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A LITERATURE REVIEW ABOUT JUDGMENTS OF LEARNING, FEELING OF KNOWING, AND TIP OF TONGUE ON AGING EFFECT

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Abstract: The purpose of this study is to review previous research findings of the effect on aging in the domain of source monitoring i.e.: Judgment of Learning (JOL), Feeling of Knowing (FOK), Tip of Tongue (TOT). In the first part of the article, the global concept of metamemory is described which has one or two main components of monitoring (e.g., JOL, FOK). Then metacognitive monitoring in older adults from several research findings in the literature is examined. In this study, the difference between younger and older adults on source monitoring which is the subject of the study is also addressed. The recent theoretical and empirical advances on the effect of aging in source monitoring are considered. Previous studies that identified the effects of aging on source monitoring are examined. These studies are compared and interesting points that stood out are discussed. After discussing the strengths and weaknesses of the studies, the questions of where and how these studies can be used are also discussed.

Keywords: Monitoring, Metamemory, Source of Memory, Feeling-of-Knowing, Judgment-of-Learning

Résumé : Le but de cette étude est de passer en revue les résultats de recherches antérieures sur l'effet sur le vieillissement dans le domaine de la surveillance des sources, à savoir : jugement d'apprentissage (JOL), sentiment de savoir (FOK), pointe de langue (TOT). Dans la première partie de l'article, le concept global de métamémoire est décrit qui comporte une ou deux composantes principales de surveillance (par exemple JOL, FOK). Ensuite, le suivi métacognitif chez les personnes âgées à partir de plusieurs résultats de recherche dans la littérature est examiné. Dans cette étude, la différence entre les adultes plus jeunes et plus âgés en matière de surveillance des sources qui font l'objet de l'étude est également abordée. Les récents progrès théoriques et empiriques sur l'effet du vieillissement dans la surveillance des sources sont pris en compte. Des études antérieures ayant identifié les effets du vieillissement sur la surveillance des sources sont examinées. Ces études sont comparées et les points intéressants qui se démarquent sont discutés. Après avoir discuté des forces et des faiblesses des études, les questions de savoir où et comment ces études peuvent être utilisées sont également abordées.

Mots-clés : Monitoring, Métamémoire, Source de Mémoire, Sentiment de Connaître, Jugement d'Apprentissage

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Abstract: Scopul acestui studiu este de a prezenta rezultatele cercetărilor anterioare ale efectului asupra îmbătrânirii în domeniul monitorizării sursei şi anume: judecarea învăţării (JOL), sentimentul de cunoaştere (FOK), vârful limbii (TOT). În prima parte a articolului, este descris conceptul global de metamemorie care are una sau două componente principale ale monitorizării (de exemplu, JOL, FOK). Apoi este examinată monitorizarea metacognitivă la adulţii în vârstă din mai multe constatări ale cercetărilor din literatură. În acest studiu, este abordată şi diferenţa dintre adulţii mai tineri şi cei mai în vârstă în ceea ce priveşte monitorizarea sursei care fac obiectul studiului. Sunt luate în considerare progresele teoretice şi empirice recente privind efectul îmbătrânirii în monitorizarea sursei. Sunt examinate studiile anterioare care au identificat efectele îmbătrânirii asupra monitorizării sursei. Aceste studii sunt comparate şi sunt discutate punctele interesante care s-au remarcat. După discutarea punctelor forte şi a punctelor slabe ale studiilor, se discută despre a şti unde şi cum pot fi utilizate aceste studii.

Cuvinte cheie: monitorizare, metamemorie, sursă de memorie, sentiment de cunoaştere, judecată de învăţare

1. Introduction

Memory can be affected by aging. The goal of the present study is to investigate the subject of monitoring of metamemory and other terms (Judgments of Learning, Feeling of Knowing, Tip of Tongue) in relation with aging. Memory loses its efficiency with aging. There are many studies about how the memories of older adults are changing overtime in the frame of metamemory. Many cognitive variables are age- related, and almost all cognitive variables are moderately interrelated with each other (Carroll, 1993). Aging affects memory skills, and some of the metacognition components, such as FOK, JOL, etc. (e.g., Hertzog & Dixon, 1994; Love- lace, 1990). Verbal learning decreases as people age alongside with cognitive aging (Light, 1991). As an example, in the years of old age, failures in resource memory skills increase with age. And this failure results in the emergence of strange situations such as forgetting the first time and re-telling a joke. Although there is no cognitive or neurological damage in the elderly, they may forget over time. One research suggests that older adults are typically found to report lower memory ability, lower personal control over memory, and greater change in their memory ability during adulthood, compared with young adults or middle-aged adults (e.g., Dixon & Hultsch, 1983; Gilewski, Zelinski, & Schaie, 1990; Hultsch, Hertzog, & Dixon, 1987; Jopp & Hertzog, 2007; Lachman, Bandura, Weaver, & Elliott, 1995; Lineweaver & Hertzog, 1998). One of the significant risk factors is getting old. Especially during the phase change from adulthood to older adulthood, and with the decrease of memory ability, the issues related to forgetfulness increase. In addition, with time the person gets slow and their response time decreases (Schwartz, 2014).

Metamemory's global definition is thought to be about abilities, tasks and personal memory beliefs. Metamemory means knowing and being aware of our memory, the ability to make judgments and controlling them. That is why metamemory refers to the monitoring of process, performance, and contents of memory (Schwartz, 2014). For example, an elderly both has to pay his already late

bills and take his dog for a walk the next day. However, he is aware of the fact that he needs to pay the bills first. We use metamemory for actions where we understand how much we are capable of doing each task, knowing when to do each, and whether we want to, or we must do.

According to Nelson and Nares (1990), metamemory frameworks have two main aspects: monitoring and control. Monitoring is the awareness of personal cognitive abilities, and thanks to monitoring, metacognitive judgment is successfully done (Flavell, 1979). For example, if a person is confident that he will remember some pieces of information, this confidence is related to metacognitive monitoring. Moreover, metacognitive control also refers to regulative encoding or retrieval processing based on our metacognitive monitoring. In other words, metacognitive control can be linked to a basic awareness of memory output (i.e., monitoring) (Nelson & Leonesio, 1988; Nelson & Narens, 1990). For example, older adults believe their memory impair, so they may not choose to try learning new information.

Monitoring is a significant term for metamemory. That is because, monitoring occurs when people judge whether they think something, or they remember something, and when they feel more confident or less confident about if they know something. In other words, they check themselves about how confident they are in terms of understanding something (Schwartz, 2014). For example, an elderly woman decides to visit her old neighbourhood after a very long time; if she checks whether she still remembers how to go there or not, or if she checks a map to see if she remembers correctly or not, this is called measuring one's mental state. Another example: a woman who is 65 years old goes grocery shopping without a shopping list. If she tries to remember what she needs to buy and what she does not need is a mental state measurement.

FOK and JOL are sub-groups of monitoring. The FOK is a part of metacognitive monitoring which plays a key role in regulating memory performance. One indication of metacognitive monitoring is the FOK. It refers to items we cannot currently remember, and the degree of the possibility of whether we can remember them later or not (Nelson & Narens, 1990). Therefore, FOK is a prospective memory judgment. Various deteriorations occur in memory functions as we age such as encoding, and retrieval. There are differences between younger adults and older adults on memory performance. As we will give details in effect on aging FOK resolutions in the main body part.

The judgments made about whether or not any subject has been learned in different areas of life is called JOL. In addition, number of studies have observed in JOL from many different aspects especially theoretical perspectives in which have used several procedures and have found that many different or similar results. Also, Hines, Hertzog, and Touron (2015) explained JOL as; one metric for assessing an individual's views of his or her current state of learning is the JOL. Alam and Shimul (2014) said, JOL is another important metamemory term which people make either in the course of learning or afterward about how well they have learned the specific target materials. People use JOL during a period of retrieval or learning.

For example, let's we think that the student encounters a previously learned subject. JOL refers to the name for remembering students' encoding information and not retrieval it. JOL; determinations made during the study of whether the item has been learned already like students. This research has been made in order to explore the effects of aging on monitoring. From this point onward, the aging effect is considered and addressed.

2. Judgments of Learning

In the literature, the term JOL uses to refer to the judgments people make about their own learning during or after learning. In this part, studies on the effect of this aging on JOL will be mentioned. For example, Tauber and Witherby's (2019) first aims of study the JOL, was to investigate whether it affects the learning of the older adults. Experimenters analysed the serious of related words paired on both older and younger adults. For both age groups, half of the participants made a JOL pair and half of them did not. After 3 minutes breaks, a cued- recall test was administered to participants by experimenters. According to results findings, in JOLs modify older adult's learning, there was no significant relation. Unlike young adults, JOL has been shown to not effect older adults in learning.

There are lots of significant studies about JOL accuracy. Some research appraises differences of age regarding how accurately individuals monitor coding processes and results. Age differences in the absolute accuracy of JOLs varied between experiments. In one experiment (Connor, Dunlosky, Hertzog, 1997), older adults showed significantly smaller differences between mean recall and mean JOLs. The findings were inconsistent with the claim that age differences in absolute accuracy reflect age-related deficiencies in metacognitive monitoring.

On the other hand, Dodson Krueger's study (2007) indicates that older adults made higher- confidence errors than younger adults when responding to questions, older adults need memory of specific details about recent events. Because older adults miscombine features from different events. During the study phase, participants (younger adults, younger-delay, older adults) heard sentences spoken by either a woman or a man. Every sentence heard was related to an image of the source. At in the test phase, individuals made an initial old-new judgment (i.e., „Did you encounter it before, or is it new?"), and for other subjects that received a judgment of old, all individuals made a source judgment about who showed the subject before (i.e., the woman or the man). The individuals rated the probable accuracy of each of these responses from 50 to 100 for their judgments (In the scale is equivalent to 50 estimates and 100 certain.). In this experiment of methods, participants randomly assigned 48 undergraduates University of Virginia (18-26 years). Half of the students (24) younger adults group, some of students (24) younger-delay group who, after study phase, return 24hr complete the test phase. Twenty- four older adults were appointed to older groups. Those three groups finished a not-related spatial relations task in 5 minutes. After that, both the younger and older groups started the testing phase of the source-monitoring task. The test consisted of 120 expressions, including 40 new expressions and 80 study

expressions showed visually and randomly. In addition, four more expressions were used to explain the task to the participants at the beginning. As a result, older adults' monitoring the accuracy of item answers were worse than youngers' accuracy of item. Moreover, another study on age differences in JOL accuracy has proven minimal effects of aging on the accuracy of metacognitive monitoring (Dunlosky and Hertzog, 2000). Researchers use both interactive images and rote repetition in the process of two study test trial when comparing older and younger adults. Their purpose are to determine the difference of knowledge updating between trials. Also, they investigate that is any difference in depending on age deficiency in metacognitive monitoring. Researchers said, „Knowledge updating was not necessarily reflected in the absolute accuracy of metacognitive judgments, it was evident for both age groups." in result of the study. The researchers' argument was older adults are not sufficient to use strategy about to use metacognitive monitoring to update knowledge. However, the study did not support that.

The effectiveness of JOL judgments in many areas of life has led to studies in many areas. Tauber and colleagues (2016) studied the impact of aging on memory monitoring and emotions. The effect of healthy aging has been observed on humans. The primary purpose of the study was to find out if there is a difference between young adult participants and older adult participants when positive and neutral pictures are given. In addition, the experimenters' secondary aim was to investigate dimensions of emotion (valence and arousal) that may affect young adult and older adult participants' monitoring of learning. The study suggested that positive pictures of young adult participants and older adult participants would be more emotionally salience on memory than neutral ones. Experimenters used pictures for younger and older adult participants. These surprising results can be mentioned briefly and in general. The differences are striking when compared to the previous article in the review of the literature review. For every two groups, JOLs were higher for positive ones than neutrals, however, previous studies suggested JOL did not differ between positive and neutral words. On the other hand, aging did not impact on dimensions of emotion. In other words, all age groups (younger and older adults) recalled more highly arousing pictures than low arousing pictures. Moreover, compared with younger adults, older adult participants did not report any impairment in monitoring learning.

Tauber and Dunlosky's other study (2012) examined the resolution of younger and older adults' JOL using emotional materials. Researchers used 10 negative words (e.g., assault, bomb cancer), 10 positive words (e.g., bunny, circus, diamond) and 10 neutral words (e.g., cork, errand, fabric) in their experiment 1. Sixty-six younger adults and fifty-nine older adults recruited from received $20 each participating. Researchers divided participants into two groups based on words' emotional valence (negative group: negative-neutral words, positive group: positive-neutral words). As a result, there was no significant difference between younger and older adults' resolution of JOL. However, older adults' JOL was not different between positive and neutral words, in contrast with older adults,

younger adults' JOL was different between positive and neutral words. Younger adults recalled positive words more than neutral words.

During the experiment, participants' biases may affect the results. Shi, Tang and Liu (2012) investigated the results of the studies affected or not. Making attribution to information is an important mental process. In different age groups (young adults-older adults), predicting source memory, in JOL judgements schematic effects were investigated by Shi, Tang and Liu (2012). Two statements were presented to subjects from a doctor and a lawyer. Researchers analyse between the relation before and after retrieving and schema-encoding condition. Subjects completed a task of source attributing which is presented by the researcher to them. JOLs provided by younger adults and older adults could predict source memory though without schematic help for encoding. The study results showed that; they use people for safe and effective forecasting strategies. Older adults are used to the schema when the task is related to the performance. When they did not want to show bad performance, they took this path.

To sum up, the previous studies demonstrated that not only older adults but also younger adults were influenced by several metacognitive cue manipulations during the experiment. And these cues are both similar and dissimilar from each other. There are differences between older adults and younger adults from evidence test performance in JOL. Also, there are many research findings as to the accuracy of JOLs. Finally, studies support that the age-related JOL resolution is insensitive. In this part of the study, studies related to JOL are compiled. In the next section, the comparison of the studies on FOK is included.

3. Feeling of Knowing

Several studies have been conducted in the FOK from many different aspects or theoretical perspectives in which have used several procedures and they have found many different or similar results. One of the goals of this review is to examine FOK studies on aging. So, in this part of the review the effect of aging on FOK was mentioned in detail. There are several heuristics for metacognitive judgements but two theoretical models based on FOK judgements: cue familiarity and accessibility model. Firstly, we explain cue- familiarity model. Cue- familiarity model have presented in several experimental studies. According to this model, If more familiar cues (word pairs) are in experiments, this cause to high FOK judgements. (If the subject is too familiar with the cue, an increase in the subject's FOK judgments is observed.) This model was suggested by Reder and Ritter (1992). This model implies that individual degree to which to cue, individual have level of familiarity on cue, individual judge they know the answer. (The more familiar the subject is with the clue to find the target word, the greater the sense of knowing (FOK)) In other words, participants judge to herself I can find target words with given cue words. (In other words, the subject makes the following judgment to himself: „I can find the target word with the given clue.") For example, Reder and Ritter's (1992) experiment 1, based on cue-familiarity model. They selected question-answer strategy in arithmetic problems. This experiment consisted of two

sets: training problems and post-training problems. First set in experiment, subjects were shown a large series of arithmetic problems. (Subjects were shown various arithmetic problems) and were told solution to these problems by them (They were asked to solve these problems) Experimenter used a computer screen microphone. Then, solution of problems was spoken to a computer microphone by subjects. Each problem was presented on a computer screen a 500-ms delay. Then, participants press either the 'R' the button for retrieve to problem answers or the press 'C' button for calculate problem answers. In a result even though 23*27 and 24+28 had not been shown earlier, previous exposure 23-27 to the problem increase FOK judgements on participants. Participants FOK judgements increases with previous exposure to familiar problem.

Otherwise, another model on FOK judgments is the accessibility model. According to Koriat (2001), it argues that participants' FOK judgments focus on the volume and strength of partial information, while when participants fail to retrieve an answer, FOK judgments are based on the amount and intensity of partial information accessed during the search for the target-paraphrase sentence. For example, the first letter of the target item, how many syllables the items have, and so on. Furthermore, the theory implies that FOK judgments vary according to the accuracy of the information retrieved by the participants.

There are many studies related to FOK. One of the study areas is semantic FOK. We may be defined as knowledge of the world is semantic FOK. Semantic knowledge consists of an individual's general information about the environment and nature. For example, when someone asks you „When Mustafa Kemal Atatürk was born?", the recall of the answer „Mustafa Kemal Atatürk was born in 1881." is semantic knowledge. In one study, Souchay et al. (2014) assessed the effect of aging on semantic FOK judgement and episodic FOK judgement. In this study were used 80 French words and 80 equivalent English words. Twenty- nine younger adults and twenty-nine older adults have been selected for the research. The goal of this study was to evaluate participants' skills to estimate future identification for non-translated items depending on their contextual knowledge. In other words, if participants believe that they can recognize the target word, they say „yes" FOK judgement, but they believe that they cannot recognize target word, they say „no" FOK judgement. As a result, for semantic FOK judgement, no aging influences were found.

Likewise, in one study about episodic FOK (Thomas & Bulevich, Dubois, 2011) determined the situations under which FOK judgments in episodic memory affected the quality of partial or contextual information. Researchers compared two conditions in the article: which partial information was questioned pre-and-post of FOK judgments. They proposed that, if made before FOK judgments, the accuracy of such decisions would be positively affected. Additionally, following the well-established deficit in older adults, they concluded that, in the lack of a particular stimulus, older adults might be less likely to use partial information efficiently when processing of FOK judgments. Researchers conducted this article using 3 experiments. In the first experiment of the study, they investigated how partial

information collected affected decisions on FOK in both older and younger adults. Using the method used by Koriat (1993), the researchers examined participants' work with goals paired with a neutral cue and then gave the participants a cued recall test. The words were chosen from the Affective Norms for English Words word list (Bradley & Lang, 1999) and the 36 cue words were chosen from the University of South Florida Free Association Norms (D. L. Nelson, McEvoy, & Schreiber, 2004). If the target could not be produced by the participants, they were asked to make a FOK judgment and then provide the valence of the word to be remembered. Then the participants were asked to complete the six-alternative forced-choice recognition test. In the second part of the experiment, researchers evaluated situations under which partial information was retrieved before and after FOK judgements were made. They predicted that when partial information was retrieved before making FOK judgments, older adults would display progress in prediction accuracy. In the last experiment, participants were required to make FOK judgments and partial replies to information within time limit constraints. The strategy was intended to force access to the associated partial information, rapidly and shallowly (unvalued). Researchers found that the quality of partial information affected predictive accuracy in FOK. It was confirmed in younger adults, irrespective of when partial information was retrieved, so in older adults only when partial information was retrieved prior to making FOK judgments. The results indicate that older adults could produce accurate predictions of episodic FOK. Yet, it was found that older adult's ability to predict future retrievability depends on the time of partial contextual information, while younger adults have been found to have access to this information more easily.

Moreover, another domain of FOK is episodic FOK. In general, studies on FOK in the literature have focused on episodic FOK rather than semantic FOK. For instance, Souchay and Isingrini (2012) studied on age-related differences between JOL and FOK. All participants both younger adults and older adults were assessed on their JOL accuracy and were asked to predict later retrieval during the study phase (FOK accuracy). The results showed that even though there were no significant differences between younger and older adults on JOL accuracy, there were differences between groups on their episodic FOK accuracy. Furthermore, we need to address an alternative hypothesis in order to we explain rising episodic FOK come with on aging: the memory constraint hypothesis which also has been suggested that by some researchers (Hertzog et al., 2010; Souchay, et al., 2007). These researchers studied on resolution FOK, and they indicated a that decline in episodic memory capacity in the older adults because of reducing to accessibility and availability in FOK on older adults.

The differences between younger and older adults have been emphasized concerning the resolution FOKs. Some studies indicate that older adults have lower self-efficacy as to memory performance (i.e., recognition, can remember target items) than younger adults. In other words, older adults tend to lower level predict their future performance than actual memory performance (Hertzog & Touron, 2011; MacLaverty & Hertzog, 2009; Sacher, Isingrini, & Tacconat, 2013). For

example, Isingrini and Taconnat (2013) investigated the effect of aging on episodic FOK accuracy under divided attention paradigm. This study's result showed the significant differences between younger and older adults on episodic FOK. In addition, although younger adults under divided attention are similar results with older adults when the full- attention task. Because older adults believe that their memory is not as well as that younger people's (Hertzog, Hultsch, & Dixon, 1989). Thus, some false beliefs were observed episodic FOKs judgments in older adults. Sacher, Landre, and Taconnat (2015) investigated the age- related differences in episodic FOK and is a similar result like previous studies about FOK effect on aging. The goal of this study investigated that, FOK accuracy change with aging. Participants consisted of 61 older adults and 59 younger adults. Firstly, sixty mild associated cue-target word pairs were shown to participants. (e.g., customs-CONTRABAND). Before participants were been seen each cue (10s per item) and asked to retrieve target word, is a 30- s interference task (processing speed test) cued- recall test was showed again, participants estimate on six- point scale (0,20,40,60,80,100 sure). Distractors, semantically similar to targets, add to list (e.g., FRAUD, TRAFFIC, EXCHANGE, CONTRA-BAND and COUNTERFEITING words that were semantically similar to the target words were added to the list). Then, participants were asked to which word had seen before (Participants were asked which word they had seen before)? As a result, younger participants made a more accurate judgment about recognize newly learned items than older participants. In other words, older adults had a lower FOK accuracy than younger adults. In we summarize that FOK studies have been made with different age groups as younger-older adults. Even though, is not a difference between younger and older adults on semantic FOKs, there is a difference between younger adults and older adults on episodic FOKs. As we emphasized above, older adults may have not confidence in their memory capability and cognitive skills. In the next part of the review, we will see to TOT phenomenon depending on age relatedness.

4. TOTs Phenomenon and Aging

From a metamemory perspective, „TOT is typically defined as a phenomenon that occurs when a word will be recalled even though it is not accessible immediately" (Schwartz, 2006). For instance, an older person may not remember the names of his children even though he knows their names. Most studies indicate that older adults experience TOTs more often than young adults (Brown & Nix, 1996; Burke, MacKay, Worthley, & Wade, 1991; Heine, Ober, & Shenaut, 1999). In this part of the review study, studies investigating the effect of aging on TOT phenomenon are discussed. The reason why older adults have more TOT experiences than younger adults are because they have a strong false belief for their decline of memory (Schwartz, 2016). In addition, older adults know more words than younger adults. This results in some retrieval problems (retrieval problems instead confusion) while trying to choose appropriate words in a conservation, which causes more TOT experiences in older adults (Mandell & Salthouse, 2013).

Important studies have been done examining the effect of age on TOT, one of which being laboratory studies. For example, Rastle and Burke (1996) investigated the TOT deficit in both young and older adults. The study examines various effects of TOT deficit on various parts of the brain. However, this article focuses on their age-related results. In Experiment 1, the hypothesis indicates that the current processing of target words decreases on TOT processing in both young and older adults. Another hypothesis suggests that phonological processing is essential for these experiments. Rastle and Burke aimed to evaluate to what degree previous works helped to obtain words semantically and phonologically. As a result, Experiment 1 showed that the current pronunciation of a word increases its recall in response to a question of general knowledge. In Experiments 2 and 3, it is shown that semantic processing enhanced correct answers for both young and older adults when asked general knowledge questions. However, they did not show any results for decreasing TOTs' being an advantage. Diary studies are another important example of TOT studies. For instance, the study of Burke et al. (1991) investigated the effect of aging on TOT phenomenon, benefitting from the structure diaries that the participants provided. These diaries consisted of eleven questions about each TOT experience. The questions were related to type of words (e.g., name of person, objects), and patterns of words (e.g., sound, number of syllables). Participants consisted of 50 younger adults, 30 middle-aged adults and 50 older adults. The study had two phases. During the first phase, participants filled out a retrospective questionnaire. They predicted how many times they experienced TOT of different kinds. In the next phase, during four weeks, the participants took notes about the random experiences of TOTs in their daily lives. Finally, the experimenters compared participants' expectations and the diary reports. As a result, middle- aged adults and older adults reported more TOTs than younger adults compared to all participants' diaries.

Furthermore, the effect of aging on TOT experience was investigated in a natural environment and laboratory by Heine, Ober, and Shenaut (1999). They studied three different age groups: 30 people in total, a group of young people aged between 18-24, a group of young people aged 60-74, and a group of old people aged between 80-92. The study was initially a laboratory experiment in which the TOT frequency and the resolution of the TOT experience were observed in all age groups. According to the researchers' hypothesis, in study 1, the TOT resolution and frequency were expected to increase with aging. In study 2, the TOT experience data is recorded from all participants by using structured diaries for a 28-day duration. Researchers' hypothesis for study 2 indicated that all age groups' TOT resolution time would increase. Findings showed that for study 1 and study 2, older adults needed a longer time to resolve TOT experience. In study 1, an age-related decrease in word retrieval is not seen in the first stage but is seen in the curing stage of the study. Also, the 80-92 age group was particularly disadvantaged about TOT than other age groups and participants. Study 2 (diary study) shows that, TOT experience is resolved in all ages, including the 80-92 age group, with adequate time. Both study 1 and study 2 demonstrate that participants would

probably remember words that they have not forgotten yet if they are given the time to retrieve them. TOT frequency is also increased by aging. In another experimental study, Brown and Nix (1996) examined TOTs in older adults versus younger adults. Picture-word tasks were used in this study. TOT experiences were recorded with an electronic timer. They found that older adults (62-84 years old, M=73.6) have more TOT experiences than younger adults (18-21 years old, M=18.9).

In certain cases, researchers have conducted various research including participants with pathology to examine the effects of pathology on TOT. Sang-A and Ji-wan (2015) studied the effect of aging on the TOT phenomenon with a task involving the names of famous people. Participants with mild cognitive impairment (MCI) were included in the study. The study included 10 MCI adults (50 years old and older), 10 oldest adults (65 years old or older), 10 older adults (50-64), 10 mid-aged adults (30-49) and, 10 younger adults (20-29). Firstly, researchers compared the rate of TOT in face naming among MCI group and the normal oldest group. Then, the rate of TOT responses was assessed between normal participants. In this study, during the first phase the participants are shown the names of famous people and then they are expected to tell these names back. The participants cannot remember some names, but in the next phase they remember these names and they can say them. As a result, there were significant differences between the normal group and the MCI group based on the rate of TOT. These results suggested that, having a pathology has an impact on TOT states. Moreover, researchers compared these findings with normal participants. The rate of TOT increased in normal aging.

In sum, in the present literature review, was mentioned that there is no significant differences between pathological participants and non-pathological participants on the rate of TOT (Sang-A and Ji-wan, 2015). In addition, was mentioned about diary- and laboratory-based studies indicate that older adults have more failure retrieval items than younger adults. Diary studies suggest that older adults spend more time to resolution in TOTs than younger adults (Burke et al., 1991; Heine, Ober, & Shenaut, 1999). First, older adults have difficulties in accessing already encoded items. So, they may make more retrieval errors even for familiar words compared to younger adults.

Discussion and the Future Directions

When we investigated studies, we realized the strength features of research. Metamemory is not only a new but also a significant branch for cognitive psychology and start studies about this area is important for future research. Our primary goal is to observe degree to which aging impacts on monitoring processes. On the other hand, there are also negative aspects of source monitoring being a new field. There are not worthwhile studies on this topic. This area is a newly developing area. The number of studies in this area are not enough. Therefore, the studies should be increased in this field. Most of studies, based on western cultures, but the rest of the cultures should not be ignored. Alam and Shimul (2014) and also,

Wright and Frederick (2009) underline cultural differences. Social context is different for every human being. Researchers should consider to culture factor in the future research of the field. The major purpose was to analyse and understand the monitoring process and also, understand two main domains of monitoring: the JOL and the FOK. In addition, we examine another phenomenon of monitoring TOT. We found studies about this phenomenon related to aging. And we explored JOL, FOK, and TOT in the investigation on the literature.

In the first part of the review article, we interest in this question „Does JOL results change related to age or does not change?". Then studies about JOL accuracy was analysed. In the studies, the effect of aging on JOL results was examined using emotion materials.

Additionally, it was examined whether participants' schemas affected the study results. Then we discuss evidence findings regarding to the FOK. Even though there is no significant difference based on the effect aging in semantic FOK. Unlike JOL, as we guessed there is an important difference in the FOK that come with the aging effect. In this old age period, some deficiencies are seen as expected, and therefore, TOT is a natural outcome of the developmental period. As we emphasized in the TOT part of this article; older adults have bigger semantic memories than youngers. That's why they fail in the retrieval process. This are also important findings and surprising consequences.

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