order to determine the significance level, the sequential Bonferroni correction procedure (Holm 1979) was used. Accordingly, the smallest p value was .000 for comparison of positive-high arousal and neutral pictures. Since it was lower than .006 (.05/8), the difference between accuracy percentage for positive-high arousal (M = 83.33, SD = 28.40) and neutral pictures (M = 96.03, SD = 16.32) was significant. The second smallest p value was .001 for the comparison of positive-high arousal and positive-low arousal pictures. Results showed that accuracy percentage for positive-low arousal pictures (M = 95.24, SD = 14.80) was significantly higher than positive-high arousal ones (.05/7 = .007, p < .007). The next smallest p value was .004 which is smaller than .05/6 = .008 for the comparison of positive-high arousal and negative-high arousal pictures. Hence, accuracy percentage for negative-high arousal (M = 92.86, SD = 19.80) pictures was found to be higher than positive-high arousal pictures. Other comparisons were found to be insignificant. It was hypothesized that scores of both negative-high arousal and positive-high arousal pictures would be higher than neutral ones (hypothesis 5a-5b). However, such differences were not found. So, hypothesis 5a and hypothesis 5b was not supported. On the other hand, as hypothesized, scores of negative-high arousal pictures were higher than positive-high arousal pictures (hypothesis 5c). Hence, hypothesis 5c was fully supported. Since any significant differences among low arousal pictures were not found, hypothesis 5d which suggested scores of positive-low arousal pictures would not differ from negative-low arousal pictures, was also fully supported. The results of paired samples t-tests on PM accuracy is presented in Table 10.

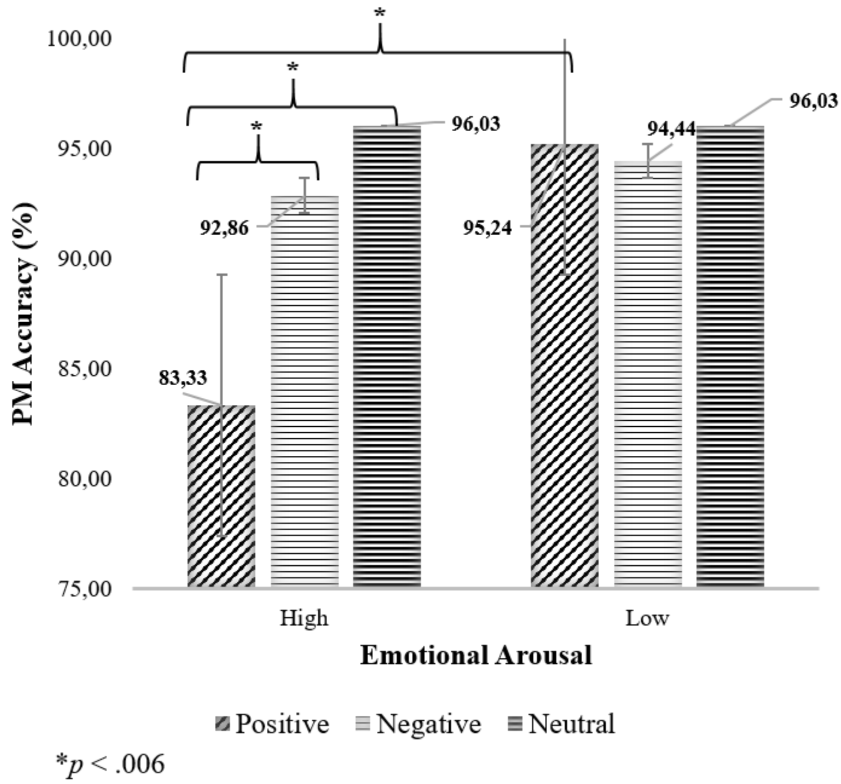

Figure 6: The Interaction Effect of Emotional Valence and Emotional Arousal on Accuracy Percentage in the PM Task

Table 10: Results of Paired Samples T-Tests on PM Accuracy

Comparisons	*t*	*df*	*p*
Positive/High Arousal – Positive/Low Arousal	-3.38	62	**.001****
Positive/High Arousal – Negative/High	-3.00	62	**.004*****
Positive/High Arousal – Neutral	-3.75	62	**.000***
Negative/High Arousal – Negative/Low	-.63	62	.531
Negative/High Arousal – Neutral	-1.27	62	.208
Positive/Low Arousal – Negative/Low Arousal	.33	62	.742
Positive/Low Arousal – Neutral	-.38	62	.709
Negative/Low Arousal - Neutral	-.81	62	.419

*$p < .006$, **$p < .007$, $p < .008$

3.2.2. Results of Reaction Time

In order to compare the effects of emotional valence (positive, negative, and neutral) and arousal (high and low), a 3 x 2 repeated measures ANOVA was conducted on reaction time in the PM task.

ANOVA results revealed a significant main effect of emotional valence on reaction time in the PM task, ($F(2,124) = 4.12$, $p < .05$, $\eta_p^2 = .062$). Reaction time for the positive pictures (*M* = 1259.50, *SE* = 37.11) and the negative pictures (*M* = 1255.38, *SE* = 34.84) were significantly slower than the neutral pictures (*M* = 1170.47, *SE* = 36.27). It was hypothesized that reaction times for both negative and positive pictures would be longer than neutral pictures (hypothesis 2a-2b). Therefore, both hypothesis 2a and hypothesis 2b was fully supported. However, hypothesis 2c which suggested reaction times for negative pictures would be longer than positive pictures, was not supported.

The main effect of emotional arousal was also found to be significant ($F(1,62) = 9.42$, $p < .01$, $\eta_p^2 = .132$). Reaction time for the pictures at high arousal levels (*M* = 1259.21, *SE* = 32.96) was slower than the pictures at low arousal levels (*M* = 1197.70, *SE* = 31.07). So, hypothesis 4 which suggested reaction times for pictures at high arousal levels would be longer than low arousal levels, was fully supported. The main effects of emotional valence and emotional arousal are presented in Figure 7 and Figure 8, respectively.

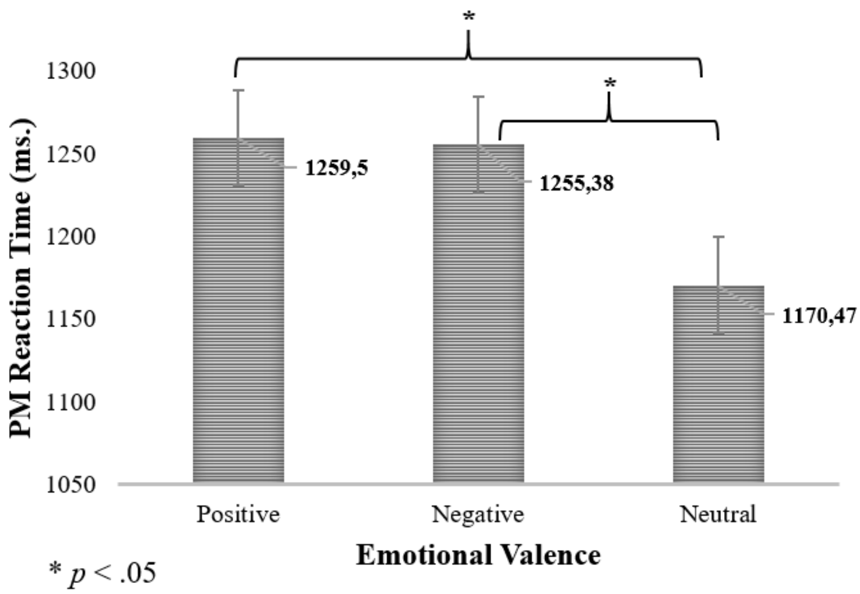

Figure 7: The Main Effect of Emotional Valence on Reaction Time in the PM Task

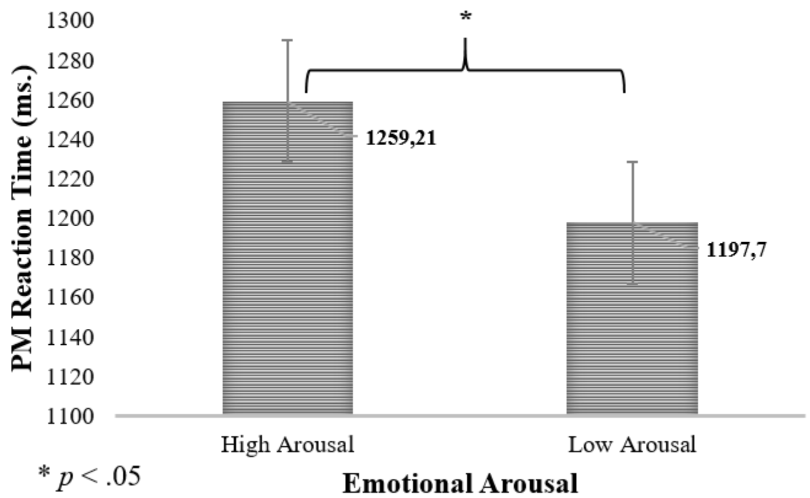

Figure 8: The Main Effect of Emotional Arousal on Reaction Time in the PM Task

Additionally, the interaction effect of emotional valence and emotional arousal on the reaction time in the PM task was not found to be significant ($F(2,124) = 2.61$, $p = .077$, $\eta_p^2 = .040$). The interaction effect is shown in Figure 9. However, a series of paired samples t-test was conducted on the basis of the hypotheses to compare the reaction time for pictures in each emotional category. Eight comparisons were made using Holm's sequential Bonferroni method (Holm 1979). The smallest p value was .002 (.05/8 = .006, $p < .006$) for the comparison between positive-high arousal and neutral pictures. Hence, reaction times for neutral pictures (M = 1170.47, SD = 287.92) were found to be significantly longer than positive-high arousal ones (M = 1330.62, SD = 396.20). Other comparisons were not insignificant. So, hypothesis 6a which suggested reaction times for positively valenced pictures at high arousal levels would be longer than neutral ones, was supported. However, hypothesis 6b which indicated reaction times for negatively valenced pictures at high arousal levels would be longer than neutral ones, was not supported. Additionally, it was hypothesized that reaction times for positive low arousal pictures would not differ from negative low arousal pictures (hypothesis 6c). Since no significant difference among pictures at low arousal levels, hypothesis 6c was fully supported. Results of paired samples t-tests on reaction time is shown in Table 11.

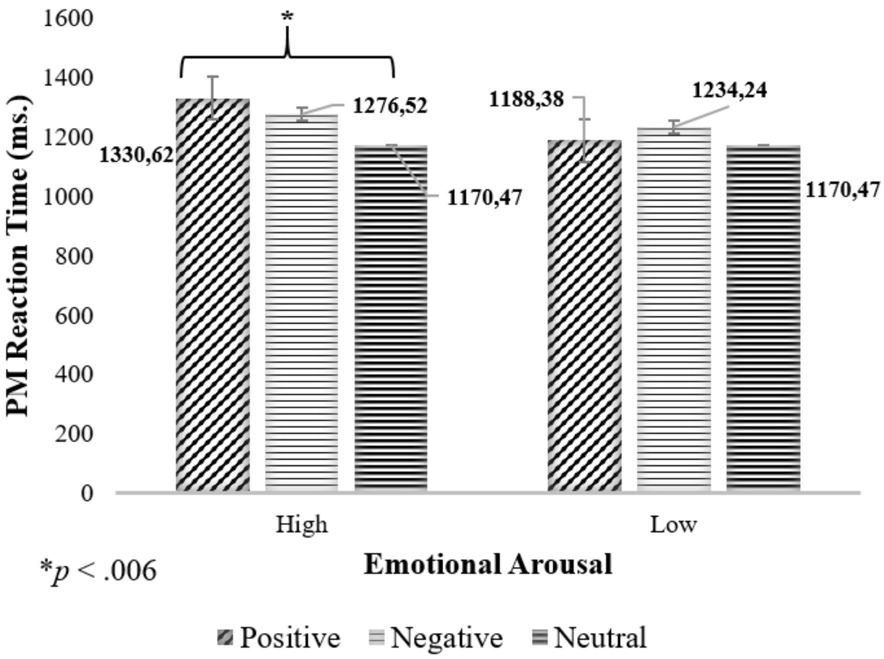

Figure 9: The Interaction Effect of Emotional Valence and Emotional Arousal on Reaction Time in the PM Task

Table 11: Results of Paired Samples T-Tests on Reaction Time

Comparisons	*t*	*df*	*p*
Positive/High Arousal – Positive/Low Arousal	2.71	62	.009
Positive/High Arousal – Negative/High Arousal	.79	62	.436
Positive/High Arousal – Neutral	3.24	62	**.002***
Negative/High Arousal – Negative/Low Arousal	.84	62	.405
Negative/High Arousal – Neutral	2.32	62	.024
Positive/Low Arousal – Negative/Low Arousal	-1.11	62	.272
Positive/Low Arousal – Neutral	.48	62	.637
Negative/Low Arousal - Neutral	1.94	62	.057

*$p < .006$

3.3. BIVARIATE CORRELATIONS AMONG THE ONGOING TASK AND THE PM TASK PERFORMANCE

To evaluate whether the ongoing task performance was correlated with the PM task performance, bivariate correlation was conducted on accuracy percentage and reaction time of the tasks separately. The results are presented below.

3.3.1. Results of Accuracy Percentage

The correlation matrix of the ongoing task and PM task in terms of accuracy percentage is shown in Table 12. Results showed that overall accuracy of the ongoing task was not correlated with overall accuracy of the PM task ($p > .05$). So, hypothesis 7 which suggested overall ongoing task accuracy would be significantly correlated with overall PM accuracy, was not supported. Considering each emotional category separately, significant positive correlation was only found in negative-high arousal pictures. Namely, accuracy percentage in the ongoing task for negative-high arousal pictures was significantly correlated with accuracy percentage in the PM task for negative-high arousal pictures ($p < .05$).

Table 12: Correlation Among Accuracy Percentage in the Ongoing Task and the PM Task

	1	2	3	4	5	6	7	8	9	10	11	12
1. Positive/High Arousal (OT)		**.988****	**.984****	**.991****	**.992****	**.996****	.101	-.002	**.252***	.066	.111	.150
2. Positive/Low Arousal (OT)			**.981****	**.992****	**.991****	**.995****	.063	-.007	.209	.037	.069	.106
3. Negative/High Arousal (OT)				**.981****	**.984****	**.991****	.082	.066	**.249***	.078	.110	.159
4. Negative/Low Arousal (OT)					**.991****	**.996****	.076	-.014	.212	.051	.071	.114
5. Neutral (OT)						**.997****	.068	.010	.221	.065	.100	.128
6. Overall OT Accuracy							.078	.011	.230	.059	.093	.132
7. Positive/High Arousal (PMT)								**.288***	**.502****	**.520****	**.377****	**.806****
8. Positive/Low Arousal (PMT)									**.295***	**.349****	**.422****	**.582****
9. Negative/High Arousal (PMT)										**.448****	**.410****	**.737****
10. Negative/Low Arousal (PMT)											**.603****	**.787****
11. Neutral (PMT)												**.725****
12. Overall PMT Accuracy												

PMT: Prospective Memory Task, OT: Ongoing Task

**p* < .05, ***p* < .01

3.3.2. Results of Reaction Time

The correlation matrix of the ongoing task and PM task in terms of reaction time is shown in Table 13. Results revealed a significant positive correlation between overall reaction time in the ongoing task and overall reaction time in the PM task ($p < .01$). This finding is in line with the hypothesis 8 which suggested reaction times in the ongoing task would be significantly correlated with reaction times in the PM task. Moreover, except from negative-high arousal pictures, significant positive correlation between reaction times in the ongoing task and the PM task for pictures in each emotional category was found. Reaction time in the ongoing task for negative-high arousal pictures was not significantly correlated with reaction time in the PM task for negative-high arousal pictures.

Table 13: Correlation Among Reaction Time in the Ongoing Task and the PM Task

	1	2	3	4	5	6	7	8	9	10	11	12
1. Positive/High Arousal (OT)		**.881****	**.876****	**.909****	**.903****	**.318***	**.961****	**.423****	**.437****	**.306***	**.458****	**.555****
2. Positive/Low Arousal (OT)			**.916****	**.866****	**.879****	.211	**.951****	**.348****	**.432****	**.311***	**.443****	**.494****
3. Negative/High Arousal (OT)				**.828****	**.851****	.204	**.935****	**.344****	.340	**.348****	**.405****	**.462****
4. Negative/Low Arousal (OT)					**.932****	**.298****	**.956****	**.362****	**.405****	**.302***	**.467****	**.521****
5. Neutral (OT)						.231	**.959****	**.408****	**.435****	**.284***	**.406****	**.503****
6. Overall OT Reaction Time							**.275***	**.400****	**.430****	**.328****	**.463****	**.538****
7. Positive/High Arousal (PMT)								**.342****	.018	**.374****	**.379****	**.582****
8. Positive/Low Arousal (PMT)									**.425****	**.428****	**.520****	**.753****
9. Negative/High Arousal (PMT)										**.324****	**.448****	**.657****
10. Negative/Low Arousal (PMT)											**.596****	**.748****
11. Neutral (PMT)												**.810****
12. Overall PMT Reaction Time												

PMT: Prospective Memory Task, OT: Ongoing Task

*$p < .05$, **$p < .01$

3.4. BIVARIATE CORRELATIONS AMONG PANAS SCORES AND PM TASK PERFORMANCE

Apart from the main hypotheses of the study, in order to detect whether participants' mood was correlated with the PM performance, bivariate correlation analysis was conducted. The correlational results among PANAS scores, PM accuracy (%) and PM reaction time (ms.) are presented in Table 14 and Table 15, respectively.

Table 14: Correlation Among PANAS Scores and PM Task Accuracy

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. PANAS Positive Affect		-.194	.106	-.098	-.100	.134	-.089	.008
2. PANAS Negative Affect			**-.285***	-.141	-.162	**-.273***	-.247	**-.310***
3. Positive/High Arousal (PMT)				**.288***	**.502****	**.520****	**.377****	**.806****
4. Positive/Low Arousal (PMT)					**.295***	**.349****	**.422****	**.582****
5. Negative/High Arousal (PMT)						**.448****	**.410****	**.737****
6. Negative/Low Arousal (PMT)							**.603****	**.787****
7. Neutral (PMT)								**.725****
8. Overall PM Accuracy								

PMT: Prospective Memory Task, OT: Ongoing Task

$^{*}p < .05$, $^{**}p < .01$

Considering the PM task accuracy, negative affect was found to be negatively correlated with the overall PM accuracy ($p < .05$). So, Hypothesis 9b which suggested negative affect scores on PANAS would be negatively correlated with overall PM accuracy, was fully supported. On the other hand, such correlation was not found for positive affect ($p > .05$). Hence, Hypothesis 9a which suggested positive affect scores on PANAS would be positively correlated with overall PM accuracy, was not supported. In a similar fashion, both positive and negative affect was not found to be significantly correlated with PM task performance for any emotional category.

Table 15: Correlation Among PANAS Scores and PM Task Reaction Time

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. PANAS Positive Affect		-.194	.029	-.011	-.116	-.148	**-.273***	-.135
2. PANAS Negative Affect			-.066	-.208	.099	.053	.015	-.022
3. Positive/High Arousal (PMT)				**.342****	.018	**.374****	**.379****	**.582****
4. Positive/Low Arousal (PMT)					**.425****	**.428****	**.520****	**.753****
5. Negative/High Arousal (PMT)						**.324****	**.448****	**.657****
6. Negative/Low Arousal (PMT)							**.596****	**.748****
7. Neutral (PMT)								**.810****
8. Overall PM Reaction Time								

PMT: Prospective Memory Task, OT: Ongoing Task

*p < .05, **p < .01

On the other hand, results showed that there was no correlation between positive affect and overall PM reaction time ($p > .05$), and negative affect and overall PM reaction time ($p > .05$). It was hypothesized that positive affect would be negatively correlated with overall PM reaction times (Hypothesis 10a) and negative affect would be positively correlated with overall PM reaction times (Hypothesis 10b). However, results did not support both Hypothesis 10a and Hypothesis 10b. Besides for each emotional category, only between positive affect and the reaction time for neutral pictures there was significant negative correlation ($p < .05$). Apart from that, reaction time for any other emotional category was not found to be correlated with both positive and negative affect.

3.5. RESULTS OF THE RECOGNITION TEST

In the context of this study, recognition test was applied to test the retrospective component of the PM. Recognition test scores were recorded by calculating the percentage of correct responses. Results showed that recognition performance was close to ceiling. In other words, most of the participants recognized all of the PM targets correctly. Therefore, hypothesis 11 which suggested all participants would discriminate all PM targets from distractors was supported. Mean, standard deviation, minimum and maximum scores obtain from recognition test is shown in Table 16.

Table 16: Results of Recognition Test

	M	***SD***	**Min.**	**Max.**
Recognition Test (%)	98.97	2.40	90	100

M: Mean, *SD:* Standard Deviation, Min: Minimum, Max: Maximum

CHAPTER IV

DISCUSSION

The current study aimed to examine the effects of emotional valence and emotional arousal on EB-PM performance among young adults. The study was conducted within two sessions. The first session involved an online survey session created to detect potential participants for the second session. In the second session, EB-PM performance was assessed by following Einstein and McDaniel's experimental PM paradigm (2005). Accordingly, participants were required to perform the PM task while also performing the 1-back working memory task within the EB-PM task. Performance on EB-PM task was examined by calculating the accuracy percentage and reaction time for each stimulus. So, reactions and responses regarding the PM targets from five emotional categories (positive-high arousal, positive-low arousal, neutral, negative-high arousal, negative-low arousal) were considered.

In this chapter, first, the findings regarding the effects of emotion on PM task performance were discussed by considering the relevant literature. Second, the relationships between ongoing task and PM task performance, as well as the relationships between PANAS scores and PM task performance, were evaluated consecutively. Then, the results of the recognition test were discussed. Finally, the limitations, suggestions for future research, and conclusion were presented.

4.1 EVALUATION OF THE FINDINGS REGARDING THE EFFECTS OF EMOTION ON PM TASK PERFORMANCE

4.1.1. The Effects of Emotion on PM Task Accuracy

Regarding the emotional valence, the findings showed a significant main effect of valence on PM performance. As indicated in hypotheses 1a and 1b, PM accuracy for both negative and positive pictures was predicted to be better than for neutral pictures. In other words, emotional pictures were thought to cause an increase in PM accuracy. As opposed to the hypotheses 1a and 1b, the findings of the current study showed that negative and neutral pictures were not differed, whereas PM accuracy for neutral pictures was higher than for positive ones. Previous studies have generally found that emotional valence enhances PM performance (e.g., Altgassen et al. 2010: 1061; May et al. 2015: 362; Rendell et al. 2011: 920; Yang et al. 2018: 4). However, this enhancement is mostly found in older adults besides young adults. For instance, Altgassen et al. (2010: 1061) have reported emotional enhancement in PM for older adults. They used 1-back working memory task as ongoing task and asked participants to press a specified key whenever they saw one of the PM targets (Altgassen et al. 2010: 1060). Results indicated that both negative and positive pictures cause an enhancement in PM accuracy of older adults, whereas such effect was not found in young adults (Altgassen et al. 2010: 1061). In the current study, similar to the procedure of Altgassen et al. (2010) was followed and the same pattern of findings was obtained among young adults. According to the findings, negative and positive pictures did not lead to an enhancement in PM accuracy among young adults. On the contrary, PM accuracy for neutral pictures was higher than for negative and positive pictures. This difference was also statistically significant, particularly when comparing the positive and neutral pictures. Moreover, in line with the hypothesis 1c, PM accuracy for negative pictures was found to be significantly higher than for positive pictures, indicating a negativity effect in the sample of young adults included in the study. The negativity effect refers to better recall performance for negative information compared to positive ones in young adults (see Reed et al. 2014, for meta-analysis). The negativity effect has been observed in different types of memory processes (e.g., Boğa et al. 2021: 27; Charles et al. 2003: 310; Ito and Cacioppo 2005: 7; Kaynak and Gökçay 2017: 331). Furthermore, the negativity effect has been observed in PM tasks in some brain imaging studies (e.g., Hering et al. 2018: 1; Xian et al. 2020: 4). The findings obtained from behavioral measures in the current study further support the observed negativity effect in young adults.

When examining the findings regarding the emotional arousal dimension, the main effect of emotional arousal on PM accuracy was found to be significant. Specifically, it was found that PM accuracy for pictures with low arousal levels was significantly higher than for those with high arousal levels. It is noteworthy that emotional arousal dimension of emotion has not been extensively investigated in the previous emotion and PM studies. In previous PM studies, emotional arousal has either been statistically controlled (e.g., Altgassen et al. 2010; Cona et al. 2015) or ignored (e.g., Graf and Yu 2015; Henry et al. 2015). However, when examined independently from the valence dimension, the arousal dimension has been found to affect memory processes in various studies (e.g., Anderson et al. 2006: 711; Buchanan et al. 2006: 26; Kensinger 2009: 101).

Upon closer examination, in some retrospective memory studies, it has been found that emotional arousal causes an enhancement in memory performance (e.g., Buchanan et al. 2006: 26; Kensinger and Corkin 2003: 1169; 2004: 3310). Accordingly, in the current study, it was hypothesized (hypothesis 3) that PM accuracy would be higher for pictures with high arousal levels compared to low arousal levels. However, the findings showed the opposite pattern, with PM accuracy being higher for pictures with low arousal levels than for those with high arousal levels. In other words, high arousal levels cause a decrease in PM accuracy. These findings are in line with the literature that reports detrimental effects of emotional arousal on memory performance (e.g., Mather 2007: 33). Particularly, studies using the picture stimuli have indicated that low arousal levels provide an advantage in memory performance (e.g., Wang and Yang 2017: 124). On the other hand, stimuli with high arousal levels have been found to enhance memory performance, typically observed two days after encoding (McGaugh 2004: 18; Storbeck and Clore 2008: 1828). Given the short interval provided in the current study, according to Einstein and McDaniel's PM paradigm (2005: 286), it can be evaluated that the enhancement effect of arousal was not found.

Apart from the main effects of the valence and arousal dimensions, the interaction effect of valence and arousal on PM accuracy was also found to be significant. Even though the interaction of valence and arousal dimensions has not been extensively examined in the relevant literature, there are such studies within the scope of emotion and memory that have explored this interaction. As previously explained, it has been indicated that positive and negative stimuli with high arousal levels are better remembered than the neutral ones (see Kensinger and Kark 2018, for a comprehensive review). In this regard, a similar pattern was expected for PM processes in the current study (hypotheses 5a and 5b). However, the findings of the current study showed that PM accuracy for neutral pictures was significantly higher than for positive pictures with high arousal levels. Additionally, PM accuracy for neutral pictures and negative pictures at high arousal levels were not found to be differed from each other. Moreover, PM accuracy for positive pictures at low arousal levels was higher than for positive pictures at high arousal levels. In other words, the detrimental effect of arousal observed in the main effect of emotional arousal was not found for positive pictures. Conversely, such effect was not observed for negative pictures.

In summary, the findings regarding the interaction effect indicated that the detrimental effect of arousal was only observed for positive pictures, not for negative pictures. Additionally, PM accuracy for pictures at low arousal levels was found as expected (hypothesis 5d), with no significant difference between positive and negative pictures at low arousal levels. Furthermore, in line with the hypothesis 5c, at high arousal levels, PM accuracy for negative pictures was found to be higher than for positive ones. Based on these findings, it can be concluded that the differentiation between positive and negative pictures was observed only when the pictures are at high arousal levels. In addition, the negativity effect found in main effect of valence was not observed when pictures were at low arousal levels, but it was observed when pictures were at high arousal levels.

4.1.2. The Effects of Emotion on PM Task Reaction Time

Within the context of PM and emotion interaction, the reviewed literature indicated that PM performance has mainly been evaluated in terms of PM accuracy, while reaction times have often been overlooked. Reaction times for PM targets within a PM task has not been focus of the previous research. PM studies generally focused on reaction times in the ongoing task by examining whether the presence of a PM task causes an increase in reaction times for the ongoing task (e.g., Smith 2003: 347). However, PM processes consist multiple cognitive systems, such as attention and working memory (Hostler et al. 2018: 1). Since reaction times are indicators of attention, it is important to examine whether participants' reaction times differ among PM targets with various emotional content. In this sense, the current study can be considered pioneering in its exploration of reaction times within a PM task.

Regarding the valence dimension of emotion, the literature suggests that emotional stimuli tend to capture one's attention more than neutral stimuli, resulting in longer reaction times (Plancher et al. 2018). It was expected this pattern would be observed in PM processes as well. Specifically, it was predicted that reaction times for negative and positive PM targets would be longer than those for neutral PM targets (hypotheses 2a and 2b). Consistent with the hypotheses, the results revealed a main effect of valence, indicating that reaction times for positive and negative PM targets were indeed longer than for neutral ones. These findings are in line with previous research (e.g., Dolcos et al. 2011; Kensinger and Corkin 2003; Plancher et al. 2018). For instance, a study examining the effects of emotional content on attentional maintenance in working memory showed that emotional content took longer to process compared to neutral counterparts (Plancher et al. 2018: 4). In a similar manner, in the PM task applied in the current study, participants processed positive and negative pictures more slowly than the neutral ones. These findings can be explained by PAMT, which suggests that PM tasks require attentional monitoring regardless of their content. PAMT also suggests that as attentional monitoring increases, performance on a PM task also increases (Smith 2003: 349). Since emotional stimuli capture more attention than neutral ones (Brosch et al. 2010: 390), it can be concluded that valence of the PM targets attracted participants' attention and increased attentional monitoring. Consequently, reaction times for emotional PM targets were longer than neutral ones. Moreover, previous literature has indicated that negative stimuli, in particular, cause an increase in the reaction times (Plancher et al. 2018: 2), thus it was expected that negative PM targets would take longer time to process than positive PM targets (hypothesis 2c). However, the findings did not support hypothesis 2c.

On the other hand, a significant main effect of the arousal dimension on reaction times for PM targets was also observed. As expected (hypothesis 4), reaction times for PM targets with high arousal levels were longer than those with low arousal levels. The findings were in line with previous research that has indicated that high arousal results in longer reaction times (e.g., Burt 2002; McKenna and Sharma 2004; Imbir 2016). Apart from the consistent literature, these findings can also be explained by the Multiprocess Theory. As indicated earlier, the Multiprocess Theory indicates that salient stimuli capture one's attention (McDaniel and Einstein, 2000: 131). In the context of arousal, highly aroused pictures may be perceived as more salient, resulting in participants directing their attentional resources toward these pictures. Accordingly, attentional monitoring was increased for highly aroused PM targets. Since attentional monitoring processes were active for these pictures, reaction times were found to be longer compared to PM targets with low arousal levels. In other words, processing pictures with high arousal levels took longer than those with low arousal levels.

In the reviewed PM literature, there were no studies that focused on both emotional dimensions and their interaction. Accordingly, when formulating the hypotheses regarding the interaction effect, previous research on general memory and emotion was taken into account. The literature indicated that positive and negative stimuli require more processing time (e.g., Dolcos et al. 2011; Kensinger and Corkin 2003; Plancher et al. 2018). Besides, highly arousing stimuli cause an increase in reaction times compared to low arousal stimuli (e.g., Burt 2002; McKenna and Sharma 2004; Imbir 2016). In accordance, it was expected that reaction times for positive PM targets at high arousal levels and negative PM targets at high arousal levels would be longer than those for neutral ones (hypotheses 6a and 6b). Moreover, since the effects of emotion have been observed primarily at high arousal levels (e.g., Buchanan et al. 2006; Kensinger and Corkin 2003; 2004), no difference in reaction times was expected between positive and negative PM targets at low arousal levels any (hypothesis 6c). However, the findings did not reveal any significant interaction effect of valence and arousal dimensions on PM reaction times. The paired samples t-test results indicated that only the reaction times for positive-high arousal PM targets were higher compared to neutral ones, which is in line with hypothesis 6a. Besides, as expected in hypothesis 6c, there was no significant difference in reaction times between positive-low arousal and negative-low arousal PM targets.

In the current study, a focal paradigm was applied to assess PM processes. The requirements of the ongoing task were similar to the PM task, and participants were not required to use additional cognitive processes to detect PM targets. Consequently, the PM task used in the current study could be considered relatively simple to perform. Under these conditions, it may have been difficult to observe the interaction effect of the two dimensions. Besides, based on the relevant literature (e.g., Altgassen et al. 2010), two pictures for each emotional category were selected as PM targets. However, this number is relatively small. These factors may explain why some of the hypotheses regarding the effects of emotion were not supported. Especially for the interaction effect of valence and arousal, a more comprehensive examination with a larger number of PM targets for each emotional category could yield more robust findings.

4.2 EVALUATION OF THE FINDINGS REGARDING THE RELATIONSHIPS BETWEEN ONGOING TASK AND PM TASK PERFORMANCE

4.2.1. The Relationships between Ongoing Task and PM Task Accuracy

PM is a complex process that includes various cognitive processes, including attention and working memory (Hostler et al. 2018: 1578). In order to assess PM processes, researchers generally employ relatively simple working memory tasks as ongoing task within the experimental procedures (e.g., Altgassen et al. 2010: 1060; Cona et al. 2015: 4; Henry et al. 2015: 4; Xian et al. 2020: 3). The relevant literature has indicated that PM is correlated with working memory (e.g., Smith et al. 2011: 115). Namely, PM task performance has been found to be positively correlated with working memory capacity (e.g., Smith 2003: 358; Smith and Bayen 2005: 243; Smith et al. 2011: 115). Even though several previous PM studies have included working memory ongoing tasks, they have sidelined to examine the correlation between ongoing task and PM task performance. Since 1-back working memory task was used as the ongoing task in the current study, overall ongoing task accuracy and overall PM task accuracy were expected to be correlated (hypothesis 7).

Theoretically, both the Multiprocess Theory and PAMT support the hypothesis that ongoing task and PM task accuracy would be correlated. For instance, the Multiprocess Theory of PM suggests that when the PM targets are focal, spontaneous retrieval processes are activated (McDaniel and Einstein 2000: 135). Therefore, any additional cognitive resources are not required to perform the PM task. So, when focal PM targets are used, as in the current study, ongoing task and PM task performance would be correlated. On the other hand, PAMT suggests that independently of the focality, PM tasks require attentional monitoring and cause a decrease in cognitive resources allocated to the ongoing task (Smith 2003: 349). Hence, as PM task performance increases, ongoing task performance would decrease. Despite the support from both the Multiprocess Theory and PAMT for hypothesis 7, the findings did not show a correlation between overall PM task accuracy and overall ongoing task accuracy. The lack of support for hypothesis 7 could be attributed to the nature of tasks employed in the current study. A 1-back working memory task and a PM task with ten PM targets were applied. This combination of tasks can be considered relatively easy for young adults and may have become automatic in reacting to the pictures. Therefore, the expected correlation between ongoing and PM task performance based on working memory literature may not have been found. In the current study, these tasks were chosen because the main interest was to assess the effects of emotion on EB-PM in a focal paradigm, and they were deemed appropriate for that purpose. However, for investigating the correlation between ongoing task and PM task performance among young adults, a more complex working memory task, such as the 2-back working memory task, could be applied as the ongoing task.

Considering the correlational findings of performance on pictures in each emotional category, a positive correlation between ongoing task and PM task accuracy was obtained only for negative pictures at high arousal levels. Based on these findings, the expected correlation between ongoing task and PM task accuracy was observed only when the pictures were negative and at high arousal levels.

4.2.2. The Relationships between Ongoing Task and PM Task Reaction Time

As indicated in the previous section, PM processes are known to be correlated with the working memory capacity (e.g., Smith et al. 2011: 115). In accordance, it was expected that reaction times in the ongoing task (i.e., 1-back working memory task) would be significantly correlated with reaction times in the PM task (hypothesis 8). In line with hypothesis 8, the findings revealed a positive correlation between reaction times in the ongoing task and reaction times in the PM task.

In the current study, participants were instructed that both tasks they were performing were equally important, and the results of the PEQ showed that participants perceived the ongoing task and PM task as equally important. According to the Multiprocess Theory of PM, the perceived importance of the PM task affects the attentional processes directed towards the task (McDaniel and Einstein 2000: 132). In other words, when the PM task is perceived as important, attentional resources directed to the PM task increase. Consequently, when the importance of the PM task is emphasized in the instructions, participants' PM task performance increases while ongoing task performance decreases (e.g., Kliegel et al. 2001: 8). Similarly, if the perceived importance of the tasks is equal, a similar amount of attentional resources would be directed to the tasks, and the performance in these tasks would not differ. Therefore, the positive correlation between reaction times in the ongoing task and reaction times in the PM task can be explained by the Multiprocess Theory.

4.3. EVAUATION OF THE FINDINGS REGARDING THE RELATIONSHIPS BETWEEN PANAS SCORES AND PM TASK PERFORMANCE

4.3.1. The Relationships between PANAS Scores and PM Task Accuracy

It is well-established that mood states can affect memory processes (e.g., Josephson et al. 1996: 437). Regarding the PM processes, it is noteworthy that previous studies have examined the effects of mood on PM by using mood induction methods (e.g., Pupillo et al. 2020; Rummel et al. 2012) without taking into account the current mood states of participants. Some of these studies have indicated that both negative and positive mood can impair PM performance compared to neutral mood (Pupillo et al. 2020: 1; Schnitzspahn et al. 2014: 267). On the other hand, another study (Pupillo et al. 2022: 186) revealed that positive mood was associated with better PM performance, while a similar pattern was not found for negative mood.

In the current study, the correlation between participants' current mood states and PM performance was examined. Current mood states were assessed using the PANAS. Consistent with hypothesis 9b, negative affect scores were found to be negatively correlated with overall PM accuracy. This finding is in line with the findings of Pupillo et al. 2020 and Schnitzspahn et al. 2014. On the other hand, positive affect scores were not found to be correlated with overall PM accuracy. Therefore, hypothesis 9a was not supported. These findings yielded inconsistent results compared to a previous study where positive mood was found to be associated with better PM performance (e.g., Pupillo et al. 2022: 186).

Participants of the current study were not selected based on their current mood states, resulting in a small number of participants scoring higher on negative affect in the PANAS. Only three participants were in a negative mood, while the remaining 60 participants were in a positive mood. One possible explanation for the lack of correlation found in the current study could be the limited variation in negative affect scores among participants. In order to thoroughly examine the correlation between current mood states and both PM accuracy and reaction times, further studies should aim to control for a wider range of positive and negative affect scores.

4.3.2. The Relationships between PANAS Scores and PM Task Reaction Time

Regarding the findings of reaction times for PM targets, no correlation was found between reaction times and both positive and negative affect scores. Hence, hypotheses 10a and 10b were not supported. In the reviewed literature, the relationship between mood and reaction times for PM cues has not been extensively examined. However, since attentional processes are affected by mood (Rowe et al. 2007: 383; Xia et al. 2023: 2), it was expected that positive and negative affect would be correlated with the reaction times for PM targets. As discussed for the PM accuracy, findings of the reaction times can be explained by the limited variation in negative affect scores among participants.

4.4. EVALUATION OF THE FINDINGS OF RECOGNITION TEST

As explained in the previous chapters, PM processes are examined through two separate components: prospective and retrospective components. According to Einstein and McDaniel (1990: 721), both components must be processed successfully in order to perform a PM task effectively. Therefore, it is important to evaluate both of the components in order to examine PM processes comprehensively. In many previous PM studies, the retrospective component of PM has been assessed using recognition tests (e.g., Altgassen et al. 2010; Rendell et al. 2012). These studies have often reported a ceiling effect, indicating that participants performed well on the recognition test.

In the current study, the retrospective component of PM was also assessed through a recognition test. The goal was to determine whether participants remembered the PM targets correctly, and it was expected that a ceiling effect would be observed (hypothesis 11). Therefore, the results of the recognition test were evaluated by considering only the percentage of correct responses. Consistent with the relevant literature, the findings exhibited a ceiling effect. In other words, almost all participants correctly recognized almost all of the PM targets. This result showed that regardless of the valence and arousal dimensions, all of the PM target pictures were successfully retrieved from participants' memory.

4.5. LIMITATIONS, FUTURE SUGGESTIONS AND CONCLUSION

In summary, the findings of the current study revealed significant main effects of the valence and arousal dimensions on PM accuracy, as well as a significant interaction effect between these dimensions. Similarly, significant main effects of the valence and arousal dimensions were observed on reaction times in the PM task. However, the interaction effect between these dimensions on reaction times was not significant. Moreover, a correlation was found between ongoing task performance and reaction times in PM task, but no such correlation was found in terms of accuracy. In relation to the PANAS scores and PM task performance, only the correlation between negative affect scores and overall PM accuracy was found to be significant. Furthermore, the results of the recognition test showed a ceiling effect, suggesting that participants successfully recognized the PM target pictures across all valence and arousal categories.

Like any study, the current study has also some limitations. Firstly, the pictures for the experimental tasks were selected from the IAPS database (Lang et al. 2008). The pictures were chosen based on their valence and arousal ratings. Although the IAPS is an internationally recognized picture database commonly used in memory literature, it is important to note that the development study of the IAPS was conducted with university students from Florida University (Lang et al. 2008). The mean ratings of valence and arousal for each picture in the database were reported based on this specific population. Therefore, one limitation of the current study is that the stimuli were selected from an international database, which may not fully represent the emotions perceived by the study's specific population. Especially when focusing on emotion, stimuli must be standardized for study’s specific population. It was particularly challenging to find neutral pictures in the present study. In the next steps of the study, it was thought that neutral pictures were not truly perceived as neutral by the study’s population. Conducting a pilot study in which participants rate the potential stimuli in terms of their valence and arousal would have been beneficial. This would have allowed for the selection of stimuli that are more appropriate and representative for the study's population. Hence, it is recommended for future research to include a pilot study to ensure the use of suitable stimuli in the experimental design.

Another limitation of the current study is the ongoing task employed. In line with the some of the previous PM studies (e.g., Altgassen et al. 2010: 1060; Cona et al. 2015: 4; Henry et al. 2015: 4; Xian et al. 2020: 3), a 1-back working memory task was applied as ongoing task. Participants were to decide whether the picture they saw was same as the previous one. Simultaneously, they were required to press a specific key whenever they saw one of the PM targets as parts of the PM task. Even though these tasks have been commonly used in the PM studies, young adult participants may have perceived tasks relatively easy and reacted to the stimuli automatically. In this way, it may have become harder to examine their exact ongoing task and PM performance. Therefore, a more complex working memory task could be employed as the ongoing task. For instance, 2-back working memory task is recommended as the ongoing task for future studies that will be conducted among young adults.

As explained in the introduction section, there are several factors that affect the interaction between emotion and PM processes (Hostler et al. 2018: 3). One of the factors is the focality of the paradigm used in the studies. In the current study, a focal paradigm was applied. Hostler et al. (2018: 3) indicated that the effects of emotion on PM performance have been differed depending on the focality of the paradigm. Specifically, in focal paradigms, negative stimuli have been found to enhance PM performance, whereas in non-focal paradigms, negative stimuli have been shown to decrease PM performance (Hostler et al. 2018: 11). Therefore, it is suggested that the effects of arousal be examined within a non-focal paradigm in the future studies.

Another important factor that influences impact of emotion on PM is aging. PM tasks in everyday life can be vital, especially for older adults. For instance, remembering to take medications at the appropriate times is of utmost importance, and failures in such PM tasks can lead to serious conditions. Consequently, the effects of aging on PM processes have been frequently investigated (see Zuber and Kliegel 2020, for a comprehensive review). Given the effects of valence and arousal dimensions, it is recommended for the future research to extensively evaluate their effects on PM processes across different age groups.

Even though the effects of emotion on PM processes have been commonly studied, it is noteworthy that a comprehensive examination of the effects of both valence and arousal dimensions on PM processes has not been conducted. Previous studies have primarily focused on evaluating emotion by considering the valance dimension, with some studies either controlling the arousal levels (e.g., Altgassen et al., 2010; Cona et al. 2015) or disregarding this dimension (e.g., Graf and Yu, 2015; Henry et al., 2015). In contrast, the current study aimed to examine both dimensions of emotion (valence and arousal) in relation to both accuracy and reaction times in the PM task. In this regard, this study is pioneering and is thought to make a significant contribution to the PM literature.

REFERENCES

ALTGASSEN Mareike, HENRY Julie D., BURGLER Stefanie and KLIEGEL Matthias (2011), "The Influence of Emotional Target Cues on Prospective Memory Performance in Depression", *Journal of Clinical and Experimental Neuropsychology*, Vol. 33, pp. 910-916.

ALTGASSEN Mareike, PHILLIPS Louise H., HENRY Julie D., RENDELL Peter G. and KLIEGEL Matthias (2010), "Emotional Target Cues Eliminate Age Differences in Prospective Memory", *The Quarterly Journal of Experimental Psychology*, Vol. 63, No. 6, pp. 1057-1064.

AMON Mary Jean and BERTENTHAL Bennett I. (2018), "Auditory versus Visual Stimulus Effects on Cognitive Performance during the N-Back Task", *Cognitive Science.*

ANDERSON Adam K., YAMAGUCHI Yuki, GRABSKI Wojtek and LACKA Dominika (2006), "Emotional Memories are not All Created Equal: Evidence for Selective Memory Enhancement", *Learning and Memory,* Vol. 13, pp. 711-718.

BALLHAUSEN Nicola, RENDELL Peter G., HENRY Julie D., JOEFFRY Sebastian and KLIEGEL Matthias (2015), "Emotional Valence Differentially Affects Encoding and Retrieval of Prospective Memory in Older Adults", *Aging, Neuropsychology, and Cognition*, Vol. 22, pp. 544-559.

BARRETT Lisa Feldman and RUSSELL James A. (1999), "The Structure of Current Affect: Controversies and Emerging Consensus", *Current Directions in Psychological Science*, Vol. 8, No. 1, pp. 10-14.

BECK Aaron T., WARD Clyde H., MENDELSON Myer, MOCK John and ERBAUGH James (1961), “An Inventory for Measuring Depression”, *Archives of General Psychiatry* Vol. 4, No. 6, pp. 561-571.

BLOCK Richard A. and ZAKAY Dan (2006), “Prospective Remembering Involves Time Estimation and Memory Processes”, *In, Timing the Future: The Case for A Time-Based Prospective Memory, Ed.* Joseph Glicksohn, Michael S. Myslobodsky, pp. 25-49, World Scientific Publishing, New York, NY.

BOĞA Merve, GÜNAY Burcu and KAPUCU Aycan (2021), “The Influence of Discrete Negative and Positive Stimuli on Recognition Memory of Younger vs. Older Adults”, *Experimental Aging Research,* Vol. 47, No. 1 pp. 21-39.

BRADLEY Margaret M. and LANG Peter J. (1994), “Measuring Emotion: The Self-Assessment Manikin and the Semantic Differential”, *Journal of Behavior Therapy and Experimental Psychiatry,* Vol. 25, No. 1, pp. 49-59.

BROSCH Tobias, POURTOIS Gilles and SANDER David (2010), “The Perception and Categorisation of Emotional Stimuli: A Review”, *Cognition and Emotion*, Vol. 24, No. 3, pp. 377-400.

BROSE Annette and EBNER-PRIEMER Ulrich W. (2015), “Ambulatory Assessment in the Research on Aging: Contemporary and Future Applications”, *Gerontology,* Vol. 61, No. 4, pp. 372-380.

BROSE Annette, SCHMIEDEK Florian, LÖVDÉN Martin and LINDENBERGER Ulman (2012), “Daily Variability in Working Memory is Coupled with Negative Affect: The Role of Attention and Motivation”, *Emotion,* Vol. 12, No. 3, pp. 605-617.

BUCHANAN Tony W. (2007), “Retrieval of Emotional Memories”, *Psychological Bulletin, Vol. 133, No. 5, pp. 761-779.*

BUCHANAN Tony W., ETZEL Joset A., ADOLPHS Ralph and TRANEL Daniel (2006), “The Influence of Autonomic Arousal and Semantic Relatedness on Memory for Emotional Words”, *International Journal of Psychopysiology,* Vol. 61, No.1, pp. 26-33.

BURT Jennifer S. (2002), “Why Do Non-Color Words Interfere with Color Naming?” *Journal of Experimental Psychology: Human Perception and Performance* Vol. 28, pp. 1019-1038.

CHARLES Susan Turk, MATHER Mara and CARSTENSEN Laura L. (2003), “Aging and Emotional Memory: The Forgettable Nature of Negative Images for Older Adults”, *Journal of Experimental Psychology General,* Vol. 132 No. 2, pp. 310-324.

COHEN Anna Lisa and HICKS Jason L. (2017), *Prospective Memory: Remembering to Remember, Remembering to Forget*, Springer, New York.

COHEN Jacob (1988), *Statistical Power Analysis for the Behavioral Sciences*, 2nd Edition, Lawrence Erlbaum Associates, New York.

CONA Giorgia, KLIEGEL Matthias and BISIACCHI Patrizia S. (2015), “Differential Effects of Emotional Cues on Components of Prospective Memory: An ERP Study”, *Frontiers in Human Neuroscience,* Vol. 9, No. 10.

CONTE Angela M. and MCBRIDE Dawn M. (2018). “Comparing Time-Based and Event-Based Prospective Memory Over Short Delays”, *Memory*, Vol. 26, No. 7, pp. 936-945.

DE HOUWER Jan and HERMANS Dirk (1994), “Differences in The Affective Processing of Words and Pictures”, *Cognition & Emotion*, Vol. 8, pp. 1-20.

DOLCOS Florin, IORDAN Alexandru D. and DOLCOS Sanda (2011), “Neural Correlates of Emotion–Cognition Interactions: A Review of Evidence from Brain Imaging Investigations”, *Journal of Cognitive Psychology*, Vol. 23, No. 6, pp. 669-694.

EINSTEIN Gilles O. and MCDANIEL Mark A. (1990), “Normal Aging and Prospective Memory”, *Journal of Experimental Psychology: Learning, Memory, and Cognition,* Vol. 16, pp. 717-726.

EINSTEIN Gilles O. and MCDANIEL Mark A. (1996), “Retrieval Processes in Prospective Memory: Theoretical Approaches and Some New Empirical Findings”, *In, Prospective Memory: Theory and Applications*, Ed. Maria Brandimonte, Gilles O. Einstein, Mark A. McDaniel, pp. 115-141, Erlbaum, Mahwah, NJ.

EINSTEIN Gilles O. and MCDANIEL Mark A. (2005), “Prospective Memory: Multiple Retrieval Processes”, *Current Directions in Psychological Science,* Vol. 14, No. 6, pp. 286-290.

EINSTEIN Gilles O., MCDANIEL Mark A., MARSH Richard L. and WEST Robert (2008), "Prospective Memory: Processes, Lifespan Changes, and Neuroscience", *In, Prospective Memory: Cognition, Neuroscience, Developmental, and Applied* Perspectives, Ed. Matthias Kligel, Mark A. McDaniel, Gilles O. Einstein, pp. pp. 867-892, Taylor and Francis, New York, NY.

EYSENCK Michael W (2014), "Prospective Memory", *In, Memory,* Ed. Alan Baddeley, Michael W. Eysenck, Michael C. Anderson, pp. 360-378, Psychology Press, London.

FAUL Franz, ERDFELDER Edgar, LANG Albert-Georg and BUCHNER Axel (2007), "G*Power 3: A Flexible Statistical Power Analysis Program for The Social, Behavioral, and Biomedical Sciences". *Behavior Research Methods*, Vol. 39, pp.175-191.

FIELD Andy P. (2013), *Discovering Statistics Using SPSS: And Sex and Drugs and Rock'n' Roll,* Fourth Edition, Sage Publishing, London.

GENÇÖZ Tülin (2000), "Positive and Negative Affect Schedule: A Study of Validity and Reliability", *Türk Psikoloji Dergisi*, Vol. 15, No. 46, pp. 19-28.

GRAF Peter and YU Martin (2015), "Valenced Cues and Contexts Have Different Effects on Event-Based Prospective Memory", *PLoS One*, Vol. 10.

GRISSMANN Sebastian, FALLER Josef, SCHARINGER Christian, SPÜLER Martin and GERJETS Peter (2017), "Electroencephalography Based Analysis of Working Memory Load and Affective Valence in an N-Back Task with Emotional Stimuli", *Frontiers in Human Neuroscience,* Vol. 11.

HENRY Julie D., JOEFFRY Sebastian, TERRETT Gill, BALLHAUSEN Nicola, KLIEGEL Matthias and RENDELL Peter G. (2015), "Prospective Memory Function in Late Adulthood: Affect at Encoding and Resource Allocation Costs", *PLoS ONE*, Vol. 10, No. 4.

HERING Alexandra, KLIEGEL Matthias, BISIACCHI Patrizia S. and CONA Giorgia (2018), "The Influence of Emotional Material on Encoding and Retrieving Intentions: An ERP Study in Younger and Older Adults", *Frontiers in Psychology*, Vol. 9, No. 114

HİSLİ Nesrin (1989), “Beck Depresyon Envanterinin Üniversite Öğrencileri için Geçerliği, Güvenirliği” (in Turkish), *Psikoloji Dergisi*, Vol. 7, No. 23, pp. 3-13.

HOLM Sture (1979), "A Simple Sequentially Rejective Multiple Test Procedure”, *Scandinavian Journal of Statistics*, Vol. 6, No. 2, pp. 65-70.

HOSTLER Thomas J., WOOD Chantelle and ARMITAGE Christopher J. (2018), “The Influence of Emotional Cues on Prospective Memory: A Systematic Review with Meta-Analyses”, *Cognition and Emotion*, Vol. 32, No. 8, pp. 1578-1596.

IMBIR Kamil (2016), “Affective Norms for 718 Polish Short Texts (ANPST): Dataset with Affective Ratings for Valence, Arousal, Dominance, Origin, Subjective Significance and Source Dimensions”, *Frontiers in Psychology*, Vol. 7, pp. 1030.

ITO Tiffany and CACIOPPO John (2005), “Variations on a Human Universal: Individual Differences in Positivity Offset and Negativity Bias”, *Cognition and Emotion*, Vol. 19, No. 1, pp. 1-26.

KAPUCU Aycan (2020), “Duygu ve Biliş” (In Turkish), *In, Psikoloji Penceresinden Duygular: Kuramdan Uygulamaya*, Ed. Emine İnan, Emine Yücel, pp. 119-141, Nobel Akademik Yayıncılık, Ankara.

KAYNAK Hande and GÖKÇAY Didem (2017), “Response Bias Shift for Positive Words in Older Adults in a Surprise Recognition Memory Task: An Incidental Encoding Study”, *Turkish Journal of Geriatrics*, Vol. 20, No. 4, pp. 331-343.

KENSINGER Elizabeth A. (2009), “Remembering the Details: Effects of Emotion”, *Emotion Review*, Vol. 1, pp. 99-113.

KENSINGER Elizabeth A. and CORKIN Suzanne (2003), “Memory Enhancement for Emotional Words: Are Emotional Words More Vividly Remembered than Neutral Words?” *Memory and Cognition*, Vol. 31, No. 8, pp. 1169-1180.

KENSINGER Elizabeth A. and CORKIN Suzanne (2004), “Two Routes to Emotional Memory: Distinct Neural Processes for Valence and Arousal”, *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 101, pp. 3310-3315.

KENSINGER Elizabeth A. and KARK Sarah M. (2018), “Emotion and Memory”, *In, Stevens’ Handbook of Experimental Psychology and Cognitive Neuroscience,* Ed. Eric Jan Wagenmakers, John T. Wixted, pp. 1-26, Wiley, NY.

KENSINGER Elizabeth A. and SCHACTER Daniel L. (2016), “Memory and Emotion”, *In, The Handbook of Emotion*, Ed. Micheal Lewis, Jeannette M. Haviland Jones, Lisa Feldman Barrett, pp. 601-617, The Guilford Press, New York.

KIRCHNER Wayne K. (1958), “Age Differences in Short-Term Retention of Rapidly Changing Information”, *Journal of Experimental Psychology,* Vol. 55, No. 4, pp. 352-358.

KLIEGEL Matthias, MARTIN Mike, MCDANIEL Mark A. and EINSTEIN Gilles O. (2002). “Complex Prospective Memory and Executive Control of Working Memory: A Process Model”, *Psychologische Beitrage*, Vol. 44, pp. 303-318.

KLIEGEL Matthias, MARTIN Mike, MCDANIEL Mark A. and EINSTEIN Gilles O. (2001), “Varying the Importance of a Prospective Memory Task: Differential Effects Across Time- and Event-Based Prospective Memory”, *Memory*, Vol. 9, No. 1, pp. 1-11.

KNIGHT Bob G., MAINES Michele L. and ROBINSON Gia S. (2002), “The Effects of Sad Mood on Memory in Older Adults: A Test of the Mood Congruence Effect”, *Psychology and Aging*, Vol. 17.

JOSEPHSON Braden R., SINGER Jefferson A. and SALOVEY Peter (1996), “Mood Regulation and Memory: Repairing Sad Moods with Happy Memories”, *Cognition and Emotion,* Vol. 10, pp. 437-444.

LANG Peter J. (1980), “Behavioral Treatment and Bio-Behavioral Assessment: Computer Applications”, *In, Technology in Mental Health Care Delivery Systems*, Ed. Joseph B. Sidowski, James Harding Johnson, Thomas Arthur Williams, pp. 119-137, Ablex, Norwood, NJ.

LANG Peter J., BRADLEY Margaret M. and CUTHBERT Bruce N. (2008), *International affective picture system (IAPS): Affective Ratings of Pictures and Instruction Manual.* Technical Report A-8.

LUI Simon S. Y., LEUNG Sandy S. W., YANG Tian-xiao, HO Karen K. Y., MAN Cappy M. Y., LEUNG Karen H. L., WONG Jessica O. Y., WANG Ya, CHEUNG Eric F. C. and CHAN Raymond C. K. (2021), "The Benefits of Emotionally Salient Cues on Event-Based Prospective Memory in Bipolar Patients and Schizophrenia Patients", *European Archives of Psychiatry and Clinical Neuroscience*, Advance online publication.

LUMLEY Thomas, DIEHR Paula, EMERSON Scott and CHEN Lu (2002), "The Importance of the Normality Assumption in Large Public Health Data Sets", *Annual Review of Public Health*, Vol. 23, pp. 151-169.

MARATOS Elizabeth J., ALLAN Kevin and RUGG Michael D. (2000), "Recognition Memory for Emotionally Negative and Neutral Words: An ERP Study", *Neuropsychologia*, Vol. 38, No. 11, pp. 1452-1465.

MARSH Richard. L., BREWER Gene A., JAMESON John Paul, COOK Gabriel I., AMIR Nader and HICKS Jason L. (2009), "Threat-Related Processing Supports Prospective Memory Retrieval for People with Obsessive Tendencies", *Memory,* Vol. 17, pp. 679-686.

MARSH Richard L., HICKS Jason L. and LANDAU Joshua D. (1998), "An Investigation of Everyday Prospective Memory", *Memory & Cognition,* Vol. 26, No. 4, pp. 633-643.

MATHER Mara (2007), "Emotional Arousal and Memory Binding: An Object-Based Framework", *Perspectives on Psychological Science,* Vol. 2, No. 1, pp. 33-52.

MAY Cynthia P., MANNING Michelle, EINSTEIN Gilles O., BECKER Lauren and OWENS Max Michael (2015), "The Best of Words: Emotional Cues Improve Prospective Memory Execution and Reduce Repetition Errors" *Aging, Neuropsychology, and Cognition*, Vol. 22, pp. 357-375.

MAYLOR Elizabeth A. (1990), "Age and Prospective Memory", *The Quarterly Journal of Experimental Psychology Section A,* Vol. 42, No. 3, pp. 471-493.

MCBRIDE Dawn M. and WORKMAN Rachel A. (2017), "Is Prospective Memory Unique? A Comparison of Prospective and Retrospective Memory", *Psychology of Learning and Motivation,* Vol. 67, pp. 213-238.

MCDANIEL Mark A. and EINSTEIN Gilles O. (2000), “Strategic and Automatic Processes in Prospective Memory Retrieval: A Multiprocess Framework”, *Applied Cognitive Psychology*, Vol. 14, pp. 127-144.

MCDANIEL Mark A. and EINSTEIN Gilles O. (2007), *Prospective Memory: An Overview and Synthesis of an Emerging Field*, Sage, Thousand Oaks, CA.

MCDANIEL Mark A., ROBINSON-RIEGLER Bridget and EINSTEIN Gilles O. (1998), “Prospective Remembering: Perceptually Driven or Conceptually Driven Processes?”, *Memory & Cognition*, Vol. 26, pp. 121-134.

MCGAUGH James L. (2004), “The Amygdala Modulates the Consolidation of Memories of Emotionally Arousing Experiences”, *Annual Review of Neuroscience*, Vol. 27, pp. 1-28.

MCKENNA Frank P. and SHARMA Dinkar (2004), “Reversing the Emotional Stroop Effect Reveals That It is Not What It Seems: The Role of Fast and Slow Components”, *Journal of Experimental Psychology: Learning, Memory and Cognition*, Vol. 30, pp. 382-392.

MIONI Giovanna, MELIGRANA Lucia, RENDELL Peter G., BARTOLOMEI Luigi, PERINI Francesco, STABLUM Franca. (2015), “Event-Based Prospective Memory in Patients with Parkinson's Disease: The Effect of Emotional Valence”, *Frontiers in Human Neuroscience*, Vol. 24, No. 9, pp. 427.

MURTY Vishnu P., RITCHEY Maureen, ADCOCK Alison R. and LABAR Kevin S. (2010), “fMRI Studies of Successful Emotional Memory Encoding: A Quantitative Meta-Analysis”, *Neuropsychologia*, Vol. 48, No. 12, pp. 3459-3469.

OCHSNER Kevin N. (2000), “Are Affective Events Richly Recollected or Simply Familiar? The Experience and Process of Recognizing Feelings Past”, *Journal of Experimental Psychology: General*, Vol. 129, No. 2, pp. 242-261.

PAKYÜREK Gün (2018), *Sigara Kullanımı ve Sigarayla İlişkili İpuçlarının Sanal Hafta Görevindeki İleriye Dönük Bellek Performansına Etkisinin İncelenmesi: Stratejik İzlemenin, Geriye Dönük Belleğin ve Çalışma Belleğinin Rolü* (Unpublished Doctorate Thesis), Hacettepe University Graduate School of Social Sciences.

PEIRCE Jonathan, GRAY Jeremy R., SIMPSON Sol, MACASKILL, Michael, HÖCHENBERGER Richard, SOGO Hiroyuki, KASTMAN Erik and LİNDELØV Jonas Kristoffer (2019), "PsychoPy2: Experiments in Behavior Made Easy", *Behavior Research Methods,* Vol. 51, pp. 195-203.

PLANCHER Gaen, MASSOL Sarah, DOREL Tiphaine and CHAINAY Hanna (2018), "Effect of Negative Emotional Content on Attentional Maintenance in Working Memory", *Cognition and Emotion,* Vol. 33, No. 7, pp. 1489-1496.

PUPILLO Francesco, PHILLIPS Louise H. and SCHNITZSPAHN Katharina (2020), "The Detrimental Effects of Mood on Prospective Memory Are Modulated by Age", *Emotion, Vol. 21, No. 3.*

PUPILLO Francesco, POWELL Daniel, PHILLIPS Louise and SCHNITZSPAHN Katharina (2022), "Remember to Stay Positive: Affect and Prospective Memory in Everyday Life", *Applied Cognitive Psychology,* Vol. 36, No.1, pp. 179-190.

RANDOLPH Christopher, TIERNEY, Micheal C., MOHR Erich and CHASE Thomas N. (1998), "The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS): Preliminary Clinical Validity". *Journal of Clinical and Experimental Neuropsychology*, Vol. 20, No. 3, pp. 310-319.

REED Andrew E., CHAN Larry and MIKELS Joseph A. (2014), "Meta-Analysis of the Age-Related Positivity Effect: Age Differences in Preferences for Positive Over Negative Information", *Psychology and Aging,* Vol. 29, No. 1, pp. 1-15.

RENDELL Peter G. and CRAIK Fergus I. M. (2000), "Virtual Week and Actual Week: Age-Related Differences in Prospective Memory", *Applied Cognitive Psychology*, Vol. 14, pp. 43-62.

RENDELL Peter G. and HENRY Julie D. (2009), "A Review of Virtual Week for Prospective Memory Assessment: Clinical Implications", *Brain Impairment,* Vol. 10, No. 1, pp. 14-22.

RENDELL Peter G., HENRY Julie D., PHILLIPS Louise H., GARCIA Xochitl de la Piedad, BOOTH Patricia, PHILLIPS Patricia and KLIEGEL Matthias (2012), "Prospective Memory, Emotional Valence, and Multiple Sclerosis", *Journal of Clinical and Experimental Neuropsychology,* Vol. 34, pp. 738-749.

RENDELL Peter G., PHILLIPS Louise H., HENRY Julie D., BRUMBY-RENDELL Tristan, de la PIEDAD GARCIA Xochitl, ALTGASSEN Mareike and KLIEGEL Matthias (2011), "Prospective Memory, Emotional Valence and Ageing", *Cognition and Emotion,* Vol. 25, No. 5, pp. 916-25.

RIEDIGER Michaela, WRZUS Conelia, SCHMIEDEK Florian, WAGNER Gert G. and LINDENBERGER Ulman (2011), "Is Seeking Bad Mood Cognitively Demanding? Contra-hedonic Orientation and Working-Memory Capacity in Everyday Life", *Emotion,* Vol. 11, No. 3, pp. 656-665.

ROWE Gillian, HIRSH Jacob B. and ANDERSON Adam K. (2007), "Positive Affect Increases the Breadth of Attentional Selection", *Proceedings of the National Academy of Sciences,* Vol. 104, No. 1, pp. 383-388.

RUMMEL Jan, HEPP Johanna, KLEIN Sina A. and SILBERLEITNER Nicola (2012), "Affective State and Event-Based Prospective Memory", *Cognition and Emotion,* Vol. 26, No. 2, pp. 351-361.

RUSSELL James A. (1980), "A Circumplex Model of Affect", *Journal of Personality and Social Psychology,* Vol. 39, No. 6, pp. 1161-1178.

SAFAZ İsmail, KURT Murat, ÇAKIR Gönül, YAŞAR Evren and ALACA Rıdvan. (2015) "Test-Retest Reliability and Practice Effects of the Turkish Version of Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) in Healthy Persons", *Bulletin of Clinical Psychopharmacology,* Vol. 25, No. 3, pp. 243-247.

SCHNITZSPAHN Katharina M., HORN Sebastian S. BAYEN Ute J. and KLIEGEL Matthias (2012), "Age effects in Emotional Prospective Memory: Cue Valence Differentially Affects the Prospective and Retrospective Component", *Psychology and Aging,* Vol. 27, No. 2, pp. 498-509.

SCHNITZSPAHN Katharina, THORLEY Craig, PHILLIPS Louise, VOIGT Babett, THREADGOLD Emma, HAMMOND Emily and KLIEGEL Matthias (2014), "Mood Impairs Time-Based Prospective Memory in Young but not Older Adults: The Mediating Role of Attentional Control", *Psychology and Aging,* Vol. 29.

SCHONFIELD David and STONES Michael J. (1979), "Remembering and Aging", In, *Functional Disorders of Memory*, Ed. John F. Kihlstrom, Frederick. J. Evans Erlbaum, pp. 103-142, Lawrence Erlbaum Associates, Hillsdale, NJ.

SHERIDAN Laura K., FITZGERALD Hiram E., ADAMS Kenneth M., NIGG Joel T., MARTEL Michelle M., PUTTLER Leon I., WONG Maria M. and ZUCKER Robert A. (2006), "Normative Symbol Digit Modalities Test Performance in a Community-Based Sample", *Archives of Clinical Neuropsychology*, Vol. 21, pp. 23-28.

SHIOTA Michelle N., CAMPOS Belinda, OVEIS Christopher, HERTENSTEIN Matthew J., SIMON-THOMAS Emiliana and KELTNER Dacher (2017), "Beyond Happiness: Building a Science of Discrete Positive Emotions", *American Psychologist*, Vol. 72, No. 7, pp. 617-643.

SMITH Aaron (1973), *Symbol Digit Modalities Test.* Western Psychological Services, Los Angeles, CA.

SMITH Edward E. and KOSSLYN Stephen M. (2014), *Cognitive Psychology: Mind and Brain*, Pearson, Boston.

SMITH Rebekah E. (2003), "The Cost of Remembering to Remember in Event-Based Prospective Memory: Investigating the Capacity Demands of Delayed Intention Performance", *Journal of Experimental Psychology*, Vol. 29, No. 3, pp. 347-361.

SMITH Rebekah E. and BAYEN Ute J. (2004), "A Multinomial Model of Event-Based Prospective Memory", *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Vol. 30, No. 4, pp. 756-777.

SMITH Rebekah E. and BAYEN Ute J. (2005), "The Effects of Working Memory Resource Availability on Prospective Memory: A Formal Modeling Approach", *Experimental Psychology*, Vol. 52, No. 4, pp. 243-256.

SMITH Rebekah E., PERSYN Deborah and BUTLER Patrick (2011), "Prospective Memory, Personality, and Working Memory: A Formal Modeling Approach", *Zeitschrift für Psychologie*, Vol. 219, No. 2, pp. 108-116.

STRAUSS Esther, SHERMAN Elisabeth M. S. and SPREEN Otfried (2006), *A Compendium of Neuropsychological Tests*, Oxford University Press, New York.

STORBECK Justin and CLORE Gerald L. (2008), "Affective Arousal as Information: How Affective Arousal Influences Judgments, Learning, and Memory", *Social and Personality Psychology Compass*, Vol. 2, No. 5, pp. 1824-1843.

TABACHNICK Barbara G. and FIDELL Linda S. (2013), *Using Multivariate Statistics*, Sixth Edition, Pearson, Boston.

WALTER Nora T. and BAYEN Ute J. (2016), "Selective Effects of Acute Alcohol Intake on the Prospective and Retrospective Components of a Prospective-Memory Task with Emotional Targets", *Psychopharmacology*, Vol. 233, No. 2, pp. 325-339.

WANG Yang and YANG Jiongjiong (2017), "Effects of Arousal and Context on Recognition Memory for Emotional Pictures in Younger and Older Adults", *Experimental Aging Research*, Vol. 43, No. 2, pp. 124-148.

WATSON David, CLARK Lee Anna and TELLEGEN Auke (1988), "Development and Validation of Brief Measures of Positive and Negative Affect: The PANAS Scales", *Journal of Personality and Social Psychology*, Vol. 54, No. 6 pp. 1063-1070.

XIA Hai-sha, LI Yu-xi, ZHANG Qing-yun, ZHONG Dong-ling, LIU Xiao-bo, GOU Xin-yun, FAN Jin, ZHAO Jing, ZHANG Yue, AI Shuang-chun, HUANG Jia-xi, LI Juan Li and JIN Rong-jiang (2023), "Attention Bias Modification for Depression: A Systematic Review and Meta-Analysis", *Frontiers in Psychiatry*, Vol. 14, pp. 1-13.

XIAN Jinhua, WANG Yan and HAN Buxin (2020), "Effect of Emotion on Prospective Memory in those of Different Age Groups", *Computational Intelligence and Neuroscience*, Vol. 2020, No. 5-6, pp. 1-8.

YANG Tian-xiao, CUI Xi-long, WANG Ya, HUANG Jing, LUI Simon S. Y., ZHANG Rui-ting, CHEUNG Eric F. C., CHAN Raymond C. K. (2018), "Effect of Emotional Cues on Prospective Memory Performance in Patients with Schizophrenia and Major Depressive Disorder", *Schizophrenia Research*, Vol. 201, pp. 145-150.

ZUBER Sascha and KLIEGEL Matthias (2020), “Prospective Memory Development Across the Lifespan”, *Psychology and Aging: European Perspectives Original Articles and Reviews*, Vol. 25, No. 3, pp. 162-173.

APPENDICES

APPENDIX A: DEMOGRAPHIC INFORMATION FORM

1. Yaşınız nedir?

   ……………………
2. Doğum tarihinizi belirtiniz (gün/ay/yıl).

   örnek: 30/11/1998

   ……………………
3. Cinsiyetiniz nedir? ☐Kadın ☐ Erkek
4. Medeni durumunuz nedir? ☐ Evli ☐Bekar ☐Boşanmış/Dul ☐İlişkisi Var
5. Son 6 ay içerisinde psikiyatrik ve/veya nörolojik bir rahatsızlık geçirdiniz mi ve/veya nu sebeple herhangi bir ilaç kullanıyor musunuz? ☐Evet ☐Hayır
6. Hangi bölümde okuyorsunuz?

   ……………………
7. Üniversitede kaçıncı sınıfta okuyorsunuz? ☐Hazırlık ☐1.Sınıf ☐ 2.Sınıf

   ☐3.Sınıf ☐4.Sınıf ☐Yüksek Lisans ☐Doktora
8. Mesleğiniz nedir?

   ……………………
9. Herhangi bir görme bozukluğunuz var mı? ☐Evet (yüz yüze uygulama için gözlük ya da lens takarak geliniz.) ☐Hayır

   Herhangi bir korkunuz var mı (örn: yükseklik, örümcek, köpek balığı, yılan)? Varsa lütfen belirtiniz. ☐Evet …………………… ☐Hayır
10. Lütfen bu korkunuzun şiddetini (1: en düşük 7:en yüksek, olmak üzere) belirtiniz.

    ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

APPENDIX B: BECK DEPRESSION INVENTORY

Aşağıda, gruplar halinde bazı cümleler verilmiştir. Her madde, bir, çeşit ruh durumunu anlatmaktadır. Son bir hafta içindeki (şu an dahil) kendi ruh durumunuzu göz önünde bulundurarak, 4 seçenekten size en uygun bulduğunuz ifadeyi daire içine alınız.

1. (a) Kendimi üzgün hissetmiyorum
(b) Kendimi üzgün hissediyorum.
(c) Her zaman için üzgünüm ve kendimi bu duygudan kurtaramıyorum.
(d) Öylesine üzgün ve mutsuzum ki dayanamıyorum.

2. (a) Gelecekten umutsuz değilim.
(b) Geleceğe biraz umutsuz bakıyorum.
(c) Gelecekten beklediğim hiçbir şey yok.
(d) Benim için bir gelecek yok ve bu durum düzelmeyecek.

3. (a) Kendimi başarısız görmüyorum.
(b) Çevremdeki birçok kişiden daha fazla başarısızlıklarım oldu sayılır.
(c) Geriye dönüp baktığımda, çok fazla başarısızlığımın olduğunu görüyorum.
(d) Kendimi tümüyle başarısız bir insan olarak görüyorum.

4. (a) Her şeyden eskisi kadar zevk alabiliyorum.
(b) Her şeyden eskisi kadar zevk alamıyorum.
(c) Artık hiçbir şeyden gerçek bir zevk alamıyorum.
(d) Bana zevk veren hiçbir şey yok. Her şey çok sıkıcı.

5. (a) Kendimi suçlu hissetmiyorum.
(b) Arada bir kendimi suçlu hissettiğim oluyor.
(c) Kendimi çoğunlukla suçlu hissediyorum.
(d) Kendimi her an için suçlu hissediyorum.

6. (a) Cezalandırıldığımı düşünmüyorum.
(b) Bazı şeyler için cezalandırılabileceğimi hissediyorum.
(c) Cezalandırılmayı bekliyorum.
(d) Cezalandırıldığımı hissediyorum.

7. (a) Kendimden hoşnutum.
(b) Kendimden pek hoşnut değilim.
(c) Kendimden hiç hoşlanmıyorum.
(d) Kendimden nefret ediyorum.

8. (a) Kendimi diğer insanlardan daha kötü görmüyorum.
(b) Kendimi zayıflıklarım ve hatalarım için eleştiriyorum.
(c) Kendimi hatalarım için çoğu zaman suçluyorum.
(d) Her kötü olayda kendimi suçluyorum.

9. (a) Kendimi öldürmek gibi düşüncelerim yok.
(b) Bazen kendimi öldürmeyi düşünüyorum, fakat bunu yapmam.
(c) Kendimi öldürebilmeyi isterdim.
(d) Bir fırsatını bulsam kendimi öldürürdüm.

10.(a) Her zamankinden daha fazla ağladığımı sanmıyorum.
(b) Eskisine göre şu sıralarda daha fazla ağlıyorum.
(c) Şu sıralarda her an ağlıyorum.
(d) Eskiden ağlayabilirdim, ama şu sıralarda istesem de ağlayamıyorum.

11.(a) Her zamankinden daha sinirli değilim.
(b) Her zamankinden daha kolayca sinirleniyor ve kızıyorum.
(c) Çoğu zaman sinirliyim.
(d) Eskiden sinirlendiğim şeylere bile artık sinirlenemiyorum.

12.(a) Diğer insanlara karşı ilgimi kaybetmedim.
(b) Eskisine göre insanlarla daha az ilgiliyim.
(c) Diğer insanlara karşı ilgimin çoğunu kaybettim.
(d) Diğer insanlara karşı hiç ilgim kalmadı.

13.(a) Kararlarımı eskisi kadar kolay ve rahat verebiliyorum.
(b) Şu sıralarda kararlarımı vermeyi erteliyorum.
(c) Kararlarımı vermekte oldukça güçlük çekiyorum.
(d) Artık hiç karar veremiyorum.

14.(a) Dış görünüşümün eskisinden daha kötü olduğunu sanmıyorum.
(b) Yaşlandığımı ve çekiciliğimi kaybettiğimi düşünüyor ve üzülüyorum.
(c) Dış görünüşümde artık değiştirilmesi mümkün olmayan olumsuz değişiklikler olduğunu hissediyorum.
(d) Çok çirkin olduğumu düşünüyorum.

15.(a) Eskisi kadar iyi çalışabiliyorum.
(b) Bir işe başlayabilmek için eskisine göre kendimi daha fazla zorlamam gerekiyor.
(c) Hangi iş olursa olsun, yapabilmek için kendimi çok zorluyorum.
(d) Hiçbir iş yapamıyorum.

16.(a) Eskisi kadar rahat uyuyabiliyorum.
(b) Şu sıralarda eskisi kadar rahat uyuyamıyorum.
(c) Eskisine göre 1 veya 2 saat erken uyanıyor ve tekrar uyumakta zorluk çekiyorum.
(d) Eskisine göre çok erken uyanıyor ve tekrar uyuyamıyorum.

17.(a) Eskisine kıyasla daha çabuk yorulduğumu sanmıyorum.
(b) Eskisinden daha çabuk yoruluyorum.
(c) Şu sıralarda neredeyse her şey beni yoruyor.
(d) Öyle yorgunum ki hiçbir şey yapamıyorum.

18.(a) İştahım eskisinden pek farklı değil.
(b) İştahım eskisi kadar iyi değil.
(c) Şu sıralarda iştahım epey kötü.
(d) Artık hiç iştahım yok.

19.(a) Son zamanlarda pek fazla kilo kaybettiğimi sanmıyorum.
(b) Son zamanlarda istemediğim halde üç kilodan fazla kaybettim.
(c) Son zamanlarda istemediğim halde beş kilodan fazla kaybettim.
(d) Son zamanlarda istemediğim halde yedi kilodan fazla kaybettim.

Daha az yiyerek kilo vermeye çalışıyorum. ( ) Evet ( ) Hayır

20.(a) Sağlığım beni pek endişelendirmiyor.
(b) Son zamanlarda ağrı, sızı, mide bozukluğu, kabızlık gibi sorunlarım var.
(c) Ağrı, sızı gibi bu sıkıntılarım beni epey endişelendirdiği için başka şeyleri düşünmek zor geliyor.
(d) Bu tür sıkıntılar beni öylesine endişelendiriyor ki, artık başka hiçbir şey düşünemiyorum.

21.(a) Son zamanlarda cinsel yaşantımda dikkatimi çeken bir şey yok.
(b) Eskisine oranla cinsel konularla daha az ilgileniyorum.
(c) Şu sıralarda cinsellikle pek ilgili değilim.
(d) Artık, cinsellikle hiçbir ilgim kalmadı.

APPENDIX C: POSITIVE AND NEGATIVE AFFECT SCHEDULE

Bu ölçek farklı duyguları tanımlayan birtakım sözcükler içermektedir. Son iki hafta nasıl hissettiğinizi düşünüp her maddeyi okuyun. Uygun cevabı her maddenin yanında ayrılan yere (puanları daire içine alarak) işaretleyin. Cevaplarınızı verirken aşağıdaki puanları kullanın.

1. Çok az veya hiç
2. Biraz
3. Ortalama
4. Oldukça
5. Çok fazla

1. İlgili	1	2	3	4	5
2. Sıkıntılı	1	2	3	4	5
3. Heyecanlı	1	2	3	4	5
4. Mutsuz	1	2	3	4	5
5. Güçlü	1	2	3	4	5
6. Suçlu	1	2	3	4	5
7. Ürkmüş	1	2	3	4	5
8. Düşmanca	1	2	3	4	5
9. Hevesli	1	2	3	4	5
10. Gururlu	1	2	3	4	5
11. Asabi	1	2	3	4	5
12. Uyanık (dikkati açık)	1	2	3	4	5
13. Utanmış	1	2	3	4	5
14. İlhamlı (yaratıcı düşüncelerle dolu)	1	2	3	4	5
15. Sinirli	1	2	3	4	5
16. Kararlı	1	2	3	4	5
17. Dikkatli	1	2	3	4	5
18. Tedirgin	1	2	3	4	5
19. Aktif	1	2	3	4	5
20. Korkmuş	1	2	3	4	5

APPENDIX D: CODING TEST

⊂	∧	=	┘	∨	⊃	+	⊥	⊢
1	2	3	4	5	6	7	8	9

ÖRNEK

=	⊢	⊂	∧	+	┘	⊥	⊃	∨	=	⊢	∧	⊃	+

⊥	⊃	∨	⊢	=	∧	⊂	+	┘	∧	⊥	⊂	+	┘

⊃	⊢	∧	=	∨	⊂	┘	+	⊥	=	⊃	∧	⊢	⊂

+	⊂	⊢	┘	=	⊢	+	∧	⊃	⊂	┘	⊥	+	⊢

⊂	+	⊢	⊃	∧	=	⊥	┘	⊂	=	+	∨	⊥	∧

∧	=	┘	⊢	+	∨	⊥	┘	∧	⊃	∨	⊥	⊂	┘

+	⊂	┘	⊃	∧	=	⊂	+	⊥	∨	┘	∧	⊃	=

APPENDIX E: POST-EXPERIMENTAL QUESTIONNAIRE

1- Bilgisayar üzerinde tamamladığınız görev sırasında ekranda gördüğünüz bir fotoğraf bir önceki gördüğünüz fotoğraf ile aynı ise hangi tuşa basmanız gerekiyordu?

……………..

2- Ekranda gördüğünüz bir fotoğraf bir önceki gördüğünüz fotoğraf ile aynı değil ise hangi tuşa basmanız gerekiyordu?

……………..

3- Eğer gördüğünüz fotoğraf daha önce ayrıca çalıştığınız fotoğraflardan biri ise hangi tuşa basmanız gerekiyordu?

……………..

4- Sizce görev esnasında daha önce çalıştığınız fotoğraflardan birini ilk görüşünüz, çalıştığınız diğer fotoğrafları gördüğünüzde ilgili tuşa basmayı hatırlamanızı sağladı mı?

……………..

5- Sizce gördüğünüz fotoğrafın bir önce gördüğünüz fotoğraf ile aynı olup olmadığını belirleme görevi ne kadar önemliydi?

1 (çok az) 2 3 4 5 (çok fazla)

6- Sizce daha önce çalıştığınız fotoğraflardan herhangi birini gördüğünüzde belirli bir tuşa basma görevi ne kadar önemliydi?

1 (çok az) 2 3 4 5 (çok fazla)

APPENDIX F: IAPS NUMBERS OF THE PICTURES USED IN THE EXPERIMENTAL SESSION

PM Targets
Positive-High Arousal: 5470, 8163
Positive-Low Arousal: 1410, 2360
Neutral: 2220, 7476
Negative-High Arousal: 1070, 8485
Negative-Low Arousal: 2490, 9101

Recognition Task
Positive-High Arousal: 7405, 8034
Positive-Low Arousal: 2370, 5010
Neutral: 2704, 7484
Negative-High Arousal: 1052, 9630
Negative-Low Arousal: 2722, 7700

Practice Trial
Neutral: 1313, 6930, 7247, 7504, 7506, 7632, 8211, 8325, 9411, 9422

Ongoing Task
Positive-High Arousal: 1650, 5260, 5621, 5626, 5629, 7270, 7502, 7570, 7650, 8030, 8080, 8158, 8161, 8170, 8179, 8185, 8190, 8251, 8300, 8370, 8400, 8470, 8490, 8499, 8501
Positive-Low Arousal: 1500, 1510, 1603, 1610, 1740, 2035, 2151, 2156, 2222, 2260, 2299, 2304, 2310, 2314, 2387, 2510, 2530, 2540, 5000, 5201, 5611, 5631, 5780, 5781, 7545
Neutral: 1112, 1122, 1390, 1505, 1645, 1945, 2635, 2780, 3210, 5395, 5455, 5535, 6900, 6910, 7021, 7211, 7248, 7497, 7503, 7560, 7820, 8060, 8232, 9150, 9468
Negative-High Arousal: 1040, 1050, 1114, 1120, 1201, 1300, 1321, 1525, 1930, 1931, 1932, 2683, 5971, 5972, 6210, 6300, 6830, 6940, 7380, 8480, 9423, 9424, 9600, 9611, 9622
Negative-Low Arousal: 2039, 2205, 2206, 2312, 2399, 2455, 2491, 2590, 2682, 2750, 6010, 7078, 7234, 9000, 9001, 9046, 9090, 9110, 9220, 9280, 9291, 9331, 9360, 9390, 9471

APPENDIX H: INFORMED CONSENT OF THE ONLINE SURVEY SESSION

Çankaya Üniversitesi Sosyal Bilimler Enstitüsü Psikoloji Anabilim Dalı Bilişsel Psikoloji Yüksek Lisans programında yürütülen bu araştırma, Dr. Öğretim Üyesi Hande Kaynak danışmanlığında, Bilişsel Psikoloji Yüksek Lisans öğrencisi Öykü Aydın'ın tez çalışmasının bir gereği olarak yapılmaktadır. Tez çalışması için, **son 6 ayda herhangi bir psikiyatrik veya nörolojik rahatsızlık geçirmemiş, 18-30 yaş arasında** üniversitesi öğrencisi yetişkinlere ihtiyaç duyulmaktadır.

Bu tez çalışmasının amacı; genç yetişkinlerde farklı uyaran türleri için bellek performansının incelenmesidir. Birazdan yanıtlayacağınız anket, çalışmanın **yüz yüze bir şekilde bilgisayar üzerinden gerçekleştirilecek ikinci oturumuna** katılacak katılımcıları belirlemek amacıyla belirlenen ölçekleri içermektedir.

Verdiğiniz yanıtlar doğrultusunda, çalışmanın ikinci oturumuna geçmeniz durumunda sizinle **mail adresiniz / cep telefonunuz üzerinden** iletişime geçilecektir. Bu nedenle **aktif ve düzenli olarak kontrol ettiğiniz** bir mail adresi veya telefon numarası girmeniz ve anketi yanıtladıktan sonra ankette belirttiğiniz **iletişim adresini düzenli olarak kontrol etmeniz oldukça** önem taşımaktadır. Anketin yanıtlandırılması **5-10 dakika** sürmektedir ve **tek seferde başlayıp bitirmeniz** tavsiye edilmektedir. Çalışmaya katılım sürecinde herhangi bir sebeple kendinizi rahatsız hissederseniz yanıtlamayı yarıda bırakabilirsiniz.

Bu çalışma **TÜBİTAK-ARDEB** tarafından desteklenmektedir. Çalışmanın ilk aşaması olan bu anketi tamamlayıp daha sonrasında **yüz yüze** gerçekleştirilecek ikinci oturumu da tamamlayan katılımcılara **75 TL** değerinde **Trendyol Cüzdan Hediye Çeki** hediye edilecektir.

Çalışma hakkında daha fazla bilgi almak için:

Psk. Öykü Aydın (**E-posta: oyku.aydin1414@gmail.com**)
Dr. Hande Kaynak (**E-posta: handek@cankaya.edu.tr**)

Verdiğiniz yanıtlar kayıt altında tutulacaktır. Daha sonra bu kayıtlar, katılımcının kimlik bilgileri gizli tutularak bilimsel nitelikli çalışmalarda ve eğitim amaçlı olarak kullanılabilir. Bu amaçların dışında bu kayıtlar kullanılmayacak ve başkaları ile paylaşılmayacaktır.

Araştırma için ihtiyaç duyulan yaş grubu içerisindeyim, araştırmaya katılmak için bilgilendirilmiş onam veriyor, çalışmaya gönüllü olarak katılmayı kabul ediyorum.

APPENDIX I: INFORMED CONSENT OF THE EXPERIMENTAL SESSION

Çankaya Üniversitesi Sosyal Bilimler Enstitüsü Psikoloji Anabilim Dalı Bilişsel Psikoloji Yüksek Lisans programında yürütülen bu araştırma, Dr. Öğretim Üyesi Hande Kaynak danışmanlığında, Bilişsel Psikoloji Yüksek Lisans öğrencisi Psk. Öykü Aydın'ın tez çalışmasının bir gereği olarak yapılmaktadır. Tez çalışması için, 18-30 yaş aralığında üniversitesi öğrencisi genç yetişkin bireylere ihtiyaç duyulmaktadır. Araştırma kapsamında, yürütülecek uygulamaların tamamı Psk. Öykü Aydın tarafından yapılacaktır.

Bu tez çalışmasının amacı; duygu içerikli uyaranların genç yetişkinlerde olay temelli ileriye dönük bellek performansına olan etkisinin incelenmesidir. Uygulamalar katılımcının ve araştırmacının uygun oldukları bir zaman içerisinde gerçekleşecektir. Görüşmeler tek oturumda gerçekleştirilecek olup oturumun yaklaşık süresi 40 dakika olacaktır. Uygulama boyunca katılımcıya bazı psikolojik değerlendirme ölçekleri uygulanacak ve bilgisayar ekranında katılımcıdan bazı görevler yapması istenecektir. Katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü rahatsızlık hisseden katılımcılar, cevaplama işini yarıda bırakabilirler. Böyle bir durumda katılımcıların çalışmayı uygulayan kişiye, çalışmayı tamamlayamayacaklarını söylemeleri yeterli olacaktır. Gerçekleştirilen görüşme sonunda katılımcıya uygulamanın bitiminde açıklama ve bilgilendirme yapılacaktır, varsa soruları yanıtlanacaktır. Çalışma hakkında daha fazla bilgi almak için Psk. Öykü Aydın (E-posta: oyku.aydin1414@gmail.com) ya da Dr. Hande Kaynak (E-posta: handek@cankaya.edu.tr) ile iletişim kurulabilir.

Görüşme sırasında katılımcının izni doğrultusunda yazılı kayıtları alınacaktır. Daha sonra bu kayıtlar, katılımcının kimlik bilgileri gizli tutularak bilimsel nitelikli çalışmalarda ve eğitim amaçlı olarak kullanılabilir. Bu amaçların dışında bu kayıtlar kullanılmayacak ve başkaları ile paylaşılmayacaktır.

(Katılımcının Beyanı)

Sayın Öykü Aydın (psikolog) ve Dr. Hande Kaynak (danışman) tarafından Çankaya Üniversitesi Sosyal Bilimler Enstitüsü Psikoloji Anabilim Dalı Bilişsel Psikoloji Yüksek Lisans programında yürütülen araştırma ile ilgili bilgiler bana aktarıldı. Bu bilgilendirmenin ardından bu araştırma faaliyetine katılımcı olarak davet edildim.

Eğer bu araştırma faaliyetine katılırsam bana ait bilgilerin gizliliğine büyük bir özen ve saygıyla yaklaşılacağına inanıyorum. Toplanan her türlü verinin eğitim ve bilimsel amaçlarla kullanımı sırasında kişisel bilgilerimin ihtimamla korunacağı konusunda bana yeterli güven verildi.

Bu görüşme süresince yapılacak harcamalarla ilgili herhangi bir parasal sorumluluk altına girmiyorum. Ayrıca herhangi bir tazminat talebim olmayacaktır.

Bana yapılan tüm açıklamaları ayrıntılarıyla anlamış durumdayım. Kendi başıma belli bir düşünme süresi sonunda:

1-Yapılan görüşme kapsamında kendime ilişkin katıldığım her türlü çalışmanın ya da değerlendirmenin araştırma ve eğitim amaçlı olarak kullanılabileceğini biliyorum ve onaylıyorum.

2-Yapılan görüşme, değerlendirme ve faaliyetlere ilişkin yazılı kayıtların araştırma ve eğitim amaçlı olarak kullanılabileceğini biliyorum ve onaylıyorum.

Bu konuda yapılan daveti gönüllülük çerçevesinde kabul ediyorum.

Katılımcı	**Katılımcı ile görüşen araştırmacı**
Adı, soyadı:	Adı soyadı, unvanı:
Mail Adresi:	Mail Adresi:
Tel:	Tel:
İmza:	İmza:

APPENDIX J: INSTRUCTIONS OF THE COMPUTER-BASED EXPERIMENTAL TASKS

Practice Trail of the 1-Back Working Memory Task (Ongoing Task)

Birazdan size bilgisayar ekranından bazı fotoğraflar sunulacaktır. Her bir fotoğraf ekranda belirli bir süre boyunca kalacaktır. Sizden gördüğünüz her bir fotoğraf için ekranda olduğu süre içerisinde, fotoğrafın bir önceki fotoğraf ile aynı olup olmadığını belirtmeniz istenmektedir. Bunun için gördüğünüz fotoğraf bir önceki fotoğraf ile aynı ise "C" tuşuna, değil ise lütfen "N" tuşuna mümkün olduğunca hızlı ve doğru bir şekilde basınız. Yönergeyi anladığınızdan emin olduğunuzda herhangi bir tuşa basarak başlayabilirsiniz.

Presenting the Prospective Memory Target Pictures

Birazdan size yine bilgisayar ekranından bazı fotoğraflar sunulacaktır. Lütfen bu fotoğrafları dikkatle inceleyip aklınızda tutmaya çalışınız. Göreceğiniz fotoğrafları iyice algılayıp daha sonra gördüğünüzde hatırlayabileceğinizden emin olana kadar her bir fotoğrafı tek tek inceleyiniz. Çünkü görevdeki başarınız buna bağlı olacaktır. “Sağ yön tuşu”nu kullanarak bir sonraki fotoğrafa geçebilirsiniz. Daha sonra gördüğünüzde hatırlayabileceğinizden emin olduğunuzda “esc” tuşuna basarak programdan çıkabilirsiniz. Herhangi bir süre kısıtlamanız bulunmamaktadır. Hazır olduğunuzda, ”Sağ yön tuşu”na basarak fotoğraflara çalışmaya başlayabilirsiniz.

Event-Based Prospective Memory Task

Çalışmanın ilerleyen evrelerinde bilgisayar üzerinden tamamlayacağınız görev sırasında az önceki görevde olduğu gibi ekranda belirli bir süre boyunca görünen her bir fotoğrafın, bir önceki fotoğraf ile aynı olup olmadığına karar vermeniz gerekecektir. Bunun için gördüğünüz fotoğraf bir önceki fotoğraf ile aynı ise “C” tuşuna, değil ise “N” tuşuna olabildiğince hızlı ve doğru bir şekilde basmalısınız. Ayrıca, görev sırasında, az önce üzerinde çalışıp öğrendiğiniz fotoğraflardan herhangi birini gördüğünüzde olabildiğince hızlı ve doğru bir şekilde “Q” tuşuna basmalısınız. Şimdi Q tuşuna basar mısınız? Çalıştığınız fotoğraflar için yalnızca “Q” tuşuna basmanız gerekecek, ayrıca “C” veya “N” tuşuna basmanız gerekmeyecektir. Eğer yanlışlıkla “C” veya “N” tuşuna basarsanız da önemli değil. Fotoğrafın daha önce çalıştığınız fotoğraflardan biri olduğunu hatırladığınız anda fotoğrafın ekranda olduğu süre boyunca hala Q tuşuna basabilirsiniz. Eş zamanlı gerçekleştireceğiniz bu iki görev eşit önem taşımaktadır. Çalışmanın ilerleyen aşamasında gerçekleştireceğiniz bu görevde ne yapmanız gerektiğini bana anlatabilir misiniz?

Recognition Test

Birazdan ekranda bazı fotoğraflar göreceksiniz. Burada size daha önce çalışmanız için sunulan fotoğraflar başka fotoğraflar ile birlikte karışık olarak sunulacaktır. Sizden istenen, fotoğrafların daha önce size çalışmanız için sunulan fotoğraflardan biri olup olmadığını belirtmenizdir. Bunun için, eğer gördüğünüz fotoğraf daha önce size sunulan fotoğraflardan biri ise “C” tuşuna, daha önce sunulan fotoğraflardan biri değil ise lütfen “N” tuşuna basınız. Hazır olduğunuzda herhangi bir tuşa basarak başlayabilirsiniz.