

THE ROLE OF SELF-REFERENCING ON FEELING OF KNOWING
JUDGMENTS

DİDEM PEHLİVANOĞLU

BOĞAZİÇİ UNIVERSITY

2012

THE ROLE OF SELF-REFERENCING ON FEELING OF KNOWING
JUDGMENTS

Thesis submitted to the
Institute of Graduate Studies in Social Sciences
in partial fulfillment of the requirements for the degree of

Master of Arts

in

Psychology

by

Didem Pehlivanoglu

Boğaziçi University

2012

Thesis Abstract

Didem Pehlivanoglu, “The Role of Self-Referencing on Feeling of Knowing Judgments”

The aim of the present thesis was to investigate the effect of self-referencing (SR) on feeling of knowing (FOK) judgments. Feeling of knowing (FOK) is a prospective memory judgment in which participants make predictions about the likelihood of future recognition for unrecalled materials. According to the accessibility model, FOK judgments are closely related to memory performance (Koriat, 1993). Since relating information to the self is one of the factors enhancing memory performance, we hypothesized that SR at encoding will produce better memory and FOK performance compared to deep processing measured by an associative condition. In Experiment 1, participants incidentally encoded 90 word pairs in the SR and associative conditions. After the retention interval, they completed cued recall, FOK rating and recognition phases. We found no significant difference between SR and associative conditions in terms of memory performance and FOK judgments. In Experiment 2, we replaced the associative condition with a common judgment condition, in which participants judged the frequency of occurrence of memoranda. These types of judgments have been considered to reflect deep processing. Our results showed that SR at encoding as opposed to the common judgment condition, resulted in better memory, higher FOK accuracy and increased recollective experience.

Tez Özeti

Didem Pehlivanoglu, “Kendine Dayalı Bilgi Kodlamanın Bilme Hissi Üzerindeki Rolü”

Bu tezin amacı, kendine dayalı bilgi kodlamanın bilme hissi kararları üzerindeki etkisini incelemektir. Bilme hissi, katılımcıların hatırlayamadıkları bilgileri tanıma olasılıkları ile ilgili ileriye yönelik olarak verdiği kararlardır. Erişilebilirlik modeline göre, bilme hissi kararları bellek performansı ile yakından bağlantılıdır (Koriat, 1993). Bilginin benlikle ilişkilendirilmesi bellek performansını arttıran faktörlerden biri olduğu için, kendine dayalı kodlamanın, ilişkili koşulla ölçülen derin kodlamaya kıyasla, daha iyi bir bellek ve bilme hissi performansına yol açacağını öngördük. 1. Deneyde, katılımcılar 90 kelime çiftini, kendine dayalı ve ilişkili kodlama koşullarında tesadüfi olarak kodlamışlardır. Bir süre sonra, ipucuyla hatırlama, bilme hissi değerlendirmesi ve tanıma testi aşamalarını tamamlamışlardır. Kendine dayalı kodlama ve ilişkili kodlama koşulu arasında bellek performansı ve bilme hissi kararları açısından bir fark bulunmamıştır. 2. Deneyde, ilişkili kodlama koşulu yerine katılımcıların, kelimelerin kullanım sıklığını değerlendirdiği yaygın kodlama koşulu kullanılmıştır. Bu tip değerlendirmelerin, derin kodlamayı yansıttığı düşünülmektedir. Bulgularımız, kendine dayalı kodlamanın, yaygın kodlama koşuluna kıyasla, , daha iyi bellek ve bilme hissi doğruluğuna yol açtığını ve hatırlama deneyimini arttırdığını göstermiştir.

ACKNOWLEDGEMENTS

To begin with, I would like to thank my thesis advisor Assoc. Prof. Ayşecan Bodurođlu for her support and helpful guidance throughout my thesis period. Her prompt and perceptive feedbacks were very helpful to solve my dilemmas that have appeared in during the preparation of this thesis. Moreover, her friendly advices during my Ph.D. applications and decision process meant a lot to me.

I would like to thank Prof. Ali Tekcan for serving as a source of inspiration and offering his critical comments during my thesis. I also wish to thank Assist. Prof. Aycan Kapucu, who was just at an e-mail distance, for sharing her invaluable suggestions and knowledge with me for the analyses. I hope that I will be able to keep the way of thinking and perspective I got from all members of my thesis committee during my Ph.D. studies and academic life.

Furthermore, I want to thank Ayşe Damla Üzrek and Can Özümetmen for their encouragement and understanding during my hard times. Their friendship is very important and special to me. I would also like to thank Aysu Mutlutürk for her warm and natural companionship, especially in coffee and lunch breaks, during the data collection process. Her templates were extremely valuable for me in arranging my data. I also want to thank my little and lovely cousin, Barış Canıtok, for helping me in selecting nouns which I used in this study.

Finally, I would like to express my deepest appreciation to my family for their warm and curious support throughout this whole process. Special thanks go to my mother, Zehra Değirmenci, for being my mother, supporting me throughout my education and preparing delicious snacks during the write up process of my thesis.

To my mother...

CONTENTS

CHAPTER 1: INTRODUCTION.....	1
Effects of Encoding Related Manipulations on FOK.....	2
Self-Reference Effect.....	5
Self-Referencing and Recollective Experience.....	8
CHAPTER 2: METHOD.....	11
Participants.....	11
Materials.....	11
Procedure.....	15
CHAPTER 3: RESULTS AND DISCUSSION.....	17
Memory Performance.....	19
Metamemory Performance.....	20
R/K/G Judgments.....	21
Executive Function Tasks.....	22
Discussion.....	25
CHAPTER 4: EXPERIMENT 2.....	27
Method.....	27
Results.....	28
Discussion.....	36
CHAPTER 5: CONCLUSIONS.....	37
APPENDICES.....	41
A. Semantically Related Word Pairs and Their Distractors.....	41
B. Semantically Unrelated Word Pairs and Their Distractors.....	44
C. R/K/G Instructions.....	47
D. Questionnaire.....	49
REFERENCES.....	50

CHAPTER 1

INTRODUCTION

Metamemory processes provide us information about material stored in our memory. These processes involve two components namely, monitoring and control (Metcalf & Dunlosky, 2008; Nelson & Narens, 1990). Monitoring refers to examining the content of the memories to make judgments about the stored information whereas control is about the regulation of monitored information when necessary. Nelson and Narens (1990) suggested that there are different ways of memory monitoring such as judgments of learning (JOL), feeling of knowing judgments (FOK), and confidence judgments (CONF). One of the crucial questions regarding meta-memory processes is about their relationship to memory processes. Some researchers investigated whether the factors affecting memory encoding have an impact on metamemory and in particular FOK judgments (e.g., Hertzog, Dunlosky, & Sinclair, 2010; Schacter, 1983). However, they reported inconsistent findings about the effect of different encoding related variables on FOK. For instance, depth of processing (Lupker, Harbluk, & Patrick, 1991) at encoding was found to increase FOK performance whereas other factors such as directed forgetting (Tekcan & Akturk, 2001) at encoding was found to not impact FOK accuracy.

Relating information to the self at encoding is shown to be one of the crucial factors for successful memory retrieval. This phenomenon is called the self-reference effect (SRE) and it results in better memory performance than semantic processing or other person (mother and famous) related encoding (e.g., Rogers, Kuiper, & Kirker, 1977; for a review see Symons & Johnson, 1997). Although SRE

provides a boost in memory performance, we still do not know much about the relationship between SRE and metamemory processes. Thus, in our study, we will examine how self-referencing at encoding affects FOK judgments.

Feeling of knowing (FOK) is a prospective memory judgment. Typically, it involves people making predictions about the likelihood of future recognition for unrecalled materials. FOK accuracy is measured by correlating FOK predictions with actual recognition performance. The accessibility model proposed by Koriat (1993) provides the most extensive explanation regarding the cognitive processes underlying FOK judgments. This model suggests that when making FOK judgments regarding unrecalled targets, a variety of cues influence people's monitoring process. Specifically, according to the accessibility model, FOK judgments are based on the amount of partial information retrieved related to the unrecalled target and the speed with which such partial information come to mind. More importantly, the accessibility account argues that there is a single retrieval and monitoring process. Thus, based on this model we can infer that metamemory processes, especially FOK judgments are closely linked to memory performance.

Effects of Encoding Related Manipulations on FOK Judgments

Given that FOK judgments are influenced by the effective retrieval of partial information, some researchers have investigated whether factors that increase memory performance also result in better FOK performance (e.g., Hertzog et al., 2010; Schacter, 1983). In particular, most of the studies focused on the question of how manipulations of encoding relate to FOK. These studies have reported inconsistent findings regarding the effects of encoding manipulations on FOK

strength and accuracy. For instance, Lupker et al. (1991) examined the effect of levels of processing on FOK judgments. In their study, participants studied word pairs in either vowel counting (shallow processing) or sentence generation (deep processing) conditions and completed cued-recall, FOK ratings and cued stem completions. Both FOK strength and accuracy was significantly higher in the deep processing than in the shallow processing condition. Similarly, Nelson et al. (1982) examined the effect of prior learning on FOK judgments. To manipulate prior learning, word pairs were presented until they were recalled correctly either once, twice, or four times during the acquisition phase. After the acquisition phase, participants completed cued recall, FOK and recognition sequence. The researchers found that items studied four times were recalled significantly more and resulted in higher FOK strength and accuracy than other items. Sacher, Taconnat and Souchay (2009) also reported positive evidence that factors affecting encoding impact FOK strength and accuracy. They investigated the effect of divided attention at encoding on FOK. In the full attention condition, participants attended fully to the word pairs whereas in the divided attention condition, they encoded the word pairs while performing an auditory task requiring detection of even numbers. As expected, the strength and accuracy of FOK judgments were significantly lower when participants encoded the words in the divided attention condition than in the full attention condition. More recently, Hertzog et al. (2010) presented word pairs for one, two, or four times during the study phase to compare the FOK performance of younger and older adults. They found that FOK strength and accuracy for unrecalled items increased as the number of presentations increased. Moreover, older adults showed greater improvement in FOK accuracy with repeated exposure compared to younger

adults¹. The studies summarized so far clearly demonstrated that encoding manipulations have an impact on FOK judgments. This conclusion is quite intuitive because Koriat (1993) suggested that FOK judgments are directly linked to memory performance.

A couple of studies, however, reported that encoding manipulations had no effect on FOK accuracy. For instance, Tekcan and Akturk (2001) examined the effect of directed forgetting on FOK judgments. They found higher FOK ratings for to be remembered words than to be forgotten words (FOK strength), but FOK accuracy was almost identical and quite low in both conditions. Schacter (1983) also reported that not all encoding related manipulations impact FOK. In his study, depth of processing at encoding and type of retrieval cue used in cued recall were manipulated at the same time. That is, participants were asked to study pairs that rhymed or were semantically associated in the encoding phase. In the recall phase there were three different types of cues. Specifically, in the identical cue condition, targets were tested by the same cues used at encoding. In the similar cue condition, targets were tested with extralist cues that shared the same relation with the intralist cues depending on the encoding condition. In the opposite cue condition, targets in the rhyme encoding condition were tested with extralist cues that were semantically associated, whereas the items in the associative encoding conditions were tested with extralist cues that rhymed. There was no effect of the levels of processing manipulation on FOK strength and accuracy. However, the type of retrieval cue

¹ The finding about older participants' greater improvement in FOK accuracy with repeated exposure to the items appeared when their memory performances were equated to younger participants. To equate the memory performance, younger participants were tested after 7 days whereas older participants were tested after 48 hours in Hertzog et al.'s study.

impacted FOK judgments. Particularly, identical cues yielded significantly higher FOK strength and accuracy than did the similar or opposite cues regardless of the encoding conditions. However, in this study, the use of different kind of retrieval cues might have made the cue-target associations stronger because some targets presented in the rhyme condition at encoding were presented with associative cues at the cued recall phase. Therefore, effect of depth of processing manipulation at encoding might have been attenuated by the presence of different retrieval cues.

As can be inferred from the studies mentioned above, effect of encoding manipulations on FOK accuracy remains controversial. In the proposed research, we will investigate the effect of self-referencing on FOK performance.

Self-Reference Effect

The self-referencing effect (SRE) refers to the memory benefit observed when people relate information to themselves during encoding. SRE has been shown to result in better memory performance than other encoding manipulations, such as depth of processing or storing information with reference to other person (e.g., Rogers et al., 1977; see Symons & Johnson, for a review). In a typical self-referencing (SR) task, participants are asked to rate personality traits with reference to the self (Does this word describe you?) in one condition. In other conditions, they are asked to rate whether similar personality traits describe others (e.g. close/famous people-Does this word describe your mother/Albert Einstein?). Also in some studies, depth of processing at encoding (Is xxxx a synonym of/does it rhyme with the presented trait?) is compared to self and other person condition. After a retention period during

which participants complete a distractor task, they are given a surprise recall or recognition test.

Across the studies, SR was consistently found to be an advantageous mnemonic strategy providing increased memory performance. For instance, in a study by Gutchess et al. (2007), participants incidentally encoded personality traits by making yes/no judgments in self (i.e., does this word describe me?), other person (i.e., does this word describe Albert Einstein?), and case (i.e., is this word displayed in upper case?) conditions. They found that participants exhibited more accurate recognition of words in the self condition compared to the other encoding conditions. Similarly, Ferguson, Rule and Carlson (1983) showed self-reference rated trait adjectives were more correctly recalled than items rated with reference to well-liked, disliked and neutral others. Moreover, SRE was significantly higher than when trait adjectives were rated in terms of their semantic relatedness. Besides behavioral studies, neuroimaging evidence suggests that self related processing activates additional brain regions that are not shared by other reference or semantically meaningful judgments (Craik et al., 1999; Kelley et al., 2002). Thus, SR benefits memory beyond other referencing and semantic processing.

Not all SR studies investigated the effects of self-referencing on memory for adjectives. For instance, Hamami, Serbun and Gutchess (2011) investigated SRE for pictures of objects. They asked participants whether the presented item was something they, their close other, or Albert Einstein would ever buy. Recognition

performance was significantly higher for items associated with both the self and close other conditions than for objects encoded in the Albert Einstein condition².

Other researchers examined whether self-referencing impacts memory for concrete nouns. Klein and Loftus (1988) presented a list of unrelated nouns to participants in elaboration, categorization and self related encoding conditions. Specifically, participants had to either think of the meaning of the words, categorize the words, or remember a personal experience relating to these words, respectively. They reported that self-reference at encoding for nouns produced significantly higher recall than the meaning elaboration task; but self-referencing resulted in only slightly higher memory performance than the organization task³. These findings contradicted results from Maki and McCaul (1985) who showed that nouns encoded with reference to a famous person were remembered better than those encoded at the self-reference condition, however, trait adjectives were recalled better in the self-reference than other referencing condition. Symons and Johnson (1997) reviewed these contradictory findings regarding the SRE in a meta-analysis and concluded that SRE was not found in studies including self and other reference comparison when nouns were used as stimuli. However, a significant SRE appeared for nouns when SR and semantic judgment conditions⁴ were compared. This boundary condition

² Hamami et al. (2011) argued that the absence of a significant difference between self and close other condition is due to the mnemonic benefit associated with intimacy. This explanation is consistent with the results from a previous meta-analysis (Symons & Johnson, 1997) showing that SRE is reduced when the target is encoded with reference to a highly familiar other.

³ Self-reference at encoding produced slightly higher recall ($M = 18.36$) than the category-sorting task ($M = 17.07$) because the encoding material which consisted of 30 nouns from 5 different categories facilitated categorization.

⁴ Symons and Johnson (1997) included tasks requiring deep processing such as synonym judgment, sentence generation under semantic task category in their meta-analysis.

regarding SRE studies with nouns is crucial for us because nouns were used in the present study.

Self-Referencing and Recollective Experience

Due to the fact that SRE is one of the factors resulting in increased memory performance, Conway and Dewhurst (1995; 2001) investigated whether SR at encoding may increase recollective experience. They presented participants with personality traits and these traits were judged either with reference to the self, with reference to a famous person or their valence was rated (semantic condition). After the study phase, participants were given a recognition test and were asked to make remember/know⁵ judgments for the old items. They found that participants in the SR condition gave a significantly higher proportion of correct remember responses compared to those in the semantic and other person conditions. No significant differences were found between the other person and semantic conditions for either remember or know responses. More recently, similar to Conway and Dewhurst, Zhang et al. (2006) demonstrated that self-referential processing produced significantly higher remember but lower know judgments than semantic-processing and other reference conditions.

It is important to note that across their studies, Conway and colleagues (2001) consistently found self-relevant recollective experience when the 1 hour retention interval was compared to a condition where the retention interval was 5 minutes.

They suggested that such kind of delay is necessary in order for the low self relevant

⁵ In the Remember/Know paradigm, remembering judgments for the items are associated with recollection of the mental representation produced at encoding while know judgments are not accompanied by learning context (Tulving, 1983).

knowledge to become less accessible compared to self relevant knowledge. During the retention interval, we will use some executive function tasks in this study⁶.

Evidence showing a link between recollective experience and SR at encoding may point out the relationship between FOK judgments and SR. However, in order to claim that there is a relationship between FOK and SR judgments, the link between FOK judgments and recollective experience becomes crucial. To investigate this issue Hicks and Marsh (2002) used the FOK procedure in which participants studied word pairs and completed cued-recall, FOK ratings and a recognition test where each response was qualified by remember-know-guess judgments. They found that high FOK judgments were accompanied with more remember than know judgments in the recognition task whereas the amount of remember and know responses were equal for items with low FOK judgments. Recent findings of Souchay et al. (2007) corroborate the proposed relationship between FOK judgments and recollective experience. In their study, the link between FOK accuracy and recollective experience of younger and older adults was investigated. They found that high levels of FOK accuracy was significantly associated with higher levels of remember responses than know responses. Particularly, FOK performance of younger adults was significantly correlated with remember responses, but not to know responses. By contrast, no significant correlations were obtained for either response in an older sample.

⁶ Essentially, these executive tasks will serve as a filler task. Our secondary aim of using these tasks is to investigate the relationship between the executive tasks and FOK performance because executive functions are suggested to be interrelated with metamemory processes (Fernandez-Duque, Baird, & Posner, 2000).

Based on previous studies regarding the SRE, recollective experience and encoding related manipulations on FOK, our novel proposition is that SR at encoding may increase recollective experience and in turn affect FOK accuracy. To investigate this prediction, we will conduct two experiments including self-reference and deep processing conditions as in Rogers et al.'s (1977) study. Specifically, memory performance and FOK judgments for word pairs in the SR condition will be compared with associative condition (Exp.1) and common judgment condition (Exp. 2). In the present study, our first aim is to show that word pairs encoded in the SR condition will be recalled more than those encoded in the associative condition. In terms of FOK strength, we expect that pairs in the SR condition will be given significantly higher FOK ratings compared to those in the associative condition. We expect higher FOK accuracy for words encoded under the SR condition as opposed to the associative condition. Lastly, we predict that word pairs encoded at SR condition will be accompanied by a greater number of remember responses than those encoded in the associative condition.

CHAPTER 2

METHOD

Participants

Thirty-seven undergraduate students from Bogazici University participated in the study. They received extra credit in their psychology courses as compensation for participation. Data from 14 participants were eliminated because A_z which is a measure of FOK accuracy could not be calculated for these data. Additional 5 participants whose either their memory and metamemory performance were below 2 standard deviations from the group means were excluded. The mean age of the remaining 18 participants (14 female) was 19.72 years ($SD = 1.07$).

Materials

We chose 192 highly concrete, purchasable and frequent nouns with a length of five or six letters (two or three syllables) from the Turkish Word Norms database (Tekcan & Goz, 2005) and Word Frequency Dictionary of Written Turkish (Goz, 2003). Of the 192 words chosen, 86 of them were rated on a scale ranged from 1 (abstract) to 7 (concrete) and their average concreteness rating was 6.78 ($SD = .14$). The remaining words were chosen by experimenter and were similarly concrete. We created two 48 pair word list; one list consisted of semantically related and the other consisted of semantically unrelated items. Given that cue frequency was previously shown to have no effect on cued recall (Nelson & McEvoy, 2000) we chose words whose frequency ranged from low (20 or less per million) to high (100 or more per million). Frequency of target words ranged from medium (20 or more per million) to high.

Klein and Loftus (1988) showed that if words can be easily categorized then the SRE might disappear. Thus, to prevent categorization, in our study, we selected cue words and targets from different categories.

In the encoding phase, 96 cue-target pairs were used. The pairs consisted of 48 semantically related and 48 semantically unrelated pairs. To determine the association level between cues and targets, a separate group of participants were asked to rate the semantic relatedness of each pair on a scale ranged from 1 (totally unrelated) to 7 (totally related) in a pilot study. The mean value of selected unrelated pairs was 1.54 ($SD = .42$) and the related pairs was 6.13 ($SD = .45$). For the SR and associative condition we chose an equal number of pairs from both semantically related and unrelated word pairs. There were four counterbalanced orders to ensure that each pair was presented in each condition across participants.

An additional 180 nouns were selected from the same databases as distractors to be used in the 4 alternative forced choice recognition test. The four options included the target, one of the previously studied targets and, 2 non-studied items, which were semantically unrelated with the target (see Appendix A and B, for word pairs and distractors). To select two sets of non-studied items, which were semantically unrelated to the targets, relatedness level between the targets and non-studied items were rated on a scale ranged between 1 and 7 in the pilot study. The mean relatedness score of selected non-studied items were 1.72 ($SD = .50$) and 1.83 ($SD = .56$), for non-studied items 1 and 2, respectively. All tasks were prepared and presented by E-Prime 1.1.

Remember/Know/Guess Instructions

To investigate the relationship between recollective experience and SR, participants were asked to indicate their state of awareness regarding their recognition of the words by selecting either remember, know or guess option (see Appendix C for full R/K/G instructions)⁷. Instructions for remember and know judgments were adapted from Gardiner's (1988) study. Specifically, participants were instructed to select the "remember" option if they were sure that they saw the word in the beginning of the study and remembered some aspects of what was experienced at the time the word was presented (e.g., aspects of the physical appearance of the word, or of something that happened in the room, or of what one was thinking or doing at that time). If they were sure that they had seen the word in the beginning of the study but could not remember any specific detail about what was experienced at the time of its occurrence, they were told to select the "know" option. In addition to these judgments, participants were instructed to select "guess" option if they were not sure that the word was presented in the beginning of the study. The reason of inclusion of guess judgment was to prevent contamination of know responses with guessing (Gardiner, Java, & Richardson-Klavehn, 1996; Mungan, Peynircioglu, & Halpern, 2011).

⁷ We would like to thank Esra Mungan for providing us with the Turkish version of R/K/G instructions.

Executive Function Tasks

Operation Span

The automated Operation span (OSPAN) task was used to measure working memory capacity of the participants (Unsworth et al., 2005). In the OSPAN task, participants had to solve simple arithmetic questions while memorizing a set of letters. At the end of the each set, participants were asked to recall the letters in a serial order. Set sizes of math questions and letters were ranged from 3 to 7 and the task included three sets of each set size.

Task Switching

For task switching, participants had to switch between trials in which they had to decide whether a letter was an “X” or an “O” (X/O), or whether it was printed in red or green (R/G) (Minear & Shah, 2008). The task consisted of three blocks of 48 test trials, and each block was preceded by a 10 practice trials including accuracy feedback. On each trial, participants were presented with the letter X or O at the center of the screen written in either red or green color. The first two blocks were single task (pure) blocks. In these blocks, participants had to make either an X/O judgment, or an R/G judgment. The third block was a mixed block including both of the tasks. In the mixed block, participants had to switch between the two tasks in 50% of the trials based on the cue presented at the upper corners of the screen. The cues were “Red” or “X” on the left hand and “Green” or “O” on the right hand. There was 200 ms interval between the cue and stimulus and 6000 ms interval between the stimulus and cue, if participants do not press a button.

Procedure

Participants were tested individually. Before the study, each participant was asked to sign a consent form. The study consisted of encoding, retention, cued-recall, FOK rating, recognition test and R/K/G judgment phases, respectively. Before the encoding phase, participants were given a brief practice of encoding task including 6 of 96 cue-target pairs to familiarize them with judgments and response keys. In the study phase, the participants incidentally encoded the remaining 90 cue-target word pairs. Thus, 45 of the pairs were encoded in the SR condition and 45 of them were encoded in the associative condition; these two conditions were intermixed. In the SR condition, participants were asked to make yes/no judgments about whether they would buy the items from the noun pair together. In the associative condition, participants were asked to make yes/no judgments about whether the words presented are semantically related or not. In the beginning of each trial, participants heard a beep tone from headphones as an indicator of beginning of new trial. Immediately after the tone, they were presented with the specific condition question for 2500ms. After the question, a word pair was displayed in the middle of the screen for 2500ms. During presentation of each pair, the participants were asked to press “d” if their response was yes or “k” if their answer was no.

To prevent a ceiling effect and ensure that pairs encoded in the SR condition are accompanied by recollective experience, participants were asked to complete an executive function battery. . During the retention interval, participants completed the OSPAN and task switching tasks. The average duration of retention interval was 22.5 minutes ($SD= 3$).

Afterwards, participants were presented with 90 cue words and were asked to remember corresponding targets for each cue. Cued recall test was followed by FOK judgment phase in which participants were presented with 90 cue words and were asked to predict whether they would recognize the target in the 4 alternative forced choice recognition test. FOK ratings ranged from 0 (definitely cannot recognize) to 100 (definitely can recognize) and participants were instructed to use the scale as evenly as possible. After completing the FOK ratings, participants received a surprise recognition test in which they had to choose the correct among four alternatives and to indicate their subjective state of awareness accompanying that recognition by clicking on either the remember, know or guess options on the screen. In the study, cue words from both conditions (SR-associative) were presented in a mixed order in the cued-recall, FOK rating and recognition phases.

Finally, participants filled out a questionnaire asking about their background and strategies used while encoding the words (Appendix D). The total duration of the experiment was approximately 90 minutes.

CHAPTER 3

RESULTS AND DISCUSSION

For each participant, for the SR and associative conditions we calculated memory accuracy (cued recall and recognition), median FOK strength, FOK accuracy and the proportion of Remember/Know and Guess judgments. We eliminated data from 14 participants for whom A_z , which is a measure of FOK accuracy, could not be calculated. The comparison of these 14 participants and the final 18 participants (see below) on whom the main analyses were conducted is presented in Table 1 and Table 2. Only in the associative condition and on the OSPAN task, the omitted participants performed significantly better than the remaining 18 participants; in the remaining conditions participants did not significantly differ.

In addition to the 14 participants who were excluded because their A_z could not be calculated, an additional 5 participants were excluded from analyses because either their FOK ratings, recognition performance or their FOK accuracy were below 2 standard deviations from the group means⁸. Therefore, all of the analyses reported below were done on 18 of 37 participants. Descriptives for memory (cued recall-recognition) and metamemory (FOK rating-accuracy) measures are summarized in Table 3.

⁸ Participants who were detected as outliers in terms of their FOK strength had a median FOK strength 0 and 5 in the SR condition where the group mean of median FOK strength was 66.42 ($SD=15.92$). Moreover, participants having recognition percentage of .36 and .40 in the SR and .33 in the associative condition were outliers. The group means for recognition accuracy were .76 ($SD=.09$) and .72 ($SD=.07$), in the SR and associative conditions, respectively. In addition, one participant's FOK accuracy was .42 in the SR condition where the group mean was .68 ($SD=.11$) and the other's was .46 in the associative condition where the group mean of FOK accuracy was .71 ($SD=.10$). Thus, these participants were outliers in terms of their FOK accuracy.

Table 1. Means and Standard Deviations of Memory and Metamemory Measures for SR and Associative Encoding Conditions for Participants Included (N=18) and Excluded (N=14) in the Analyses in Experiment 1

	SR Condition		Associative Condition	
	N=18	N=14	N=18	N=14
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
<i>Memory Measures</i>				
Recall (%)	.29 (.09)	.33 (.10)	.31(.10)	.31(.11)
Recognition (%)	.76 (.09)	.79 (.12)	.72(.07)	.79 (.09)*
Cond. recog. (%)	.23 (.07)	.27 (.12)	.22 (.08)	.24 (.12)
<i>Metamemory Measures</i>				
FOK strength	66.42 (15.92)	61.43 (28.58)	66.11 (18.77)	54.29 (28.64)
FOK accuracy	.68 (.10)	N/A	.71 (.09)	N/A

Note. Any significant group differences are noted; * $p < .05$.

Table 2. Means and Standard Deviations of Executive Tasks for Participants Included (N=18) and Excluded (N=14) in the Analyses in Experiment 1

	N=18	N=14
	Mean (SD)	Mean (SD)
<i>Executive Measures</i>		
OSPAN Scores	43.61 (15.32)	53.57 (14.55) *
Task Switching: Global cost (ms)	398.99 (227.99)	393.35 (275.6)
Task Switching: Switch cost (ms)	128.72 (90.14)	119.39 (126.80)
Task Switching: Mixing cost (ms)	327.10 (208.79)	327.71 (241.79)

Note. Any significant group differences are noted; * $p < .10$

Table 3. Descriptives of Memory and Metamemory Measures for the SR and Associative Encoding Conditions in Experiment 1

	SR Condition	Associative Condition	<i>t</i>	<i>p</i>	<i>d</i>
	Mean (SD)	Mean (SD)			
<i>Memory Measures</i>					
Recall (%)	.29 (.09)	.31 (.11)	-.79	.444	-.19
Recall RT (ms)	4476.61 (1116.42)	4265.06 (782.83)	.96	.351	.22
Recognition (%)	.76 (.09)	.72 (.07)	2.39	.029	.49
Recog. RT (ms)	3837.28 (670.25)	3869.56 (698.12)	-.31	.760	-.05
Cond. recog. (%)	.23 (.08)	.22 (.08)	.29	.776	.13
<i>Metamemory Measures</i>					
FOK strength	66.42 (15.92)	66.11 (18.77)	.07	.945	.02
FOK accuracy	.68 (.10)	.71 (.09)	-.85	.406	-.32

Memory Performance

Recall

To compare the effect of encoding condition on cued recall, a paired sample t-test was conducted. There was no significant difference between SR and associative encoding conditions with regard to recall accuracy ($t(17) = -.79, p > .10$).

Recognition

There was a significant effect of encoding condition on recognition performance ($t(17) = 2.39, p < .05$). Specifically, SR at encoding produced better recognition performance ($M = .76, SD = .09$) than the associative condition ($M = .72, SD = .07$).

Appearance of SRE in the recognition test may be due to exclusion of the participants for whom A_z scores could not be calculated. These participants' recognition performance was significantly higher than the remaining 18 participants in the associative condition (Table 1). In other words, exclusion of 14 participants may have decreased the average of recognition in the associative condition which in

turn resulted in an artificial significant difference between encoding conditions in terms of recognition⁹. However, type of encoding did not impact conditional recognition (recognition performance for non-recalled items in the cued recall) ($t(17) = .29, p > .10$).

Metamemory Performance

FOK Strength

A paired sample t-test was conducted on median FOK ratings to investigate differences in FOK strength between the two conditions. There was no difference between FOK ratings given for word pairs encoded at SR and associative conditions ($t(17) = .07, p > .10$).

FOK Accuracy

Masson and Rotello (2009) indicated that the use of gamma to calculate FOK accuracy may result in Type I error. Specifically, they showed that gamma values may differ across subjects who have the same level of accuracy due to changes in response bias. Moreover, variation in gamma values is more pronounced when underlying distributions differ in variability. Therefore, Masson and Rotello (2009) suggested A_z as an alternative measure of FOK accuracy. A_z ranges between 0.5 (chance performance) and 1 (perfect performance). Scores around 1 show a better match between FOK predictions and recognition performance while .50 means no

⁹ The difference between conditions in terms of recognition performance became marginally significant when we included participants whose A_z scores could not be calculated to the analyses ($t(32) = 1.81, p = .079$) ($M = .77, SD = .10$ and $M = .75, SD = .08$ for SR and associative conditions, respectively).

association between predictions and recognition. In the current thesis we used A_z to measure FOK accuracy.

There was no significant difference between pairs encoded in the SR and associative conditions in terms of FOK accuracy ($t(17) = -.85, p > .10$)¹⁰. Thus, self-referencing at encoding did not enhance FOK accuracy, which is not surprising given that SR had no effect on recall. If SRE had been observed, then it would have been expected to boost FOK performance.

R/K/G Judgments

For each participant, we calculated the proportion of remember-know-guess responses given for correctly recognized items in encoding both conditions (Figure 1). A 2 x 3 (Encoding Condition: SR vs. Associative x Response Type: Remember, Know, Guess ANOVA revealed a significant main effect of response type, $F(2, 34) = 36.07, MSE = .03, p < .001, \eta_p^2 = .68$. Specifically, participants gave more remember responses ($M = .51, SD = .11$) than know ($M = .25, SD = .10$), ($p < .001$) and guess ($M = .21, SD = .11$), ($p < .001$) responses. The difference between know and guess responses was not significant, ($p > .10$). However, neither the main effect of encoding condition nor the Encoding Condition x Response Type interaction reached significance, $ps > .10$. Thus, in contrast to what we expected, self-reference at encoding did not improve recollective experience over the associative condition. As expected, for both SR and associative condition, incorrectly recognized items were accompanied with a significantly higher proportion of guess responses ($M = .77, SD =$

¹⁰ When we based our analyses on gamma scores instead of A_z , we found no effect of encoding conditions on FOK accuracy ($t(30) = -.90, p > .10$).

.23; $M = .76$, $SD = .23$) than know ($M = .13$, $SD = .19$; $M = .15$, $SD = .21$) and remember responses ($M = .05$, $SD = .07$; $M = .04$, $SD = .07$).

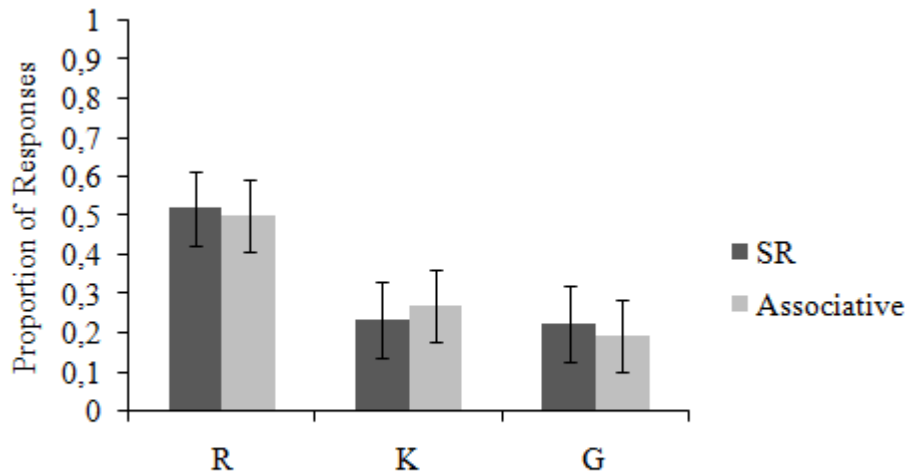


Fig. 1. Proportion of R/K/G responses for correctly recognized items as a function of encoding condition in Experiment 1.

Executive Function Tasks

Given that executive functions may contribute FOK accuracy (e.g., Boduroglu, Tekcan, & Kapucu, under review; Perrotin et al., 2008), we checked the relationship executive function tasks and metamemory measures.

For the OSPAN task, none of the OSPAN scores were either 2 standard deviations above or below the group mean. Thus, we found no outlier in terms of OSPAN scores. For task switching, we calculated global, mixing and switching cost separately. Any RT above or below of 3 standard deviations from the condition mean were excluded from the analyses for each participant. After cleaning outlier trials, we explored task switching scores and eliminated the data from a participant whose global and mixing costs were 2 standard deviations above the group mean.

Therefore, OSPAN analyses were carried out data from 18 participants and task switching analyses were done on 17 participants¹¹. Descriptives for each measure were reported on Table 4.

Table 4. Descriptives for OSPAN Scores and Task Switching Performance in Experiment 1

	Experiment 1		
	Mean (SD)	Min	Max
<i>Executive Measures</i>			
OSPAN Scores	43.61 (15.32)	15	68
Task Switching: Global cost (ms)	368.06 (192.19)	35.99	888.55
Task Switching: Switch cost (ms)	124.60 (91.15)	-83.659	301.93
Task Switching: Mixing cost (ms)	298.50 (176.16)	-46.66	726.53

Note: Descriptives for OSPAN scores were reported on 18 participants and task switching were based on 17 participants.

OSPAN

Participants' OSPAN scores were used as a measure of working memory capacity. OSPAN score was the sum of all correctly recalled number of letters in the sets. OSPAN scores were significantly correlated with FOK strength in the SR condition $r(16) < -.50, p < .05$), indicating that FOK judgments decreased as working memory capacity increased. This significant negative correlation between OSPAN scores and FOK strength in the SR condition suggests that high capacity participants were aware that they will perform poorly in a future recognition task. However, there was no such a significant negative correlation between OSPAN performance and FOK judgments in the associative condition $r(16) < -.21, p > .10$). Absence of a significant

¹¹ In addition to FOK accuracy measured by A_2 scores, we checked the correlations between FOK performance measured by Gamma coefficient and executive tasks. However, neither FOK strength nor FOK accuracy measured by Gamma were not correlated with executive tasks (all $r_s(29) < .30, p > .10$).

negative relationship in the associative condition may show that participants were good at predicting future recognition performance only for self-relevant material. FOK accuracy in either condition were not correlated with OSPAN performance (all $r_s(16) < .27, p > .10$).

Task Switching

For each participant we calculated three measures of task switching. Global cost is the comparison of the average RT for mixed block with the average RT for pure blocks. Switch cost is determined by comparing the average RT on switching trials in the mixed block with the average RT for non-switching trials in the mixed block. According to Roger and Monsell (1995), switching cost arises from engagement of active anticipation process about an upcoming task switch and the arrival of a stimulus compatible with that anticipated task. Mixing cost is the difference between the average RT from single task blocks and the average RT for the non-switching trials in the mixed block. The mixing cost includes controlled process required to focus on relevant aspects of the task rules while ignoring irrelevant aspects of the task (Minear & Shah, 2008).

FOK strength in the associative condition was significantly correlated with global ($r(15) < .50, p < .05$) and mixing ($r(15) < .50, p < .05$) cost. There was no such a significant correlation between FOK strength and task switching performance in the SR condition (all $r_s(15) < .39, p > .10$). FOK accuracy was not correlated with task-switching performance in both encoding conditions (all $r_s(15) < .39, p > .10$).

Discussion

In Experiment 1, we unfortunately were not able to find an effect of self-referencing on recall accuracy, FOK strength and FOK accuracy. However, there was a slight difference of SR on recognition performance. One of the reasons why there was no SRE in this experiment may be due to participants' response patterns. Some participants reported that whenever they were presented with semantically related pairs at encoding, they responded "yes" regardless of the specific question asked. This might have rendered the SR manipulation at encoding ineffective. This possibility is also consistent with Symons and Johnson (1997)'s results showing that highly related stimuli may lead to a smaller mean of SRE than stimuli having low relatedness. This was indeed the case. For both associative and self-reference conditions, the proportion of "yes" responses for semantically related pairs were quite similar ($M = .81$, $SD = .24$ and $M = .85$, $SD = .17$, respectively), ($t(17) = .89$, $p > .10$). Also, response latencies of yes responses for semantically related pairs at encoding were similar for both conditions ($t(17) = -.40$, $p > .10$). These findings suggest that regardless of encoding question, participants may have processed information in the same way and consequently did not sufficiently process information in a self-reflective manner.

While there was no effect of SR on cued recall, there was a significance difference observed in recognition. As we mentioned before, the SR advantage at recognition may be partly due to elimination of the data from 14 participants for whom A_z could not be calculated. Since these participants had significantly higher recognition performance in the associative condition than the remaining 18 participants, exclusion of these participants from the analyses may have decreased

the average of overall recognition accuracy in the associative condition. Thus, this decrease may result in a significant advantage of SR in terms of recognition performance over associative condition. This assumption was supported when we analyzed condition differences with regard to recognition accuracy by including these 14 participants because the difference became marginally significant.

CHAPTER 4

EXPERIMENT 2

In Experiment 2, to eliminate the response bias problem observed in Experiment 1, we used a different deep encoding condition to compare with the self-reference condition. Instead of the associative condition, participants were asked to judge the frequency of occurrence of presented word pairs (common judgment condition). For the common judgment trials, participants were presented with word pairs and asked whether they would encounter one of the words in the pair more often when reading. These types of judgments have previously been shown to evoke deep processing (Craig & Lockhart, 1972; Hamami et al. 2011).

In Experiment 2, we hypothesized that word pairs encoded in the SR condition would be recalled and recognized more than those encoded in the common judgment condition. Moreover, in terms of FOK performance, we expected higher FOK ratings and accuracy for word pairs encoded under the SR condition as opposed to the common condition. Finally, we expected that words encoded in the SR condition would be accompanied by a greater number of remember responses than those encoded in common condition.

Method

Participants

A total of 64 students from Bogazici University participated in the Experiment 2 for course credit. We excluded 10 participants from further analyses because their A_z scores could not be calculated. In addition, data from additional 6 participants whose

scores were found to be outliers were eliminated. The mean age of the remaining 48 participants (35 female) was 20.60 ($SD= 1.50$).

Materials and Procedure

In this experiment, we used the same 96 noun pairs used in Experiment 1. As in Experiment 1, we used the same four counterbalanced orders to ensure that each pair was presented in each condition across participants¹². The only change was that we used a common judgment condition instead of the associative condition. Participants were asked the following question: “When reading a paper or book would you come across these words equally often?”.

All of the procedure was the same as Experiment 1. The average duration of the RI was 23.02 minutes ($SD= 3.91$).

Results

Ten participants whose A_z scores could not be calculated were eliminated from analyses. The comparison of these 10 participants and the final 48 participants on whom the main analyses were conducted is presented in Table 5 and Table 6¹³. There was a significant difference between the two groups in terms of recognition and FOK

¹² There was no effect of counterbalanced orders on cued recall in the SR ($F(3,44)= 1.23, p> .05$) or common judgment condition ($F(3,44)= .42, p> .10$), nor on recognition in the SR ($F(3,44)= 1.76, p> .10$) or common condition ($F(3,44)= .66, p> .10$). Similarly, there was no effect of different counterbalanced orders FOK strength in the SR ($F(3,44)= .74, p> .10$) or common condition ($F(3,44)= .29, p> .10$).

¹³ Given that there was a significant difference between the groups in terms of recognition and FOK rating performance, we investigated whether the self reference effect may have been artificially driven by our inclusion criteria. However, when those participants whose A_z scores could not be calculated were included in the self versus common comparison, we still observed a significance difference in recognition ($t(58)= 3.63, p= .001$) ($M= .72, SD= .10$ and $M= .66, SD= .14$ for SR and common conditions, respectively) and FOK rating performance ($t(58)= 3.35, p= .001$), ($M= 56.36, SD= 22.94$ and $M= 49.60, SD= 18.84$ for SR and common conditions, respectively).

strength performance in both encoding conditions. Specifically, omitted participants had significantly higher recognition accuracy in both encoding conditions compared to the remaining 48 participants and their FOK strength were significantly lower than those final group of participants in both encoding conditions (Table 5).

In addition to the 10 participants whose A_z scores could not be calculated, additional 6 participants were excluded from the analyses because either their FOK rating or FOK accuracy were either 2 standard deviations below the group mean¹⁴. Thus, all of the analyses were done over 48 of the 64 participants. Descriptives for all tasks are presented in Table 7.

Table 5. Means and Standard Deviations of Memory and Metamemory Measures for SR and Common Encoding Conditions for Participants Included (N= 48) and Excluded (N=10) to the Analyses in Experiment 2

	SR Condition		Common Condition	
	N=48	N=10	N=48	N=10
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
<i>Memory Measures</i>				
Recall (%)	.24 (.11)	.29 (.10)	.18 (.10)	.21(.12)
Recognition (%)	.70 (.10)	.79 (.13)*	.65 (.13)	.74(.17)*
Cond. recog. (%)	.18 (.10)	.23 (.12)	.12 (.08)	.17 (.12)
<i>Metamemory Measures</i>				
FOK strength	60.27 (19.23)	37.60 (30.48)*	53.03 (14.24)	33.15 (28.74)*
FOK accuracy	.69 (.10)	N/A	.64 (.11)	N/A

Note. Any significant group differences are noted; * $p < .05$.

¹⁴ Participants detected as outlier in terms of their FOK strength had a median FOK strength 0, 10, and 15 in the common encoding condition where the group mean of median FOK strength was 53.03 ($SD = 14.24$). In addition, two participants whose FOK accuracy were .29 and .32 in the common condition where the group mean of FOK accuracy was .64 ($SD = .11$) were determined as outliers.

Table 6. Means and Standard Deviations of Executive Tasks for Participants Included (N= 48) and Excluded (N=10) to the Analyses in Experiment 2

	N=48	N=10
	Mean (SD)	Mean (SD)
<i>Executive Measures</i>		
OSPAN Scores	46.77 (13.06)	54.30 (9.27)*
Task Switching: Global cost (ms)	384.70 (200.76)	321.29 (162.87)
Task Switching: Switch cost (ms)	102.36 (130.88)	97.89 (71.24)
Task Switching: Mixing cost (ms)	327.59 (179.17)	97.89 (71.24)

Note. Any significant group differences are noted; * $p < .10$

Table 7. Means and Standard Deviations of Memory and Metamemory Measures for SR and Common Encoding Conditions in Experiment 2

	SR Condition	Common Condition	t	p	d
	Mean (SD)	Mean (SD)			
<i>Memory Measures</i>					
Recall (%)	.24 (.11)	.18 (.10)	4.99	.000	.57
Recall RT (ms)	4838.22 (1758.20)	4625 (1847.59)	1.79	.080	.12
Recognition (%)	.70 (.10)	.65 (.13)	3.39	.001	.43
Recog. RT (ms)	4205.60 (1607.09)	4455 (1438.74)	-2.42	.019	-.16
Cond. recog. (%)	.18 (.10)	.12 (.08)	5.21	.000	.66
<i>Metamemory Measures</i>					
FOK strength	60.27 (19.23)	53.03 (14.24)	3.05	.004	.43
FOK accuracy	.69 (.10)	.64 (.11)	2.32	.025	.48

Note: For FOK strength, we reported the average of median instead of mean responses of individuals.

Memory Performance

Recall

As predicted, SR at encoding produced significantly higher recall accuracy than the common judgment condition ($t(47) = 4.99, p < .001$).

Recognition

Word pairs encoded in the SR condition were recognized significantly better than those encoded in the common condition ($t(47) = 3.35, p < .01$). In addition, RT for

recognition accuracy was significantly faster in the SR condition than common condition ($t(47) = -2.42, p < .05$). Moreover, conditional recognition performance was significantly better for the pairs encoded in the SR condition than those encoded in the common condition ($t(47) = 5.21, p < .001$). This finding suggests that even if retrieval is not successful, attempt to retrieve self-relevant information during the cued recall enhanced its retrieval in subsequent memory tasks.

Metamemory Performance

FOK Strength

FOK ratings were significantly higher for items encoded in the SR condition compared to items encoded in the common condition ($t(47) = 3.05, p < .01$).

FOK Accuracy

FOK accuracy calculated by A_z measure was significantly higher in the SR than common condition ($t(47) = 2.32, p < .05$), supporting our main expectation that SR at encoding provided a boost for FOK performance. To see consistency between FOK accuracy measures, we calculated gamma scores for each participant¹⁵. Type of encoding impacted FOK accuracy measured by Gamma scores ($t(58) = 2.39, p < .05$). Specifically, participants' FOK accuracy was higher for items encoded in the SR condition ($M = .49$) than those encoded in the common condition ($M = .38$). Thus,

¹⁵ To do gamma analyses, we excluded data from 5 participants because either their FOK strength or gamma scores were 2 standard deviations below the the group mean.

along with previous studies (e.g., Fitzgerald, Oriet, & Price, 2011; Mitchum & Kelley, 2010), two measures of FOK accuracy were highly consistent in our study¹⁶.

Moreover, we found a significant relationship between FOK strength and accuracy in the SR condition ($r(46) = .45, p < .01$) whereas there was no such a significant correlation in the common condition ($r(46) = .04, p > .10$). This finding supports advantage of self-referencing on metamemory performance over common condition and suggests that participants were more consistent in their FOK performance for items encoded in the SR condition.

R/K/G Judgments

We calculated the proportion of remember-know-guess responses for correctly recognized items in both conditions (Figure 2). A 2 x 3 (Encoding Condition: SR vs. Common x Response Type: Remember, Know, Guess) ANOVA showed a significant main effect of response type, ($F(2, 94) = 18.92, MSE = .06, p < .001, \eta_p^2 = .29$). Participants gave significantly higher number of remember responses ($M = .45, SD = .18$) than know ($M = .25, SD = .13$), ($p < .001$) and guess ($M = .28, SD = .16$), ($p < .001$) responses. However, there was no main effect of encoding condition. Taken together, these findings are congruent with previous studies showing that deep

¹⁶ Given that Gamma measure based on ratings resulted in Type I error due to the response bias whereas relative accuracy measures based on signal detection did not (Masson & Rotello, 2009), we checked whether response bias is evident in our data as well. Participants' response criterion was significantly more liberal for word pairs encoded in the common condition ($M = -.21$) than those encoded in the SR condition ($M = -.12$), ($t(58) = 2.07, p < .05$). That is, participants were more inclined to categorize items encoded in the common condition as old than items in the SR condition. Thus, FOK accuracy differences shown by Gamma measures in our study might have occurred due to response bias differences between encoding conditions. However, this possibility does not change our main finding showing advantage SR on FOK accuracy measured by Az shown to be not affected by response bias (Masson & Rotello, 2009).

processing is associated with greater remember experience rather than know judgments (e.g., Gardiner, 1988; Khoe et al., 2000). More critically, a significant interaction between encoding condition and response type was observed ($F(2, 94) = 13.99, MSE = .02, p < .001, \eta_p^2 = .23$). Follow-up analyses showed that the amount of remember responses were significantly higher in the SR condition ($M = .49, SD = .20$) compared to common condition ($M = .40, SD = .17, F(1, 47) = 14.05, MSE = .01, p < .001, \eta_p^2 = .23$). However, no significant differences were found between know responses across conditions ($F(1, 47) = .15, MSE = .00, p > .10$). That is to say, participants were sure that they saw the items presented in the both encoding conditions but they had specific remember experience regarding the items encoded only in the SR condition. Furthermore, guess responses were significantly higher in the common condition ($M = .32, SD = .18$) compared to SR condition ($M = .24, SD = .14, F(1, 47) = 9.5, MSE = .01, p < .001, \eta_p^2 = .17$), indicating that the pattern for remember responses was reversed for guess responses. Overall, these findings replicate self-relevant recollective experience shown by Conway and Dewhurst (1995). As in Experiment 1, incorrectly recognized items were accompanied by significantly higher guess responses ($M = .73, SD = .21$; $M = .75, SD = .17$) than know ($M = .17, SD = .16$; $M = .14, SD = .13$) and remember responses ($M = .06, SD = .09$; $M = .07, SD = .09$).

To understand how recollective experience is related to memory tasks used in our study, we checked the relationships between R/K/G judgments and those tasks. The only significant correlation was between FOK strength and remember judgments in the SR condition ($r(46) = .31, p < .05$), indicating that self-referential processing

increased participants' feeling of knowing. However, there were no significant correlations between these judgments and any of the memory-metamemory tasks.

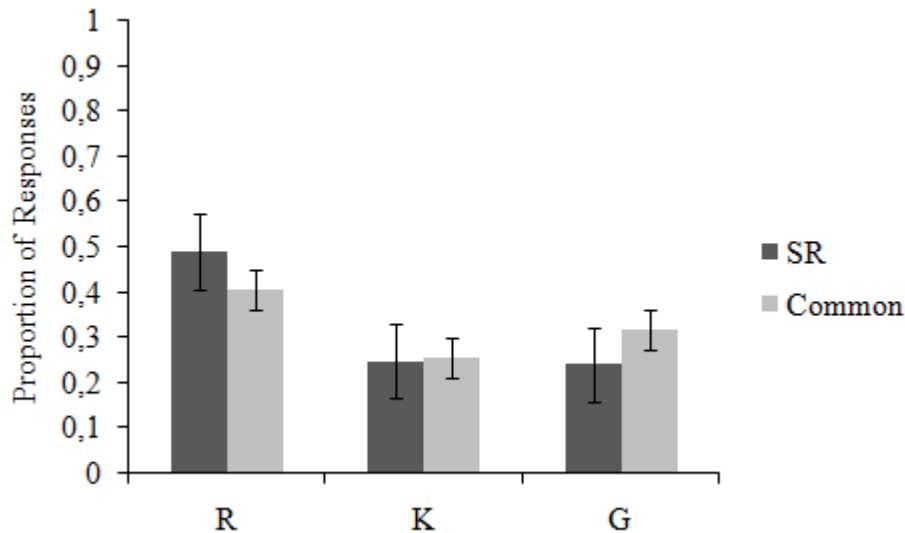


Fig. 2. Proportion of responses for correctly recognized items as a function of encoding condition in Experiment 2.

Executive Function Tasks

For OSPAN task, we performed an outlier analysis over OSPAN scores of 48 participants and none of the OSPAN scores were either 2 standard deviations above or below the group mean. For task switching, again any RTs above or below of 3 standard deviations from the condition mean were excluded from the analyses for each participants. After cleaning of outlier trials, we explored task-switching scores and eliminated the data from 4 participants who had task switching cost either 2 standard deviations above or below the group mean. Therefore, OSPAN analyses

carried out on 48 participants and task-switching analyses were done on 44 participants¹⁷. Descriptives for each task were presented on Table 8.

Table 8. Descriptives for OSPAN Scores and Task Switching Performance in Experiment 2

	Experiment 2		
	Mean (SD)	Min	Max
<i>Executive Measures</i>			
OSPAN Scores	46.77 (13.06)	20	75
Task Switching: Global cost (ms)	360.11 (160.27)	54.60	753.77
Task Switching: Switch cost (ms)	98.07 (98.77)	-77.09	284.70
Task Switching: Mixing cost (ms)	304.84 (145.37)	27.96	667.15

Note: Descriptives for OSPAN scores were reported on 48 participants and task switching were based on 44 participants.

OSPAN

OSPAN scores were not correlated with any of the metamemory measures in both encoding conditions (all $r_s(46) < .04$, $p > .10$).

Task Switching

FOK strength and accuracy were not correlated with task switching performance (all $r_s(42) < .26$, $p > .10$) measured by either of the three measures of task switching (global-mixing-switch).

¹⁷ When we checked the correlations between FOK performance measured by Gamma coefficient and executive tasks, only FOK accuracy in the SR condition was positively correlated with switch cost ($r(53) = .29$, $p < .05$). This finding suggests that FOK accuracy for self-relevant material is significantly related to controlled processes. Neither FOK strength in both encoding conditions nor FOK accuracy in the common condition were correlated with executive tasks (all $r_s(29) < .11$, $p > .10$).

Discussion

In Experiment 2, we demonstrated the SRE on memory. More importantly, advantage of SR extended to metamemory processes as shown by a higher FOK strength and accuracy for pairs encoded in the SR condition than those encoded in the common judgment condition. Finally, self-referencing at encoding increased remember responses at recognition.

As in Experiment 1, there was no difference between the two conditions in the proportion of "yes" responses for semantically related pairs ($t(47) = .57, p > .10$) ($M = .82, SD = .15$ and $M = .83, SD = .16$ for common and SR conditions, respectively)¹⁸.

Unlike Experiment 1, responses were significantly faster in the SR ($M = 1293.42$) than common judgment condition ($M = 1378.43$), ($t(47) = -3.33, p < .01$), in line with previous research indicating that self-reference decisions at encoding are made faster than other reference decisions (e.g., Mueller, Wonderlich, & Dugan, 1986).

¹⁸ In order to see how semantically unrelated pairs influence self-referencing and metamemory, we prepared totally new and unrelated 45 noun pairs by mixing semantically related pairs between each other. We conducted another experiment with 16 participants by using a total of these 90 semantically unrelated pairs (45 newly prepared-45 previously used). The only change was that there were newly created unrelated pairs instead of semantically related ones. All of the procedure was the same as Experiment 2. However, we did not analyze the data because the average percentage of recall was around %3 in both encoding conditions.

CHAPTER 5

CONCLUSIONS

In the present thesis, our primary goal was to investigate whether SR at encoding produces higher FOK strength and accuracy compared to deep encoding. In Experiment 1, we compared memory and metamemory performances for word pairs encoded at SR and associative conditions. We found no advantage of self-referencing at encoding on memory and FOK performance over the associative condition. However, changing the type of deep processing in Experiment 2, resulted in a self-reference effect. In line with previous studies showing an advantage of SR in memory tasks (e.g., Ferguson, Rule, & Carlson, 1983; Gutchess et al., 2007), word pairs encoded with reference to self were recalled and recognized more than those encoded at common judgment condition. Most critically, FOK accuracy was higher for words encoded under the SR than common condition, and greater recollective experience was associated with these words. This pattern of results suggests that SR at encoding increases memory-metamemory performance and recollective over deep processing condition.

In our study, FOK strength and accuracy were significantly higher in the SR condition than common judgment condition, along with previous studies confirming the effect of encoding manipulations on FOK performance (e.g., Lupker et al., 1991; Sacher et al., 2009). Moreover, proportion of remember responses were significantly correlated with FOK strength only in the SR condition in the current study. Given that high levels of predictive confidence was found to improve recollective experience in FOK task (Hicks & Marsh, 2002), this finding may point out that self-

reference at encoding may increase confidence level compared to deep processing conditions. This suggestion is in line with the finding by Macrae et al. (2004) showing that trait adjectives judged to be self-relevant were more likely to be recognized with high confidence than words judged not to be self-relevant.

More recently, Cosentino et al. (2011) used task of agency, a computer task including self and computer controlled trials and found a significant relationship between FOK accuracy and self controlled trials of agency task. They suggested that this association between metamemory and performance on the agency task reflects a shared “self-referential” component. Our findings showing the benefit of SR task on FOK accuracy are congruent with Cosentino et al.’s study because SR judgments required self controlled and subjective decision processes.

One may claim that the effect of SR on FOK accuracy observed in our study may have been related to an advantage of deep processing provided by SR tasks. Therefore, in order to explain how self-reference task results in stronger encoding above and beyond than the depth of processing manipulations, emphasizing the distinctiveness framework becomes crucial. Within this framework, a group of researchers (e.g., Rajaram, 1998) showed that nature of the stimuli (e.g. items with dominant meaning) leads to the remember experience at retrieval by increasing distinctiveness and other groups (e.g., Johnson, Raye, Foley, & Foley, 1981) found that encoding tasks (e.g., self generation at encoding) requiring distinctive cognitive operations results in recollective experience. Since we used SR task in this study, recollective experience observed in our study should be related to distinctiveness of self-referencing task compared to the deep encoding condition. This assumption is highly consistent with a study by McDonough and Gallo (2008) showing that

autobiographical elaboration task in which participants were asked to think about specific memory regarding presented trait adjectives improved recognition and recollective based experience compared to semantic judgment condition measured by a valence rating task. They suggested that the advantage of autobiographical task may be related detailed imagery and self-referential processes triggered by the task. Moreover, autobiographical elaboration seems to require multiple cognitive operations involving retrieval of information based on episodic memories or general life events, as suggested by Conway's (2005) working self model, compared to semantic judgment or deep encoding. Thus, self-reference at encoding may create a distinctive processing which increased FOK strength and accuracy by increasing recollective experience in the SR condition over deep processing condition.

Another important finding of our study is replication of self-relevant recollective experience shown by Conway and Dewhurst (1995). That is to say, participants gave significantly greater number of remember responses for correctly recognized items encoded in the SR condition than those recognized in the common condition. This finding is also consistent with Hicks and Marsh's study (2002) showing that high FOK judgments were accompanied with more remember than know judgments because FOK ratings were significantly higher in the SR condition than common condition in our study as well. When we look at prerequisite for appearance of self-relevant recollective experience, the minimum duration of delay was found to be 30 minutes in Conway and Dewhurst (1995) study. More recently, Conway and colleagues (2001) tested the effect of duration of retention interval for recollective experience by using self-reference and semantic encoding tasks and found self relevant recollective experience at 1 hour retention interval rather than 5

minutes. However, we found self-relevant recollective experience at approximately 25 minutes in the current study. Since Conway et al. did not test any other retention intervals range between 5 minutes and 1 hour or less than 30 minutes, they might have missed the effect observed in this study. Thus, our study may contribute to the literature regarding the amount of retention interval necessary for low self-relevant information to become less accessible so that self-relevant information could be more accessible.

Overall, we replicated advantage of SR over deep encoding condition on memory performance and confirmed the proposal suggested by Rogers, et al. (1977) that self operates as a “superordinate schema” to support the encoding, processing, and retrieval of personal information. More importantly, the novelty of this research was to show the benefit of self-referencing at encoding on prospective memory judgments measured by FOK strength and accuracy. Our findings provided support for Koriat’s accessibility model (1993), which suggests that FOK judgments are based on the amount of partial information accumulated during the initial stages of search and retrieval since advantage of self-referencing at encoding resulted in better memory performance which in turn increased FOK performance. We believe that this research may shed some light on a controversial topic about the relationship between memory and metamemory performance.

Appendix A

Semantically Related Word Pairs and Their Distractors

Cue	Frequency	Target	Frequency	Distractor 1 (Previous Target)	Target	Distractor 2	Distractor 3
MENEMEN	3	BİBER	73	LAMBA	BİBER	TORBA	KEPÇE
KİMYON	5	KÖFTE	33	KAZAK	KÖFTE	BAKIR	YAKIT
MANDAL	3	ÇAMAŞIR	52	MARGARİN	ÇAMAŞIR	DEREOTU	HELVA
KOLONYA	16	PAMUK	55	TUĞLA	PAMUK	KEMER	BULGUR
AYRAN	19	DÖNER	23	İPLİK	DÖNER	FOTOĞRAF	KRAVAT
MAYO	14	TERLİK	24	PİLAV	TERLİK	KURABİYE	AHŞAP
FİNCAN	15	KAHVE	172	KILIÇ	KAHVE	MOTOR	BASTON
SANDIK	17	ÖRTÜ	81	SÖZLÜK	ÖRTÜ	ERİK	TAVŞAN
KİBRİT	18	KUTU	126	ÜZÜM	KUTU	BUĞDAY	DÜRÜM
SÜZGEÇ	19	MAKARNA	27	DEFTER	MAKARNA	MÜREKKEP	BAVUL
ELDİVEN	15	PALTO	25	RADYO	PALTO	FASULYE	BALTA
ANTEN	12	KABLO	90	NİŞASTA	KABLO	KAKAO	TENEKE
POĞAÇA	4	ZEYTİN	64	TERLİK	ZEYTİN	BACA	KİTAPLIK
PİDE	11	KIYMA	22	HARİTA	KIYMA	TELEVİZYON	KETEN
NAFTALİN	4	KAZAK	32	KEMAN	KAZAK	AVİZE	KUMBARA
KARABİBER	50	PİLAV	53	KİLİT	PİLAV	YAZICI	ELMA
BAKLAVA	23	FISTIK	28	KABLO	FISTIK	KLİMA	KAZAN
KASE	27	YOĞURT	71	SANDALYE	YOĞURT	CÜZDAN	YORGAN

Appendix A (continued)

Semantically Related Word Pairs and Their Distractors

Cue	Frequency	Target	Frequency	Distractor 1 (Previous Target)	Target	Distractor 3	Distractor 2
ÇEKİÇ	20	ÇİVİ	27	İLAC	ÇİVİ	ÇORBA	SANDVIÇ
ASKI	25	CEKET	64	FISTIK	CEKET	KEBAP	SEPET
KARYOLA	20	YASTIK	77	KÖFTE	YASTIK	KESTANE	KUPA
ÇİLEK	20	PASTA	79	ÇORAP	PASTA	FİDAN	DEMİR
SOBA	49	BORU	80	PİYANO	BORU	AYNA	PİZZA
ENGİNAR	31	ZEYTİNYAĞI	94	ÇİKOLATA	ZEYTİNYAĞI	KAVUN	ÇANTA
RAKI	63	MEZE	27	ODUN	MEZE	DÜĞME	TAHTA
SALATA	72	MARUL	24	TEPSİ	MARUL	TATLI	PUDRA
BONCUK	26	TESPİH	23	PASTA	TESPİH	KAŞAR	SEBZE
FIRÇA	52	TABLO	161	KAVANOZ	TABLO	BAHARAT	TARAK
SİRKE	31	ÜZÜM	61	ETEK	ÜZÜM	ÖNLÜK	KADİFE
FINDIK	32	ÇİKOLATA	115	ÇATAL	ÇİKOLATA	EŞARP	LEVHA
YUMURTA	167	TAVUK	92	PALTO	TAVUK	ANTİKA	MERMİ
ÇERÇEVE	179	GÖZLÜK	78	SALÇA	GÖZLÜK	GAZOZ	TURŞU
ELBİSE	117	İPLİK	27	KÖMÜR	İPLİK	BİSKÜVİ	KASA
ÇİÇEK	177	SAKSI	31	RAKET	SAKSI	TAKI	REÇEL

Appendix A (continued)

Semantically Related Word Pairs and Their Distractors

Cue	Frequency	Target	Frequency	Distractor 1 (Previous Target)	Target	Distractor 3	Distractor 2
EKRAN	144	KUMANDA	23	ÇAMAŞIR	KUMANDA	SERAMİK	ŞEMSİYE
KAPAK	142	KAVANOZ	51	KARİDES	KAVANOZ	KARPUZ	MOBİLYA
AYAKKABI	144	BOYA	98	TAVA	BOYA	BALIK	TÜFEK
DOMATES	141	SALÇA	20	KADEH	SALÇA	MAKAS	KASET
SOĞAN	240	BIÇAK	100	TABLO	BIÇAK	KİTAP	ÇEREZ
MASA	401	LAMBA	83	SABUN	LAMBA	PATLICAN	TOKA
ANAHTAR	106	KİLİT	31	BAYRAK	KİLİT	PORTAKAL	ÇÖMLEK
KALEM	134	DEFTER	100	DÖNER	DEFTER	TEREYAĞI	MEYVE
BARDAK	131	KOLA	34	BOYA	KOLA	KESE	CEVİZ
İÇKİ	141	KADEH	65	SAAT	KADEH	BİLET	MASKE
PEYNİR	144	SİMİT	26	GÖMLEK	SİMİT	ÇEKMECE	ŞEFTALİ

Appendix B

Semantically Unrelated Word Pairs and Their Distractors

Cue	Frequency	Target	Frequency	Distractor 1 (Previous Target)	Target	Distractor 2	Distractor 3
PENSE	2	BİRA	54	SİMİT	BİRA	FENER	PEDAL
VAZO	17	BİSİKLET	64	ZEYTİNYAĞI	BİSİKLET	TUZLUK	TAKVİM
POSTER	8	TAVA	30	BANT	TAVA	ŞAPKA	BİLGİSAYAR
SİGARA	1	ÇATAL	43	ALTIN	ÇATAL	ŞERBET	MERMER
KAYISI	17	HARİTA	61	BİBER	HARİTA	SÜPÜRGE	KEKİK
PIRASA	1	KILIÇ	37	YASTIK	KILIÇ	ÇUVAL	ŞURUP
LAHMACUN	4	SAAT	74	YUFKA	SAAT	PLAK	KETÇAP
AYVA	6	PIYANO	37	KUTU	PIYANO	POŞET	TABELA
GİTAR	6	SABUN	30	MAKARNA	SABUN	BARBUNYA	İNCİR
SÜRAHİ	6	KÖMÜR	44	KOLA	KÖMÜR	KİRAZ	ROBOT
MANTI	6	PERDE	79	KAHVE	PERDE	PABUÇ	LAHANA
PEKMEZ	7	ALTIN	168	SAKSI	ALTIN	BİTKİ	CİĞER
TARÇIN	11	ODUN	40	OYUNCAK	ODUN	NOHUT	ÇARŞAF
SÜTLAÇ	5	RAKET	28	ÖRTÜ	RAKET	BEŞİK	PRİZ
AMPUL	15	TEPSİ	69	GÖZLÜK	TEPSİ	ARMUT	HAVLU
MAYONEZ	37	ÇORAP	46	MARUL	ÇORAP	HİNDİ	BADEM
MENDİL	36	IZGARA	54	KUTU	IZGARA	YATAK	KOLYE
LİMON	60	SÖZLÜK	35	PERDE	SÖZLÜK	ATKI	MAMA

Appendix B (continued)

Semantically Unrelated Word Pairs and Their Distractors

Cue	Frequency	Target	Frequency	Distractor 1 (Previous Target)	Target	Distractor 2	Distractor 3
PANO	34	YUFKA	37	SARIMSAK	YUFKA	TOHUM	KİLİM
ÇİZME	41	KARİDES	40	KUMANDA	KARİDES	GAZETE	TULUM
HAVUÇ	37	GÖMLEK	73	TAVUK	GÖMLEK	BENZİN	LALE
CETVEL	38	ÇEKİRDEK	97	ÇADIR	ÇEKİRDEK	TEKERLEK	ŞAMPUAN
KREMA	36	ÇADIR	40	PATATES	ÇADIR	DİSKET	İPEK
PARFÜM	63	SANDALYE	89	ZEYTİN	SANDALYE	SALATALIK	YELPAZE
DONDURMA	69	TUĞLA	42	BUZDOLABI	TUĞLA	TÜTÜN	HAMBURGER
ZARF	50	PATATES	60	ZİNCİR	PATATES	DETERJAN	KÜPE
HOROZ	27	İLAC	233	CEKET	İLAC	SOPA	TOST
NANE	27	HALI	67	BORU	HALI	SOSİS	HORTUM
SUCUK	24	KÜREK	33	KREM	KÜREK	KÜRK	SAKIZ
MISIR	41	ZİNCİR	65	ŞEKER	ZİNCİR	MACUN	BALON
MERDİVEN	144	ŞEKER	143	BIÇAK	ŞEKER	ALET	DÜDÜK
KAĞIT	323	ÇİMENTO	30	KIYMA	ÇİMENTO	HOPARLÖR	SEHPA
TENCERE	106	LASTİK	63	PATATES	LASTİK	DOLMA	VİŞNE
FIRIN	123	KEMAN	28	KÜREK	KEMAN	BAKLA	PAPATYA
TABAK	128	ETEK	66	HALI	ETEK	HAMSİ	VİDA

Appendix B (continued)

Semantically Unrelated Word Pairs and Their Distractors

Cue	Frequency	Target	Frequency	Distractor 1 (Previous Target)	Target	Distractor 2	Distractor 3
ŞARAP	169	OYUNCAK	88	ÇİMENTO	OYUNCAK	KONSERVE	MANDALİNA
DOSYA	104	KREM	71	BİRA	KREM	OLTA	İNCİ
EKMEK	253	BANT	45	MEZE	BANT	KOVA	TURP
KÖPEK	279	MARGARİN	32	TESPİH	MARGARİN	SİLGİ	MONİTOR
KOLTUK	126	NİŞASTA	25	MAYDONOZ	NİŞASTA	BATTANİYE	BİLEZİK
RESİM	355	MAYDONOZ	42	PAMUK	MAYDONOZ	MONT	YÜZÜK
KUMAŞ	144	SARIMSAK	54	ÇEKİRDEK	SARIMSAK	PORSELEN	TELEFON
ROMAN	215	BUZDOLABI	61	ÇİVİ	BUZDOLABI	TİŞÖRT	KAFES
KAŞIK	102	RADYO	140	YOĞURT	RADYO	TAHİL	GİYSİ
KEDİ	132	BAYRAK	55	BİSİKLET	BAYRAK	ÇANAK	PEÇETE

Appendix C

R/K/G Instructions

Bazı tip hatırlamada, kelimeyi çalışmanın başında sunulduğunu hatırlamanıza ek olarak, o kelimeyi gördüğünüzde, kelimeyle ilgili olarak, yaşadığınız bazı ayrıntıları da hatırlayabilirsiniz. Mesela, kelimenin listedeki yerini (örn. hangi kelimedenden önce ya da sonra sunulduğu), kelimenin aklınıza getirmiş olduğu bir olayı veya bir düşünceyi, ya da sizde uyandırdığı bir duyguyu da hatırlayabilirsiniz. Yani, sadece kelimeyi gördüğünüz anı değil, onu gördüğünüz an ile ilgili bir bilgi de hatırlarsınız. İşte bu tip hafızaya hatırlama tipi hafıza diyoruz.

Öte yandan yine kelimeyi çalışmanın başında sunulduğundan kesin olarak eminsinizdir fakat onunla ilgili başka hiçbir şey hatırlamazsınız. Kelimeyle karşılaştığınız zaman dikkatinizi çekmiş olan veya yaşadığınız bir ayrıntı hatırlamazsınız. Yani, o kelimenin çalışmanın başında sunulmuş olduğunu bilirsiniz, ancak onu gördüğünüz a ile ilgili başka bir ayrıntı hatırlamazsınız. Bu da, bilme tipi hafıza dediğimiz bir hafıza.

Sizden, seçtiğiniz her kelime için bu 2 durumdan hangisinin uygun olduğunu belirtmek için, her bir çoktan seçmeli sorunun sonrasında gelecek olan ekranda Hatırlama ya da Bilme şıklarından birini Mouse kullanarak seçmeniz gerekmektedir.

Eğer birinci tipte ise, yani sadece kelimenin çalışmanın başında gördüğünüzü değil, ayrıca gördüğünüz anla ilgili de kimi ayrıntılar hatırlıyorsanız, Hatırlama şikkını seçiniz. Yok, sadece kelimeyi çalışmanın başında gördüğünüzden eminseniz ancak gördüğünüz anla ilgili herhangi bir ayrıntı hatırlamıyorsanız, Bilme şikkını seçiniz.

Fakat bazen bir kelimeyi çalışmanın başında gördüm diye düşünürüz ve o kelimeyi seçeriz çünkü kelimeyi sanki görmüşüz gibi gelir ancak emin değilizdir, gördüğümüzü tahmin ediyoruzdur. Eğer seçtiğiniz kelimeye bu tarz bir hatırlama eşlik ediyorsa lütfen Tahmin şikkını seçiniz.

ÖNEMLİ NOT: Hatırlama ve bilme tipi hafıza arasında bir kuvvet veya değer farkı yoktur. Yani hatırlama, bilme den daha kuvvetli veya daha değerli değildir. Başka bir ifadeyle, bazı ayrıntıların eşlik etmediği “bilme”, kesinlikle zayıf bir hafıza anlamına gelmez. Bilme ve Hatırlama, sadece hafızanın iki ayrı durumunu temsil eder, hafıza kuvvetini göstermez.

Hatırlama ve Bilme ile ilgili olarak günlük hayattan şu şekilde örnekler verilebilir:

Mesela, en son izlediğimiz filmle ilgili birçok ayrıntı hatırlayabiliriz. O filme kiminle gittiğimizi, sinemada nerede oturduğumuzu, filmle ilgili o andaki duygu veya düşüncelerimiz gibi ayrıntıları canlı bir şekilde hatırlarız. Bu durum birinci tip, yani hatırlama tarzı hafızadır. Ama, örneğin, filmi seyrettiğimizi kesin biliriz, filmin içeriğini vs. hatırlarız, ancak ne zaman kiminle nerede o filme gittiğimiz kesinlikle hatırlamayız, bu da ikinci tip, yani bilme tipi hafızadır.

Appendix C (continued)

R/K/G Instructions

Bir başka örnek: Diyelim ki bir partide birileriyle tanıştınız. Aradan 2-3 hafta geçti ve o kişiyle bir yerlerde tekrar karşılaştınız. Bazen tekrar karşılaştığımızda sadece o kişiyi tanıdığımızı bilmeyiz, ayrıca nerede, ne zaman, nasıl tanıştığımızı hatırlarız, mesela o partide tanıştığımızı hatırlarız. Bu, “hatırlama” tipi hafıza dediğimiz şey. Öte yandan kişiyle karşılaştığımızda onu tanıdığımızı kesinlikle biliriz ama nerede nasıl ne zaman tanıştığımızı hatırlayamayız. İşte bu da “bilme” dediğimiz hafıza tipi.

Seçtiğiniz kelime ile ilgili hatırlama tipini belirtmek için, her bir çoktan seçmeli sorunun sonrasında gelecek olan ekranda “Hatırlama”, “Bilme” ya da “Tahmin” şıklarından birini Mouse kullanarak seçmeniz gerekmektedir.

Appendix D

Questionnaire

Yaş:..... Cinsiyet: K E

Bölüm:..... Sınıf:.....

GPA:

Ders: Deney kredisini hangi ders için almak istediğinizi seçiniz.

PSY 101 PSY 242

Çalışmadaki yönergeler anlaşılır mıydı?Eğer bazı yönergelerin anlaşılır olmadığını düşünüyorsanız, bu yönergelerin çalışmanın hangi kısmındakiler olduğunu belirtiniz?

Çalışmayı yaparken zorladığınız kısımlar oldu mu?Cevabınız evet ise, hangi kısımlarda zorlandığınızı belirtiniz.

Sizece bu çalışma ne hakkındaydı?

Çalışmanın sonunda hafıza testi olacağını, çalışmanın başında tahmin etmiş miydiniz?

Çalışmanın başında sunulan “Bu ikisini bir arada satın alır mıydınız?” sorusunu yanıtlarken aklınızdan ne gibi düşünceler geçtiğiniz belirtiniz.

Çalışmanın başında sunulan “Kitap ya da gazete okuduğunuzda bu iki kelime ile karşılaşma olasılığınız aynı mıdır?” sorusunu yanıtlarken aklınızdan ne gibi düşünceler geçtiğiniz belirtiniz.

Çalışmanın başında sunulan kelime çiftlerine yeterince dikkat ettiğinizi düşünüyor musunuz?

1 2 3 4 5
(hiç dikkat etmedim) (tamamen dikkat ettim)

References

- Boduroglu, A., Tekcan, A. & Kapucu, A. (under review). The relationship between executive functions, episodic feeling of knowing and confidence judgments.
- Conway, M. A. (2005). Memory and the self. *Journal of Memory and Language*, *53*, 594-628.
- Conway, M. A., & Dewhurst, S. A. (1995). The self and recollective experience. *Applied Cognitive Psychology*, *9*, 1-19.
- Conway, M. A., Dewhurst, S. A., Pearson, N., & Sapute, A. (2001). The self and recollection reconsidered: How a “failure to replicate” failed and why trace strength accounts of recollection are untenable. *Applied Cognitive Psychology*, *15*, 673-686.
- Cosentino, S., Metcalfe, J., Holmes, B., Steffener, J., & Stern, Y. (2011). Finding the self in metacognitive evaluations: a study of metamemory and agency in non-demented elders. *Neuropsychology* *25*, 602-612.
- Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal behavior*, *11*, 671-684.
- Craik, F. I. M., Moroz, T. M., Moscovitch, M., Stuss, D. T., Winocur, G., Tulving, E., & Kapur, S. (1999). In search of the self: A positron emission tomography study. *Psychological Science*, *10*, 26-34.
- Ferguson, T. J., Rule, G. R., & Carlson, D. (1983). Memory for personally relevant information. *Journal of Personality and Social Psychology*, *44*, 251-261.
- Fernandez-Duque, D., Baird, J. A., & Posner, M. I. (2000). Executive attention and metacognition. *Consciousness & Cognition*, *9*, 288-307.
- Fitzgerald, R. J., Oriet, C., & Price, H. L. (2011). Change detection inflates confidence on a subsequent recognition task. *Memory*, *19*(8), 879-890.
- Gardiner, J. M. (1988). Functional aspects of recollective experience in recognition memory. *Memory & Cognition*, *16*, 309-313.
- Gardiner, J. M., Java, R. I., & Richardson-Klavehn, A. (1996). How level of processing really influences awareness in recognition memory. *Canadian Journal of Experimental Psychology*, *50*, 114-122.
- Goz , I. (2003). *Yazılı Türkçenin kelime sıklığı sözlüğü*. [Word frequency dictionary of written Turkish]. Ankara, Turkey: Turk Dil Kurumu.

- Gutchess, A.H., Kensinger, E.A., Yoon, C., & Schacter, D.L. (2007). Aging and the self-reference effect in memory. *Memory, 15*, 822-837.
- Hamami, A., Serbun, S.J., & Gutchess, A.H. (2011). Self-referential processing and memory specificity with age. *Psychology & Aging, 26*, 636-646.
- Hertzog, C., Dunlosky, J., & Sinclair, S. M. (2010). Episodic feeling-of-knowing resolution derives from the quality of original encoding. *Memory & Cognition, 38*, 771-784.
- Hicks, J. L., & Marsh, R. L. (2002). On predicting the future states of awareness for recognition of unrecalable items. *Memory & Cognition, 30*, 60-66.
- Johnson, M. K., Raye, C. L., Foley, H. J., & Foley, M. A. (1981). Cognitive operations and decision bias in reality monitoring. *American Journal of Psychology, 94*, 37- 64.
- Kelley, W. M., Macrae, C. N., Wyland, C. L., Caglar, S., Inati, S., & Heatherton, T. F. (2002). Finding the self? An event-related fMRI study. *Journal of Cognitive Neuroscience, 14*, 785-794.
- Khoe, W., Kroll, N. E. A., Yonelinas, A. P., Dobbins, I. G., & Knight, R. T. (2000). The contribution of recollection and familiarity to yes-no and forced-choice recognition tests in healthy subjects and amnesics. *Neuropsychologia, 38*, 1333-1341.
- Klein, S. B., & Loftus, J. (1988). The nature of self-referent encoding: The contribution of elaborative and organizational processes. *Journal of Personality and Social Psychology, 55*, 5-11.
- Koriat, A. (1993). How do we know that we know? The accessibility model of the feeling of knowing. *Psychological Review, 100*, 609-639.
- Lupker, S. J., Harbluk, J. L., & Patrick, A. S. (1991). Memory for things forgotten. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 17*, 897-907.
- Macmillan, N. A., & Creelman, C. D. (2005). *Detection theory: A user's guide* (2nd ed.). Mahwah, NJ: Erlbaum.
- Macrae, C. N., Moran, J. M., Heatherton, T. F., Banfield, J. F., & Kelley, W. M. (2004). Medial prefrontal activity predicts memory for self. *Cerebral Cortex, 14*, 647-654.
- Maki, R. H., & McCaul, K. D. (1985). The effects of self-reference versus other reference on the recall of traits and nouns. *Bulletin of the Psychonomic Society, 23*, 169-172.

- Masson, M. E. J., & Rotello, C. M. (2009). Sources of bias in the Goodman-Kruskal gamma coefficient measure of association: Implications for studies of metacognitive processes. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *35*, 509-527.
- McDonough, I. M., & Gallo, D. A. (2008). Autobiographical elaboration reduces false recognition: Cognitive operations and the distinctiveness heuristic. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *34*, 1430-1445.
- Metcalf, J., & Dunlosky, J. (2008). Metamemory. In H.L. Roediger, III (Ed.), *Learning and Memory: A Comprehensive Reference* (pp. 349-362). Oxford: Elsevier.
- Miner, M., & Shah, P. (2008). Training and transfer effects in task switching. *Memory & Cognition*, *36*, 1470-1483.
- Mitchum, A. L., & Kelley, C. M. (2010). Solve the problem first: Constructive solution strategies can influence the accuracy of retrospective confidence judgments. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, *36*(3), 699-710.
- Mueller, J. H., Wonderlich, S., & Dugan, K. (1986). Self-referent processing of age specific material. *Psychology and Aging*, *1*, 293-299.
- Mungan, E., Peynircioglu, Z. F., & Halpern, A. R. (2011). Levels-of-processing effect on remember responses in recognition for familiar and unfamiliar melodies. *American Journal of Psychology*, *124*(1), 37-48.
- Nelson, D. L., & McEvoy, C. L. (2000). What is this thing called frequency? *Memory & Cognition*, *28*, 509-522.
- Nelson, T. O., & Narens, L. (1990) Metamemory: A theoretical framework and new findings. *The Psychology of Learning and Motivation*, *26*, 125-322.
- Nelson, T. O., Leonesio, R. J., Shimamura, A. P., Landwehr, R. F., & Narens, L. (1982). Overlearning and the feeling of knowing. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *8*, 279-288.
- Perrotin, A., Tournelle, L., & Isingrini, M. (2008). Executive functioning and memory as potential mediators of the episodic feeling-of-knowing accuracy. *Brain and Cognition*, *67*, 76-87.
- Rajaram, S. (1998). The effects of conceptual salience and perceptual distinctiveness on conscious recollection. *Psychonomic Bulletin & Review*, *5*, 71-78.
- Rogers, R. D., & Monsell, S. (1995). The cost of a predictable switch between simple cognitive tasks. *Journal of Experimental Psychology: General*, *124*, 207-231.

- Rogers, T. B., Kuiper, N. A., & Kirker, W. S. (1977). Self-reference and the encoding of personal information. *Journal of Personality and Social Psychology*, *35*, 677-688.
- Sacher, M., Taconnat, L., & Souchay, C. (2009). Divided attention at encoding: Effect on feeling-of-knowing. *Consciousness & Cognition*, *18*, 754-761.
- Schacter, D. L. (1983). Feeling of knowing in episodic memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *9*, 39-54.
- Souchay, C., Moulin, C.J. A., Clarys, D., Taconnat, L., & Isingrini, M. (2007). Diminished episodic memory awareness in older adults: Evidence from feeling-of-knowing and recollection. *Consciousness and Cognition*, *16*, 769-784.
- Symons, C. S., & Johnson, B. T. (1997). The self-reference effect in memory: A meta-analysis. *Psychological bulletin*, *121*, 371-394.
- Tekcan, A. I., & Akturk, M. (2001). Are you sure you forgot? Feeling of knowing in directed forgetting. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *27*, 1487-1490.
- Tekcan, A. I., & Goz, I. (2005). *600 Türkçe kelimenin imgelem, somutluk, sıklık değerleri ve çağrışım setleri*. [Turkish Word Norms]. Istanbul: Bogazici Universitesi Yayinlari.
- Tulving, E. (1983). *Elements of episodic memory* (Ch. 3). Oxford: Oxford University Press.
- Unsworth, N., Heitz, R. P., Schrock, J. C., & Engle, R. W. (2005). An automated version of the operation span task. *Behavior Research Methods*, *37*, 498-505.
- Zhang, L., Zhou, T., Zhang, J., Liu, Z., Fan, J., & Zhu, Y. (2006). In search of the Chinese self: An fMRI study. *Science in China Series C*, *49*(1), 89-96.