EFFECT OF PRIOR KNOWLEDGE ON THE ILLUSORY TRUTH

EFFECT AND MEMORY AND METACOGNITIVE

PROCESSES UNDERLYING THIS ILLUSION

A Master's Thesis

by

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İhsan Doğramacı Bilkent University

Ankara

July 2021

To all the things that brought me here...

EFFECT OF PRIOR KNOWLEDGE ON THE ILLUSORY TRUTH
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PROCESSES UNDERLYING THIS ILLUSION

The Graduate School of Economics and Social Sciences
of
İhsan Doğramacı Bilkent University

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ABSTRACT

EFFECT OF PRIOR KNOWLEDGE ON THE ILLUSORY
TRUTH EFFECT AND MEMORY AND METACOGNITIVE
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Repeated information typically produces higher truth ratings than novel information. This is called the illusory truth effect. Since this illusion can be obtained with various research materials, the repetition of the information is considered as the driving force of the illusion rather than the content, but whether the effect depends on familiarity or recollection is controversial. The present study aimed to investigate how the novelty of the content may also contribute to this effect through familiarity versus recollection. In a series of three experiments, participants were presented with categorical information about novel pseudowords in an initial phase. Then, they were presented with either congruent or incongruent details about the category of the items. It was hypothesized that if familiarity drives the effect, just the mere repetition

should increase truth ratings for all old items. Experiment 1 showed that the mere repetition of some cues from previously studied category statements did not produce the illusory truth effect. In Experiment 2, an additional phase of retrieval practice to teach the categorical information about the pseudowords produced a robust illusory truth effect. The results of Experiment 2 showed that when participants learned new information effectively, they made truth assessments by considering the congruence of the semantic details they remembered with existing statements. Experiment 3 aimed to understand how the time interval affects familiarity and recollection processes within the framework of the current research. Contrary to the results of previous studies, Experiment 3 did not find a pattern in which recollection turned into familiarity over time, but the illusory truth effect persisted over time. The results and future work are discussed in the context of referential theory and the illusory truth effect literature.

Keywords: the illusory truth effect, familiarity, recollection, prior knowledge, referential theory

ÖZET

ÖNCEDEN EDİNİLMİŞ BİLGİNİN YANILTICI DOĞRULUK ETKİSİNE OLAN KATKISI VE BU ETKİNİN ALTINDA YATAN BELLEK VE ÜSTBELLEK SÜREÇLERİ

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Tekrarlanan bilgilerin yeni bilgilerden daha doğru kabul edilmesi, yanıltıcı doğruluk etkisi adı verilen ve yaygın olarak araştırılan bir olgudur. Bu yanılsama çeşitli araştırma malzemeleriyle elde edilebildiğinden verilen bilgilerin içeriğinin değil tekrarının önemli olduğu kabul edilmektedir. Mevcut çalışma, deney içerisinde bellekte anlamsal referanslara sahip olmayan ifadeler kullanarak önceden edinilmiş bilginin yanıltıcı doğruluk etkisini nasıl etkilediğini araştırmayı amaçlamıştır. Ayrıca, üç deney boyunca bu yanılsamada aşinalık ve hatırlama süreçlerinin nasıl rol oynadığı anlanmaya çalışılmıştır. Üç deney boyunca katılımcılara belli kategorik ifadeler özneleri sözde sözcükler olacak şekilde sunulmuş ve ardından bu sözde sözcükler uyumlu hem de uyumsuz ayrıntılarla birlikte doğruluk değerlendirmesi

aşamasında kategori bilgileri için ipucu olarak tekrarlanmıştır. Deney 1, çalışılan kategori ifadelerinin bazı ipuçlarının sadece tekrarının, yanıltıcı doğruluk etkisi yaratmadığını göstermiştir. 2. deneyde, sözde sözcükler ve kategorilerinin bellekten geri getirilme pratiğiyle öğrenilmesinden sonra sağlam bir yanıltıcı doğruluk etkisi bulunmuştur. Deney 2'nin sonuçları, katılımcıların yeni bilgileri etkili bir şekilde öğrendiklerinde, hatırladıkları anlamsal detayların mevcut ifadelerle uyumunu göz önünde bulundurarak doğruluk değerlendirmesinde bulunduklarını göstermiştir. Deney 3, mevcut araştırma çerçevesinde zaman aralığının aşinalık ve hatırlamayı nasıl etkilediğini anlamayı amaçlamıştır. Daha önceki çalışmaların sonuçlarının aksine, zaman geçtikçe hatırlamanın aşinalığa dönüştüğü bir örüntü bulunamamış fakat yanıltıcı doğruluk etkisi bulunabilmiştir. Sonuçlar ve gelecek çalışmalar referans kuramı (referential theory) ve yanıltıcı doğruluk etkisi literatürü kapsamında tartışılmıştır.

Anahtar Sözcükler: yanıltıcı doğruluk etkisi, aşinalık, hatırlama, önceden edinilmiş bilgi, referans teorisi

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CHAPTER I

INTRODUCTION

Do you think that you may believe a statement saying that "Pandas can hold their breath under water for about 5 minutes."? What about "Dragons are the ancient relatives of dinosaurs."? These statements may seem unplausible or obscure for many people; however, if they are repeated two or more times, would you think they became more credible? Over the last forty years, research has shown that individuals are inclined to believe repeated information, even when they are uncertain about the validity or truthfulness of that information (for review, see Brashier & Marsh, 2020). This phenomenon is called "the illusory truth effect." (Hasher et al., 1977).

We are bombarded with vast amounts of information every day, and we tend to believe that some are more trustworthy than others, mostly without our awareness (Shapiro, 1999). Understanding the construction of truth judgments is a crucial issue since people tend to share false news on social media even though the sources may be unreliable (Pennycook et al., 2018), and we live in a world that false news can spread faster than accurate ones (Vosoughi et al., 2018).

Our decisions regarding believing whether some information is truthful or not may sometimes be critical in our real-life choices; buying a bad-quality face cream may not cause harm to a considerable degree to our life, but believing a notion such as "Vaccination causes autism" may have serious consequences. Therefore, it is essential to understand the underlying processes of the illusory truth effect and the factors influencing our truth judgments.

In the current study, we sought to explain how truth judgments occur when people lack prior knowledge about some basic units of the given information like words (i.e., referential theory) in memory, considering the contributions of recollection and familiarity utilized in the memory retrieval process. Recollection and familiarity are distinguished with the content of the retrieved memory, such as containing the specific contextual details of the encoding episode or just the feeling that the certain stimulus was encountered before without specific encoding details, respectively. Both of these memory retrieval processes will be discussed in detail within the scope of the *repetition-induced truth effect*, the people's subjective sense of truthiness on the repeatedly presented information. Before starting to articulate on inferential nature of truth judgments and knowledge network in memory, I will emphasize how the illusion of truth occurs in the introduction chapter. After giving a closer look at previous studies on the illusory truth effect, their methods, and essential results, I will briefly mention semantic and episodic memory. This section will also emphasize the recollection-based and familiarity-based illusion of truth regarding the conditions that these memory processes contribute to that illusion. Following that, I will be discussing the influence of lack of prior knowledge on one's truth judgments. Lastly, the aims of the current study will be explained along with the research questions.

1.1 The Illusory Truth Effect

Repeated information is considered truther than novel information. This is called the illusory truth effect. In the studies investigating this illusion, participants are presented with informative sentences at the exposure phase and sometimes asked to rate how interesting this information is (Fazio et al., 2015) or familiar (Parks & Toth, 2006). After initial exposure, participants are presented with the to be rated statements immediately or after some time intervals like minutes (Begg et al., 1985; 1992; Fazio et al., 2015), weeks (Arkes et al., 1991; Garcia-Marquez, 2015; Henkel & Mattson, 2011) or months (Schwarz, 1982; Brown & Nix, 1996). Truth ratings are obtained with odd scales (Hasher et al., 1977; Unkelbach & Rom, 2017) or even scales (Parks & Toth, 2006; Fazio et al., 2015). As many of these manipulations could produce the illusory truth effect, it is considered as a quite robust effect (Dechêne et al., 2010).

This illusion was first demonstrated by Hasher and her colleagues (1977), who were particularly curious about how real-world information is processed and judged to be true or false without having specific knowledge about it. They pointed out that how much people trust the veracity of information is related to how often that information is encountered, so their main focus was the repetition frequency. In their seminal work, each participant was presented with 60 factually true or false statements with the warning that some of the information is true while some others are false. These statements were created in topics ranging from politics, history, sports to geography; however, their actual truth value was ambiguous. For instance, "Australia is approximately equal in area to the continental United States" is the factually true

statement related to geography topic, and "Outside of New York and Chicago, the tallest building in America is found in Dallas." is the false statement in the same category. 20 of those statements were repeated, the other 40 statements were new, and participants gave truth ratings on a 7-point scale. Results revealed that participants assigned their truth rating due to a particular material's repetition status; namely, they gave higher truth ratings to the repeated items than new items.

Bacon (1979, Experiment 1) stressed an important distinction between the actual and perceived repetition of the material regarding their contribution to truth judgments. He found that participants were inclined to judge the given statements' veracity as true when they claimed that these statements were repeated regardless of the actual repetition. In other words, truth ratings differed as a function of the recognition judgments: When a statement was perceived to be old, regardless of the accuracy, it received a higher truth rating (also see Begg et al., 1991).

The illusory truth effect can be explained through both recollection and familiarity. For instance, Begg et al. (1992) introduced a process dissociation procedure for testing whether automatic (i.e., familiarity) and controlled processes (i.e., recollection) influence truth ratings independently by manipulating the repetition and source memory. They introduced male and female voices as reliable and unreliable sources of information, or vice versa. They assumed that old statements matched with the reliable voices would be rated by relying on both familiarity and source recollection but old statements matched with the unreliable voices would be rated false if recollection of the source successful, otherwise old-unreliable statements rated as true only because familiarity.

Results showed that statements coming from the reliable source were rated truer than the unreliable source; however, when a divided attention task impaired the recollection process, ratings for statements coming from reliable and unreliable sources were similar to each other, so participants' truth judgments were governed by familiarity. These results show that recollection and familiarity are distinct processes since distraction could affect one processes but not the other, and their influences on truth ratings are independent.

Fazio et al. (2015), however, showed that repeated false informative statements receive higher truth ratings even when the correct information is recollected. They provided participants with the four types of general knowledge statements; true-known, true-unknown, false-known, and false-unknown at the first phase. Subsequently, at the truth rating phase, some of these statements were repeated along with the new statements and participants were asked to rate the truthfulness of those statements. Participants were not informed about truth value of the statements but were warned that they can encounter the statements either true or false. At the end of the study, researchers checked whether participants knew the correct version of each statement with a recognition test. Their findings showed that people are prone to base their truth judgments on familiarity for the repeated false items even though they could recollect the correct information if asked directly. Thus, they concluded that people rely on familiarity first, rather than searching their memory for the veracity of that certain information (but see, Unkelbach & Stahl, 2009).

Contribution of recollection versus familiarity processes to truth ratings might change as a function of the time interval. Garcia-Marquez et al. (2015) presented participants with the trivia statements within a mixed design in which they

manipulated the time interval (same session vs. one week later) and item type (identical vs. contradictory) as between-subjects factors and repetition (studied vs. unstudied) as a within-subjects factor. When participants rated the truth of identical (e.g., *crocodiles sleep with their eyes closed*) and contradictory (e.g., *crocodiles sleep with their eyes open*) statements in the same session, contradictory statements received lower truth ratings than the new statements while identical statements received the highest truth ratings (see also, Bacon, 1979, Experiment 2; Silva et al., 2017). However, this pattern changed after one week; old statements, regardless of the contradictory details, were rated as almost equally true with identical ones, and these ratings were higher than the new statements. Given these results, recollection influences truth ratings when they are given immediately, and contradictions are detected. Yet, recollection is replaced with the feeling of familiarity as the time between initial encoding and truth rating phases increases.

1.2 Construction of Truth Judgments

    1.2.1 Base Rates Probabilities

Theorists have claimed that people typically accept the information that they encounter as true at the first step rather than reject it; thus, they are biased to give "true" judgments (Unkelbach, 2007; Bond & DePaulo, 2008; Fazio et al., 2015). For example, Gilbert (1991) contended that people are prone to accept the provided information as they comprehend it; thus, believing the truthiness of an expression precedes believing its falsity; however, it is critical to ask why we are predisposed to believe a claim initially. Considering our real-life experiences, for instance, we believe that the things we see are real. This creates a contingency between experience and veracity; as Brashier and Marsh (2020) emphasized people are

predisposed to think that "seeing is believing." As an adaptation of this notion to other modalities, reading also leads one to believe that information at the first step (Henkel & Mattson, 2011).

Another complementary view suggests that we are more likely to encounter accurate information in daily life; therefore, we initially think that what we hear or read is true (Unkelbach, 2007). The probability of encountering true information on various occasions is higher in the real world (Unkelbach, 2007); therefore, we believe that repeatedly encountered information is more credible.

1.2.2 Semantic Memory (Knowledge)

Even though it has been emphasized the repetition is the prominent factor producing the illusory truth effect, truth judgments are actually related to the meaning of the given expression (Whittlesea, 1993), which relies on semantic memory that contains the factual information acquired throughout life (Tulving, 1985).

Semantic memory includes words, facts, categories, and concepts (Tulving, 1972). Category refers to a group of objects sharing similar typical elements, so exemplars of the same category evoke similar inferences due to their shared properties (Murphy, 2010). For example, even if one does not have existing knowledge about *Merhan*, a pseudoword, when that person reads "Merhan is a flower", he would have similar attributions for Merhan as they do about *Rose.* Accordingly, *Merhan* could potentially bloom, should have leaves, could smell nice, etc., due to categorical knowledge about flowers stored in semantic memory. Besides, concepts are the mental representations of categories; flower concept is the abstraction of the general

features of the objects in the flower category as a summary of all the flowers that one has encountered so far (Murphy, 2010).

Network models of semantic memory are mostly accepted approaches regarding knowledge representation. Knowledge network in semantic memory consists of nodes correspond to the concepts and their subcategories, while pathways connect concepts, category exemplars, and their features. For example, in the hierarchical network model typical properties of the "cat" concept, such as breathing, moving, eating, etc. are not repeated in every exemplar node but can be found by tracking pathways from specific exemplar to the higher concept (i.e., animal) (Collins & Quillian, 1969,).

New words and category members can also join the existing network by being linked to related concept node and its features (Steyvers & Tenenbaum, 2005). Therefore, a pseudoword (i.e., *Merhan* as a member of the flower category), can be integrated into this semantic network by linking it to a category as one of its members. Consequently, that pseudo-*member* could evoke the same attributions that other category members evoke.

Considering the truth judgments, Unkelbach and Rom (2017) suggest that excitatory and inhibitory connections between the nodes of represented information in one's knowledge network leads to the acceptance or the rejection of novel information. For example, the connection between the "Australia," "snake," and "poisonous" are excitatory and coherently linked semantic nodes activates each other. If the "harmless" is added to this sentence, this information will not be accepted as true due

to the inhibitory connections between those semantically incoherent representations. In other words, a proposition like "the poisonous snakes in Australia are harmless" would be accepted as false due to the incongruence between the concepts in one's semantic knowledge network.

Similarly, if a new category exemplar like *Merhan*, pseudoword, is added into flower concept in memory; expressions congruent with the concept would be accepted as true while expressions incongruent to the concept would be rejected. Accordingly, if *Merhan* is known as a flower "Merhan sprouts in arid lands with the arrival of spring and blooms." would be rated as true whereas "Merhan begins to blow in arid lands with the arrival of spring." would be rated as false.

1.3 Memory Processes Underlying the Illusory Truth Effect

Truth judgments sometimes rely on episodic memory when the source of information is a criterion for truth evaluation (Begg et al., 1992; Parks & Toth, 2006). According to the dual process of recognition memory, episodic memory relies on two separate processes: recollection and familiarity (Yonelinas, 2002; but see Ingram et al., 2012). Typically, familiarity is considered as an effortless automatic process, whereas recollection is effortful and controlled. Recollection is defined as remembering the precise details related to the time and place of a certain event (Tulving, 1972, 1985), while familiarity is more about knowing that the event happened without retrieving those specific contextual details (Mandler, 1980; Tulving, 1985; Yonelinas, 2001; Migo et al., 2012). However, the contribution of familiarity versus recollection processes to any memory product is hard to estimate since they both play significant roles in memory retrieval (Yonelinas, 2002).

Both recollection and familiarity contribute to the illusory truth effect, yet, size of this illusion changes due to certain manipulations influencing recollection. Begg et al. (1992) demonstrated that when they attenuated the recollection with a divided attention task, the truth illusion is larger due to the increased influence of familiarity.

1.3.1 Recollection

The influence of recollection on truth judgments may favor true or false judgments depending on two possibilities. Suppose that the recollected details about the studied information match the information presented at the rating phase. In that case, this statement is assigned a higher truth rating than the new statements, yet, if the presented statement contains contradictory details to the studied statement, then it is assigned lower truth ratings than new statements (Bacon, 1979; Begg et al., 1985).

Recollection-based truth judgments are mostly associated with remembering the source of information. Source recollection is an intentional retrieval process that also affects truth ratings independently from familiarity (Begg et al., 1992). For instance, Law (1998) tested this assumption with product-related claims. He showed that if the source information was recollected, the perceived truth of the claims associated with the unreliable source was lower than claims associated with reliable and novel sources. Yet, the unreliable source-related claims' truth ratings were higher than the ratings of new claims if the source recollection failed (also see Begg et al., 1991, 1992; but see, Arkes et al., 1991). General findings regarding this issue show that people are prone to judge the truthfulness of the information due to source reliability when the source memory is accessible. Otherwise, repetition or familiarity

overshadows the negative influence of unreliable sources on perceived truth (Henkel & Mattson, 2011).

Recollection is more likely to deteriorate as a function of retention time and also requires more attention in contrast to a feeling of familiarity. Henkel and Mattson (2011) showed that 25% of the participants in their study were unable to remember the credibility value of the source after three weeks of the first encounter. Also, manipulations impairing this effortful process by providing secondary tasks like divided attention or mental arithmetic show that the effect of recollection on truth judgments decreases when the encoding efficacy reduces (Begg et al., 1992). These abovementioned conditions leave room for repetition-induced familiarity to influence truth judgments.

1.3.2 Familiarity

Truth judgments can be inferential, so people occasionally use heuristics as a shortcut for those inferences (Reber & Schwarz, 1999; Unkelbach, 2007). Fluency is one of the prominent heuristic cues used in case of provided material easily processed (Koriat, 1997); therefore, it can be defined as a side product of a metacognitive process (for review, see Alter & Oppenheimer, 2009). Familiarity is mediated by interpretation of processing ease of the study material; the information comprehended faster or with less effort generally produces processing fluency, and this experience is attributed to familiarity (Whittlesea, 1993; Unkelbach, 2007).

One explanation of why people interpret fluent processing as true information is that this is learned through experience (Unkelbach, 2006; 2007). Since easily processed

material is typically encountered previously, people interpret this feeling as a cue of prior experience (Whittlesea, 1993). A growing body of studies in the field of metacognition investigated manipulations create these personal interpretations. Various manipulation including the visual and auditory clarity (Besken, 2016; Besken & Mulligan, 2014), repetition of the same item (Castel et al., 2007), conceptually related cue to the studied material (Whittlesea, 1993; Begg et al., 1985; Parks & Toth, 2006) or semantically related word (Rajaram & Geraci 2000) can generate processing fluency, and affect the judgmental processes in return.

Repetition has been an essential manipulation used in the illusory truth studies and type of this manipulation changes across studies regarding the research question, yet, materials are repeated typically in four different ways; verbatim (exact wording) repetition of the sentence, paraphrasing the original sentence, changing the general meaning by preserving most of the wording, and paraphrasing by changing the general meaning (Silva et al., 2017). However, the type of repetition changes the contribution of conceptual and perceptual fluency to truth judgments, and it is hard to distinguish the influence of conceptual and perceptual fluency when the studied information is exactly repeated since it bears both the same meaning and the visual characteristics as the original one.

Silva et al. (2017) contrasted the contribution of conceptual and perceptual fluency to truth judgments by manipulating the perceptual and the conceptual similarities of repeated statements by composing paraphrases and contradictory statements. For the first experiment, they used the paraphrased versions of the studied statements like; 'The infection with the highest prevalence in the world is Malaria" with the

paraphrased version ''Malaria is the most predominant infectious disease on the planet". They aimed to examine whether perceptual fluency is influenced by visual similarity or meaning. They also composed contradictory and paraphrased contradictory versions of the original statements for the second experiment; this distinction helped them to separate the influence of meaning and visual similarity for contradictions. Contradictory statements were similar to studied ones regarding the general topic and perceptual characteristics; however, their meaning was different. Besides, paraphrased versions of these contradictory statements can be associated with the original ones only in the shared topic. Results showed that both the repeated and the paraphrased versions of the original statements were rated truer than the new statements in the same session and one week later. Contradictory statements to the original ones rated as falser than the new ones in same session, while, this pattern did not occur after one week.

Silva and her colleagues' (2017) findings are important in two ways; first, they showed that perceptual similarity affects truth judgments to a lesser extent than conceptual similarity. Secondly, they provided a better understanding of the differential influence of the memory processes, namely familiarity and recollection, on the illusory truth effect.

Concerning the research interests of the current study, the findings of Silva et al. (2017) are important for demonstrating that conceptual fluency could be generated by repeating some wording of the studied statement. This type of fluency is considered a more valid cue for truth judgments (for appropriateness of fluency cue, see Whittlesea, 1993). The other important finding of their study is that recollection

is influential for detecting contradictories when ratings are obtained in a brief time interval; thus, old contradictories receive lower truth ratings than the new ones in same session. Yet, due to impairment in the recollective process within a long-time-interval (also see Yonelinas, 2002), participants did not produce lower truth ratings for the contradictories, whereas they still assign similar ratings for repeated materials after one week.

1.3.2.1 Perceptual Fluency

Truth judgments are affected by ease of processing, yet, there are other factors creating fluent experience rather than repetition. Easily perceived materials also led to fluent processing; thus, processing fluency caused by perceptual clarity is called perceptual fluency (Reber & Schwarz, 1999). For example; Besken et al. (2019) showed that when intact and inverted picture pairs presented in same experiment inverted picture pairs caused to slower information processing due to perceptual disfluency compared to intact picture pairs, and can sometimes affect memory-related judgments negatively. Moreover, plenty of research agreed that perceptual fluency can be used as a cue for the truthfulness of the expressions (i.e., Parks & Toth, 2006; Unkelbach, 2006; 2007; Reber & Schwarz, 1999; but see Whittlesea, 1993). Parks and Toth (2006), however, showed that when perceptual fluency is manipulated by using variety of font types, there is only a little difference between the truth ratings assigned to easy-to-perceive and hard-to- perceive statements.

Whittlesea (1993) suggested that the nature of the provided task is crucial in the interpretation and employment of the processing fluency to obtain a considerable truth effect. He mainly argued that relevance between the source of fluency and the

judgment type is essential for fluency to be used as a judgment criterion. Truth judgments require semantic processing of meaning; for this reason, they are contextually driven judgments. Accordingly, perceptual fluency could be considered as a relevant cue for these decisions to a lesser extent (Whittlesea, 1993; but see Reber & Schwarz, 1999; Unkelbach, 2007), and people rely more on conceptual cues while rating the truth of the expressions compared to perceptual cues (for a detailed discussion see Silva et al., 2017).

1.3.2.2 Conceptual Fluency

Conceptual fluency can be generated by repeating conceptual cues like topic and theme or some part of the wording from the original statement (Silva et al., 2017), giving the general sense of the meaning of the original material. These cues provided at the truth rating phase facilitate processing materials semantically related to studied material, thus, creating conceptual fluency (Whittlesea, 1993).

Begg and his colleagues' (1985) presented participants with the statements giving the main theme of the statements as "hen's body temperature" at the exposure phase, then provided more detailed information about that topic as "The temperature of a hen's body is about 104 degrees Fahrenheit." at truth rating. They found that participants believed that the statements related to the studied theme were more truthful than statements related to the unstudied theme. They suggested that people remember the core topics of the sentences and forget the details given in that sentence; therefore, just giving the general theme of to be rated statements at the beginning of the experiment makes those statements more familiar (fluent) than the new ones at rating. Similar results were also shown by Arkes et al. (1991), with the topic repetition across different sessions in a couple of weeks (i.e., China as a topic).

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These studies agree that verbatim repetition is not the only condition for generating the illusory truth effect. Still, topic repetition also leads people to believe that the statements congruent with the topic are more truthful.

Overall, considering the abovementioned studies and previous research on conceptual fluency, it is reasonable to suggest that people believe that conceptually familiar statements are truer even if they were not given in the exact same wording (Silva et al., 2017).

There are two substantial views on the underlying cognitive mechanisms of familiarity; some researchers argue that familiarity occurs due to activation of existing representations in memory (e.g., Reder et al., 2000), while others argue that familiarity might be caused by episodic representations (e.g., Hintzman, 1998). The existing representation theories emphasize that the concept nodes are linked to each other as a network, and the activation on one node spreads to others (Reder et al., 2000), hence, high activation causes to feeling of familiarity. On the other hand, episodic representation theories argue that familiarity relies on episodic memory and is the result of remembering previous encounters with certain stimuli (Hintzman, 1988; Shiffrin & Steyvers, 1997). Both of these approaches explaining the underlying mechanisms of familiarity provide compelling evidence; thereby, it is useful to examine each.

1.3.2.3 Existing Representations Theories

Source of Activation Confusion (SAC) model (Reder, 2000) explains familiarity process with concept and episode nodes; knowledge in memory is represented with

concept and episodic nodes connected as in the network models of semantic memory. Accordingly, concept nodes include semantic and perceptual features of the word, and episode nodes encode the episodic details of the setting. These assumptions of the SAC rely on the dual-process model of memory; familiarity and recollection are two distinct memory processes involving recognition memory.

Activation in concept nodes changes due to the frequency of the word (e.g., low-frequency words vs. high-frequency words) and its exposure recency. The frequency of the words is affected by pre-experimental exposure history while exposure recency is manipulated within the experiment. Therefore, exposure recency is related to the repetition time of certain stimuli in the experiment. Familiarity-based judgments are affected by both frequency (baseline activation) and repetition. Accordingly, the words presented repeatedly in a certain time would have a higher activation level in the concept node; thus, they would be more familiar (Reder et al., 2000).

Importantly, existing representation theories claim that recognition memory operates on the materials that have already existing concept nodes in memory; hence familiarity could emerge due to activation on these nodes with the experimental exposure. A critical assumption of this approach related to our research question is that nonwords could not produce familiarity due to a lack of conceptual representations of these words in memory. Consequently, if there are no concept nodes, there would be no activation leading to familiarity (Arndt et al., 2008).

1.3.2.4 Episodic Representations Theories

This group of approaches (e.g., Global matching models) suggest that familiarity occurs due to the retrieval of specific episodic details related to the context that word encountered. For example, the multiple-trace simulation model (Hintzman, 1988) provided some explanations regarding how repetition affects memory. With exposure to a certain stimulus, memory encodes a variety of features of that stimulus as vectors. Each repetition produces some memory traces for that stimulus, and all of the encoded copies of this memory may not be perfect and identical to each other. However, Hintzman (1988) stressed that these memory traces are activated when the cue is presented in retrieval tasks simultaneously; thus, all encoded versions of a certain stimulus create one cumulative representation by summing up all the vectors encoded in each previous encounter.

Overall, episodic representation theories state that one exposure to the stimulus is enough to produce familiarity when that stimulus is encountered again due to the activation of memory traces encoded about that certain event at the first exposure. Therefore, familiarity can occur as a result of exposure to meaningless material such as nonwords or pseudowords (Arndt et al., 2008).

Some studies provided compelling evidence for the familiarity process for materials having no pre-experimental representations like nonwords (Gardiner & Java, 1990), pseudowords (Arndt et al., 2008), and arbitrary geometrical shapes having no pre-experimental value (Yonelinas & Jacoby, 1995). However, even though these studies found critical results regarding the underlying processes of familiarity, it is beneficial

to be skeptical about those results since they tested only the basic material such as words, nonwords, shapes, etc. Given that, it is intriguing to test the hypothesis of both of these approaches with more complex materials, such as detailed general knowledge-like statements, constituting the main goal for this study. Therefore, it is important to show that familiarity can occur for materials with no pre-experimental representations.

1.4 Prior Knowledge and the Illusory Truth Effect

Previous studies on the illusory truth effect used a variety of materials like expertise related statements (Srull, 1983; Arkes et al., 1991), information related to a certain occupation (Boehm, 1994), general knowledge (Fazio et al., 2015; Fazio et al., 2019), obscure trivia knowledge (Begg et al., 1985, 1992; Unkelbach & Rom, 2017; Garcia-Marquez et al., 2015; Unkelbach & Greifeneder, 2018), fake news (Pennycook et al., 2018), or product-related claims (Hawkins et al., 2001). The shared characteristic of all these studies is that they can be processed by relying on the existing semantic information within one's knowledge network in memory.

The referential theory of Unkelbach and Rom (2017) is providing a clear understanding of the generation of truth judgments regarding prior knowledge. They suggest that truth judgments are related to the conceptual references of each item in a statement; thus, truth judgments rely on meanings of words stored in memory. Two important factors influence the truth decision process; first, one should have semantic knowledge about the elements in a proposition; second, those references should be related to each other coherently to create meaningful information unit as mentioned earlier.

Moreover, Unkelbach and Rom (2017) explain the repetition-induced truth effect with referential theory; information presented at the initial phase prompts corresponding references and their related semantic nodes within the knowledge network. In the case of novel information, new links are formed and these links get stronger with the repeated exposure. Thus, when participants are asked to rate the truth of the statements, the studied statements have a higher level of activation and more coherently linked references than the novel statements. Consequently, novel statements receive lower truth ratings than the studied statements.

Importantly, the referential theory claims that when people have no corresponding references for the statement's elements, the judgment process mostly resulted in a "don't know" response. Unkelbach and Rom explain this situation as "People should judge the statement that ''Mimas has more spin than Pallene." as *don't know* because the statement provides no corresponding references. The lack of corresponding references prevents check incoherence between those references, and it will not translate to a *false* judgment, but rather to an *I do not know* judgment" (p. 112, 2017).

1.5 Aims of the Current Study

The current study aimed to replicate the illusory truth effect with unfamiliar material for which participants lack corresponding references and investigate memory and metamemory processes underlying this illusion.

Unkelbach and Rom (2017) argued that truth judgments are produced with activation of corresponding references and their coherence in one's knowledge network (i.e.,

referential theory). This view confirms the deterministic role of prior knowledge on truth decision processes and evokes another question: For information that one encounters for the first time, how does this decision process operate? Investigating this question is quite important since understanding how people can use novel information in a complementary way when deciding the truthfulness of the other related information especially in situations they learn novel information. Therefore, with this question in mind, we provided participants with some categorial information containing category referents that they had not encountered before, a pseudoword. Then we examined how they used this information in their truth judgments across three experiments.

As Silva et al. (2017) showed, conceptual fluency could be produced by repeating some wording from the original statements; this manipulation was adapted to the current study by including only the pseudowords from the original statements into the repeated statements (i.e., fictitious facts). For the study phase, we asked participants to rate their pre-experimental familiarity with the category statements. At the truth rating phase, they were presented with some statements having studied details while others were novel. So, half of the statements were related to the category information presented at the study phase; old congruent and old incongruent statements along with new statements.

The main aim of this study is to test whether we could observe the illusory truth effect with the material that people lack conceptual references. Unkelbach and Rom (2017) tested the pattern of truth judgments with meaningless statements as "A Ma is bigger than an Omp," and they could not observe this illusion. They emphasized that

"The statement is comprehensible and has a relational qualifier that allows coherence or incoherence in comparison to other statements" such as ''An Omp is bigger than a Ma." Yet, people should have no corresponding references in memory that give meaning to these elements in the statement." (2017, p.120). Considering that we employed a design that we could offer the meaning of pseudowords related to a category initially, after then test the truth judgments for congruent and incongruent expressions with that initially provided category information. Accordingly, we intended to test how 1) having prior conceptual knowledge affects the illusion of truth and whether 2) truth ratings were given based on recollection or familiarity.

Another aim of this study is to examine how the reliance of truth judgments to recollection and familiarity changes due to time intervals after participants successfully learned all pseudowords and their categorical associations. Old incongruent fictitious fact statements were expected to receive lower truth ratings than new statements if participants used recollection because participants who could successfully recollect the initial semantic details in the category statements would refute the truthfulness of that statements (Silva et al., 2017; Garcia-Marquez et al., 2015; Begg et al., 1985; Bacon, 1979). However, impaired recollection with an increased time interval after initial exposure (Yonelinas, 2002) should make it harder to detect incongruent details in the old statements, which may lead to a relatively similar processing fluency for old incongruent and congruent statements. In this situation, truth ratings for old congruent and old incongruent fictitious fact statements were expected to be similar (Garcia-Marquez et al., 2015; Silva et al., 2017) because of that perceived truth of the incongruent statements may increase in

delayed ratings and be rated based on familiarity, while the truth ratings for congruent statements may decrease.

CHAPTER II

PILOT EXPERIMENT

Previous studies used fabricated informative sentences (Bacon, 1979; Begg, Armour & Kerr, 1985; Fazio et al., 2015; Brashier et al., 2020) like; "The Minotaur is the legendary one-eyed giant in Greek mythology.", "Oslo is the capital of Finland." (Fazio et al., 2015), or headlines like "Trump to Ban All TV Shows That Promote Gay Activity Starting with Empire as President." (Pennycook & Rand, 2018a). The studies used a variety of material as general knowledge, trivia knowledge, and obscure fact statements; however, their common ground is that people have conceptual references to make inferences about those statements.

Unkelbach and Rom (2017), in their referential theory, suggested that truth judgments are given based on conceptual references in memory corresponding to the elements of an expression, and people make inferences by checking the coherence of those references for that expression. Considering that, the subjects of the statements given in previous studies are conceptually compatible with the provided information in the expression. For instance, it is known that Minotaur is a mythological creature even though it is not the one-eyed giant, and Oslo is a city name even though it is not the capital of Finland, or Trump is an authority figure who has the power to ban TV

shows. All these conceptual connections already exist in one's memory, helping participants judge the truthfulness of those expressions.

It is difficult to estimate whether similar effects would be found if participants judge the truthfulness of information when they have no existing conceptual referent for the given information in their memory. Therefore, the main motive driving the current study was to investigate the lack of prior knowledge on illusory truth effect by providing participants with study materials consisting of fictitious factual information in a sentence form with pseudowords, as the subjects of those sentences.

There were two aims for the pilot study. The first aim was to check the validity of the generated materials to see whether people give their truth ratings considering the congruence between the category information and the generated facts that either has complementary and contrasting details with category information. The second aim of the pilot study was to ensure that congruent and incongruent statements were indeed perceived as intended. In other words, it was important to ensure that people can notice the complementary and contrasting details in the fictitious factual statements when they process them with the category information.

2.1 Participants

Eighty-eight participants participated in the pilot study voluntarily. Some participants were excluded due to the following criteria; not completing the survey or spending less than 5 minutes to complete the survey (as the median to complete the survey was 22 minutes and 58 seconds) and giving uniform ratings to all statements. According to these criteria, the results of 68 participants were analyzed (43 women; $M_{age} =$

25.63, *SD* = 7.24, *Mdn* ~age~ = 24). All participants had at least university-level education (52 undergrads, 16 graduate students; completed or continuing).

2.2 Materials

    2.2.1 Pseudowords

For the pseudoword generation, webpages providing pseudowords (randomwordgenerator.com; www.feldarkrealms.com) and Wuggy software, a pseudoword and nonword generation program that is widely used in psycholinguistic studies (Keuleers & Brysbaert, 2010), were used with Turkish dictionary plugin. The working principle of Wuggy software is based on The Levenshtein distance, which is the number of required manipulations as inserting and removing letters from the original word to transform that word to another. Specifically, Wuggy uses the *orthographic Levenshtein distance 20* (OLD20) metrics, which is related to the resemblance of the words in a language to each other visually; in other words, it is a measure of orthographic similarity. Orthographically closer words have a low OLD20 value, while orthographically, far words have a high OLD20 value (Yarkoni et al., 2008). The average OLD20 value of pseudowords used in the current study was around 2.58. All words consisted of 5 to 7 letters or 3 syllables (see Appendix A).

    2.2.2 Categories

Categories used in this study were based on Van Overshelde et al.'s (2004) category and exemplar norms. They asked over 600 students to provide an exemplar for various categories such as carpenter's tool, four-footed animal, vegetable, military title, liquid, member of the clergy, pernicious stone, etc., 70 categories in total. Forty-eight categories were selected among Van Overshelde et al. (2004), yet to

increase the number of items, thirty-three new categories were also generated for the current study (see Appendix B).

2.2.3 Fictitious fact statements

After creating category statements with pseudowords (see Appendix C), two factual statements for each category were generated. One factual statement contained complementary information to the presented category, while the other factual statement contained contrasting information. Those statements consisted of 6 to 13 words. The congruent and incongruent versions of the same factual statement included almost the same wording. For instance, the congruent fictitious fact statement for the category statement "Noxu is a color" was "Noxu has a tone mentioned in fairy tales and is said to be invisible to mortals." The incongruent fictitious fact statement for the same category was, "Noxu has a melody mentioned in fairy tales and is said to be unheard to mortals." Hence, 81 congruent and 81 incongruent fictitious fact statements were combined with the 81 category statements (see Appendix D).

2.3 Design

The pilot study was conducted as a within-subject design in which each participants read only one version of the fictitious fact statements related with the category information either congruent or incongruent. So, all participants were provided with the same material by changing the congruence of the fictitious fact statement presented with that category statement. All statement pairs were presented in random order and ten of them on one page. Participants were able to see their progress through the progress bar at the bottom of the screen.

2.4 Procedure

The pilot study was conducted as an online Qualtrics survey. The survey consisted of 81 categories, and for each category, two fictitious fact statements (81 congruent, 81 incongruent) in two counterbalanced conditions. Participants were required to give truth ratings to fictitious fact statements presented under the related category information. All participants were presented with the same category statements; however, the congruence of the second statement (fictitious fact statement) changed according to participants' assigned condition.

First, participants were presented with the general information about the experiment with a written consent form and told that they were also free to withdraw from the survey at any time by simply closing the browser. The instructions presented on the screen were as follow:

"In the following questions, you will be given category information in the first sentence and then some information about that category in the second sentence. These sentences may contain information that you do not encounter in your daily life or rarely encounter. We want you to evaluate the truthfulness of the second sentence based on the category information given in the first sentence. Please give your answers according to the information provided to you, not according to your existing knowledge."

This general instruction was placed at the beginning of each page of the survey to ensure that all participants gave their ratings according to the same criteria. Each

statement pair appeared on the screen in a randomized order. The scale was a 6-point Likert scale (*1 = certainly false, 2 = probably false, 3 = possibly false, 4 = possibly true, 5 = probably true, 6 = certainly true*) asking the truth ratings beneath each statement. The truth ratings on a 6-point scale were specifically chosen to eliminate the answer "unsure" because the previous studies showed that the magnitude of the illusory truth effect was greater when participants had no middle point option referring to unsure response (Dechêne et al., 2010). At the end of the survey, they were asked to provide demographics and thanked.

2.5 Results

2.5.1 Truth ratings

Based on the participants' truth ratings, 17 category statements were excluded from our material pool, leaving 64 category statements to use in the study phase along with 64 congruent and incongruent fictitious fact statements for each category to use at the truth rating phase. There were two pre-conditions for a category item to be included in the survey: a congruent statement should have received a rating higher than 4 on average. In contrast, an incongruent statement should have received a rating lower than 3. For example, if a fictitious fact statement that was supposed to contain incongruent details with the critical category received an average score of 3.94 out of 6, this material was removed from the list. Thus, 17 items were excluded from the study in this manner (for the list of items and truth ratings, see Appendix E). No categorical item was excluded from the study based on low ratings because they all received ratings in the range of 4 to 6.

CHAPTER III

EXPERIMENT 1

Episodic representation theories (global matching models; e.g., REM, Shiffrin & Steyvers, 1997) explain the occurrence of familiarity with the episodic memory consisting of memory traces of the particular item (Arndt et al., 2008). So, familiarity relies on episodic representations, and one presentation is enough to produce familiarity when that specific item is encountered later on. As opposed to this view, existing representation theories (e.g., Reder et al., 2000) emphasize the importance of existing concept nodes in memory, similar to Unkelbach and Rom's referential theory (2017). According to this approach, familiarity depends on the activation of existing concept nodes in one's memory; therefore, it is impossible to feel familiar with items having no conceptual representations, such as nonwords or pseudowords.

The current experiment had two main research questions. The first question aimed to understand how individuals judge the truthfulness of some information without prior knowledge. According to the vast amount of research showing the repetition induced truth effect in thirty years (Dechêne et al., 2010), it was hypothesized that even though participants did not have prior knowledge about the given information in the experiment, they would judge the fictitious fact statements including the category

referent that they encounter at the study phase truer than new items, due to processing fluency caused by repeated exposure (i.e., familiarity). The second aim of the study was to understand the familiarity and recollection processes influencing this illusion. It was expected that participants should assign lower truth ratings to incongruent fictitious fact statements than congruent fictitious fact statements if recollection prominently governs these judgments; however, they should assign equivalent truth ratings to both congruent and incongruent fictitious fact statements if familiarity, caused by the previous exposure to the category information, was the main process causes this illusion.

3.1 Participants

Forty students between the ages of 18 and 30 (Women; 25, $M_{age} = 20.35$, $SD = 1.83$) were recruited for the experiment from Bilkent University either for course credit or gift card lottery. All participants were native Turkish speakers. The sample size was determined by looking at the sample size of previous studies that had conceptually similar designs. Hasher et al. (1977) was the first study demonstrating the illusory truth effect by testing their manipulation on 40 college students also Fazio et al. (2015) obtained this effect with 40 participants. According to meta-analysis comparing 43 illusory truth studies (Dechêne et al., 2010) median of the number of participants recruited in those studies was also 40; therefore, we decided to recruit 40 participants in this experiment.

3.2 Materials

Sixty-four pseudo-words and their complementary and opposing fictitious statements that were obtained from the pilot study were used for this experiment. The list was

randomly divided into two separate lists to constitute old versus new items. The items within these lists were further divided randomly once again to be either presented with the complementary or the contrasting fictitious fact. The listing status (old vs. new) and the type of fact accompanying the pseudoword (complementary vs. opposing) were counterbalanced across participants and were presented to an equal of participants for each condition. Thirty-two critical category statements were used at the study phase; these were considered as the old items, along with three category statements for both primacy and recency blocks. Primacy and recency items were selected among the excluded materials. The presentation of each category and fictitious fact statement pairs was balanced, and we tested participants in four conditions. At the truth-rating phase, participants were exposed to all 64 pseudowords, half with their congruent statements and the rest with the incongruent statements.

3.3 Design

We used a within-subject design in which all participants are exposed to the same material in a different order as counterbalanced. An equal number of participants were recruited to counterbalance conditions. Bilkent University Ethics Committee approved all the experimental procedures.

3.4 Procedure

Due to COVID-19, the data collection was conducted online. All participants were tested individually in their computerized settings via the internet. To assert more control over the study, participants were required to log in to the assigned Zoom meeting before starting the experiment. They were given instructions via Zoom by

the experimenter and sent the experiment link and participation code unique to each participant. The Gorilla Experiment Builder (www.gorilla.sc) was used to create and host this and subsequent experiments. In the beginning, participants read the consent form, and they provided demographics. Important points were specifically explained by the experimenter and with the instructions on the screen:

> 1) In this study, I would kindly ask you to keep other tabs on the browser closed during the experiment. The only tab remaining open should be the experiment tab. This is because other tabs in the internet browser staying open or switching between tabs will cause problems in the reliability of the study and the recording of the responses.

> 2) Since the active time is limited, your attention must be on the screen during this time. However, you do not need to hurry; the experiment's duration is sufficient unless you follow the instructions correctly and do not take a break. For this reason, please continue by following the instructions without a break.

> 3) To ensure that you have completed the experiment, please continue until you see the "information after the experiment" page. Otherwise, your answers may be recorded incompletely or incorrectly, and we may not be able to use your data.

The experimenter turned her screen and mic off not to cause any distraction for the participants, but it was emphasized that the experimenter would be there during the experiment. The experimenter asked participants to open Zoom on a device other than the computer they would be using for the experiment and stay online throughout

the experiment. However, they were free to choose whether to keep their cameras on because the duration of this experiment was quite short (15-20 minutes).

The experiment consisted of three phases: study, distractor, and truth rating. The participants were told that they would see statements containing category information, and they were asked to rate their familiarity at the initial phase. They were explicitly told that they would need to use this information for subsequent phases of the experiment; therefore, they needed to read the statements carefully.

Each trial of the study phase started with a black screen for 500 ms. as preparation and was followed by presenting category statements such as "Soloren is a military title." *Soloren,* in this sentence, is a pseudoword that was created for the current study, and the "military title" is a category of the pseudoword *Soloren*. Participants had 5 seconds to read and rate how familiar each category statement was to them. The familiarity rating was included in the study phase for two purposes. First, to increase participants' engagement with the task; second, to establish that the study material did not indeed correspond to participants' pre-experimental knowledge. In addition, each category statement was presented with the question "How familiar is this information to you?" at the bottom of the screen. Participants were required to provide their answer by choosing a number from a 1 to 4 scale (*1 = definitely not heard, 2 = probably not heard, 3 = probably heard, 4 = definitely heard*) presented under this question.

In the distractor phase, participants were provided with seventy basic math problems (e.g., 50-28=? 23x15 =?) and required to solve as many as possible of them in 3

minutes. Participants typed their answers into the blank box at the bottom of the screen and pressed ENTER to proceed to the following problem.

The last part was the truth rating phase, in which the participants were presented with 64 fictitious fact statements. 32 of these fictitious facts were related to category statements from the study phase; 16 of them contained congruent semantic details that agreed with the studied category information, while 16 statements contained incongruent semantic details. For example, if they were presented with the "Soloren is a military title", the congruent fictitious fact statement they would see was "Soloren was awarded to knights who returned successfully from a war in the twelfth century Britannia." In contrast, the incongruent statement was, "Soloren was used for wall painters in the twelfth century Britannia." Participants were also presented with the 32 new fictitious fact statements that they did not see any category information related to them at the study phase. After they completed three practice trials, they proceeded to the actual task. They gave their truth ratings on a scale of 1 to 6 (*1 = certainly false, 6 = certainly true*) placed at the bottom of the screen, which was presented with each fictitious fact statement. Participants completed this task at their own pace; they gave their answers by selecting a number from the scale by using the mouse.

We also employed several methods to increase our experimental control over the study. First, we used several options on Gorilla Experiment Builder (www.gorilla.sc), such as the time limit, device, and browser control. Secondly, we added check trials into the study phase to see the participant's engagement with the task instructions. These materials consisted of questions asking them to select a

certain number from the scale placed at the bottom of the screen. Since participants

have completed the study phase at an experimenter-paced speed, we placed check

trials with unlimited time; they remained on the screen until the participant chose a

number on the scale. With this manipulation, we aimed to rule out the possibility that

the participant would proceed through an entire phase by just watching the screen.
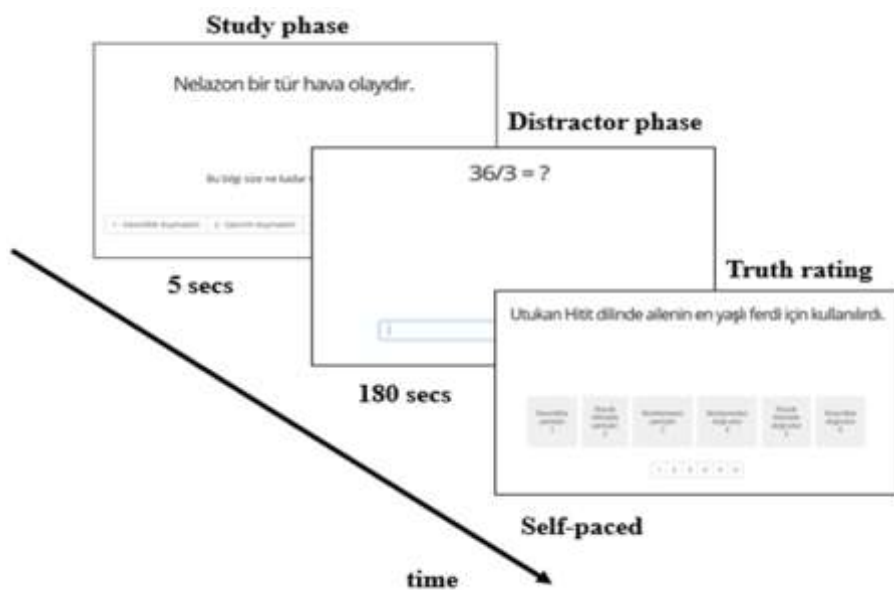
Figure 1. Schematic display of Experiment 1

3.5 Results

 3.5.1 Familiarity ratings

Participants' familiarity ratings showed that they were not familiar with the category

statements presented to them at the study phase. The category statements related to

fictitious fact statements that participants would see with congruent details were

rated as unfamiliar ($M = 1.53$, $SD = .82$) similar to incongruent ($M = 1.57$, $SD = .85$)

ones. Considering the 1 to 4 scale, the mean response of 1.53 and 1.57 almost

correspond to the "2 = *probably not heard*" response.

3.5.2 Truth ratings

Participants' mean scores for truth rating were computed for each item type as shown in Table 1. Participants' truth ratings for old congruent statements ($M = 3.68$, $SD = .61$) were similar to old incongruent statements ($M = 3.57$, $SD = .61$) and new statements ($M = 3.61$, $SD = .47$).

Truth ratings were analyzed in a one-way ANOVA with the item type (item type: old congruent, old incongruent, new) as a within-subject factor. Results did not reveal any significant difference between the truth rating given to old congruent, old incongruent and new fictitious fact statements $F(2, 78) = .740$, $MSE = .172$, $p = .480$, $\eta_p^2 = .019$. These results showed no illusory truth effect, as opposed to our expectation.
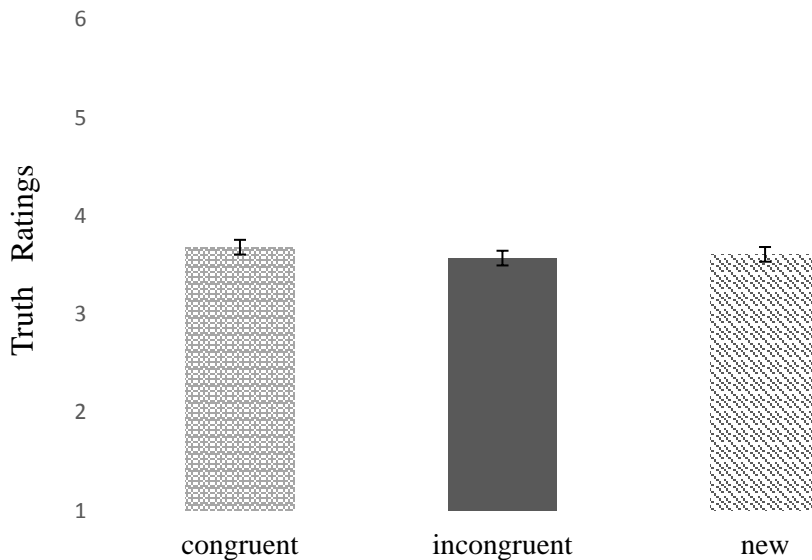
Figure 2. Mean truth ratings by item type (old congruent vs. old incongruent vs. new). Error bars display the standard errors of the means.

3.5.3 Truth rating response times

Median response times for old congruent (Mdn = 5453, SD = 1250) old incongruent (Mdn = 5516, SD = 1560) and new (Mdn = 5448, SD = 1399) statements were almost the same. These rating times were analyzed as a function of item type in one-way ANOVA, and it revealed no significant difference between the median response times of any item type, $F(2, 78)$ = .212, MSE = 27453, p = .809.

Table 1

Mean (SD) of truth ratings and Median (SE) response times in milliseconds in Experiment 1

Item type	Truth ratings	Response times
congruent	3.68 (.61)	5453 (197)
incongruent	3.57 (.62)	5516 (246)
new	3.61 (.47)	5448 (221)

3.6 Discussion

The current study aimed to see whether repetition of the category referents (i.e., pseudowords) would produce higher truth ratings than novel pseudowords by the mere fact that they had been heard at the familiarity phase. To be clear, we provided participants with the pseudowords within the category statements as the subject, and these pseudowords remained as the subject of congruent and incongruent fictitious fact statements while participants were rating the truthfulness of those statements. This partial repetition method was employed in previous studies, and it has been repeatedly observed that participants believe that repeated materials are truer than the new ones (Begg et al., 1985; Bacon, 1979; Hawkins et al., 2001; Silva et al.,2017)

even though they are exposed to that critical information only one time at the initial phase (Arkes et al., 1991; Fazio et al. 2015, Fazio et al., 2020). Therefore, this effect is considered quite robust (for meta-analysis, see Dechêne et al., 2010).

In contrast to the abovementioned studies, the current study did not show the illusory truth effect; participants did not differentiate their truth ratings between fictitious fact statements (i.e., old congruent, old incongruent) related to studied categories and new statements. Moreover, participants' response times for old congruent or old incongruent fictitious fact statements were not shorter than the new fictitious fact statements. These results imply that participants did not experience processing fluency which should have emerged by the repetition of the same pseudoword during both familiarity and truth rating phases. Therefore, participants did not show any facilitated response for the episodically familiar fictitious fact statements in their truth ratings.

The null results of the current study were quite surprising in the sense that repetition of pseudowords did not engender the illusory truth effect considering the assumption of episodic representation theories of familiarity. Episodic representation theories such as the multiple-trace simulation model (Hintzman, 1988) suggest that familiarity emerges when the previously encountered stimulus is presented due to activation on the memory traces created at the first exposure. The critical claim of these theories is that the one exposure is enough for one to feel familiar with that stimulus when it is encountered again. Previous studies employing research materials as pseudowords (Arndt et al., 2008), non-words (Gardiner & Java, 1990), or shapes (Yonelinas & Jacoby, 1995) to investigate the mechanisms underlying familiarity

provided compelling evidence. However, the current experiment did not show familiarity-driven truth ratings when participants were exposed to critical material ones at the study phase. Due to undifferentiated truth ratings assigned to studied or novel statements, we did not observe a repetition-induced illusory truth effect. Considering that, results of the current experiment showed that one exposure is not enough for producing familiarity when the experimental material is complex as factual statements.

However, these results are in line with the referential theory (Unkelbach & Rom, 2017), explaining how people could judge the truthfulness of an expression when they lack prior knowledge. For instance, when a person is asked to rate the truthfulness of "A Weon is deeper than a Grei." he should respond as "unsure" or "don't know" since *Wean* and *Grei* are not real words, so the person has no prior knowledge to activate corresponding references for these words in their memory which is the first step in these judgments. Coherence check is the second step after the activation of corresponding references in memory; since there are no activated nodes, he would not proceed to coherence check. Consequently, he would not respond as false or true to that expression. As Fig. 1. displays, participants in the current study assigned almost equal truth ratings to old congruent, old incongruent, and new fictitious fact statements, and these ratings were around 3.5 points. This score is in the middle of "*3- probably false*" and "*4- probably true*" on a 6-point scale, whereas it corresponds to the "unsure" or "don't know" responses in odd scales. Therefore, our results resemble to anticipated results of the referential theory for novel information.

These results also implies that just the mere repetition of concepts is not sufficient to increase truth ratings. One also needs to be able to refer to existing concept in order to increase their truth rating. When they cannot, the effect of repetition is canceled out.

CHAPTER IV

EXPERIMENT 2

A tremendous body of research shows that when people are presented with information even for one time, they are prone to think that this information is truer than the new ones (Hasher et al., 1977; Parks & Toth, 2006; Scholl et al., 2014; Fazio et al., 2015; Pennycook et al., 2018). As opposed to these findings, Experiment 1 did not reveal differences between previously seen and new category-related information when category statements were presented for once at the study phase.

Due to the existing representations and episodic representations theories, there is no consensus about how familiarity occurs (Arndt et al., 2008). Episodic representation theories assert that being exposed to the material for one time is enough to create the familiarity when this material is encountered again (Shiffrin & Steyvers, 1997). However, existing representation theories argue that familiarity comes from the activation of current concepts in memory; multiple exposures to material increase the activation level of these concept nodes and creates familiarity (Reder et al., 2000). In a similar vein, according to the referential theory of Unkelbach and Rom (2017), the illusory truth effect is related to the activated concepts in memory, making them more visible to a person in the form of mnemonic cues as fluency.

Due to the null results of Experiment 1, in the current experiment, we aimed to create concept nodes for pseudowords. In order to do that, the learn-to-perfection manipulation inspired by Undorf and Erdfelder (2015) was employed as the retrieval practice task. In Experiment 2, after participants were made familiar with the category information for pseudowords in the initial phase, they went through the retrieval practice phase, in which participants saw the category information along with the word-stem of the pseudoword. For example, they were presented with the "Solo… is a military title." and asked to complete the last syllable and type the whole pseudoword into the blank box on the screen. Correct completions were dropped out from the study list, and feedback was given for incorrect completions of pseudowords. Participants went through this retrieval practice until they completed all pseudowords correctly and started the truth rating phase after the distraction phase as they did in Experiment 1. Finally, a multiple-choice recognition test was added to the end of the experiment to check whether participants actually remembered the categories of these pseudowords or not.

According to referential theory, it was expected that when the pseudowords and their category information are integrated into the participants' knowledge network, those corresponding references would be activated when that pseudoword was encountered again. This expectation of referential theory is in line with existing representation theories (e.g., SAC, Reder et al., 2000), suggesting that familiarity emerges due to activation on the existing concept and episodic nodes. Therefore, we expected that if the elements of the presented statement were congruent with that pseudoword's category, those statements should be accepted as truer than new and statements

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having incongruent details with that category. Specifically, it was hypothesized that old congruent fictitious fact statements would be rated truer than old incongruent and new fictitious fact statements if the category information is recollected successfully. However, if the recollection of category information fails, both old congruent and old incongruent fictitious fact statements should be rated as almost equally true, and these ratings should be higher than the ratings of new fictitious statements due to the repetition-based familiarity of old items.

4.1 Participants

Forty students who did not participate in the pilot study and Experiment 1 between the ages of 18 and 30 (Women; 29, $M_{age} = 20.23$, $SD = 1.77$) were recruited to experiment from Bilkent University either for course credit or gift card lottery. All participants were native Turkish speakers.

4.2 Materials & Design

We recruited 40 participants with the same criteria we used in Experiment 1. Also, the G*Power analyses confirmed that we have sufficient power to detect the average effect size of d=0.49 [95% CI: 0.45–0.55] reported by Dechêne et al. (2010) with 40 participants.

We used the same materials used in Experiment 1. The only difference of Experiment 2 is that we included retrieval practice and recognition memory tasks in this experiment. The study consisted of five phases: study phase, retrieval practice, distraction, truth-rating phase, and knowledge-check phase.

4.3 Procedure

The procedure of Experiment 2 was identical to Experiment 1. However, participants were asked to keep their cameras on during this experiment since it took more time (about 50 minutes) and was more complicated than Experiment 1. Thus, it was ensured that participants were on their computers and they followed the instructions correctly for each task.

The study phase was identical to Experiment 1. After that phase, we introduced the retrieval-practice task that participants were presented with the word-stem of the category name (i.e., pseudowords) they saw at the study phase and asked to complete and type it in the blank box presented at the bottom of the screen. Each block of retrieval practice trials consisted of the question, answer, and feedback screen, so participants advanced to the next block after writing down their answer to the blank box and pressed the "ENTER" button on their keyboard. For example, participants saw a statement, "Mer… is a flower name" and they were asked to complete the word-stem with the missing syllable and type it in the blank at the bottom of the screen as a whole word. If they wrote "Merhan", which is the correct answer, they were presented with the feedback screen informing participants about the accuracy of their answer as "your answer is correct", and this word was dropped from retrieval practice (Fig. 3). If they gave the wrong answer, the feedback was "your answer is wrong," and they were presented with this question again. Each feedback screen also contained the correct version of the category statement so that participants could see the completed version of the pseudoword within the whole sentence without a time limit. These trials were presented to participants in random order and continued until the participant provided the correctly completed version of the pseudowords for each

thirty-two category statement. Participants proceeded to distractor and the truth-rating phases sequentially. The truth rating and distractor phases were identical to Experiment 1.
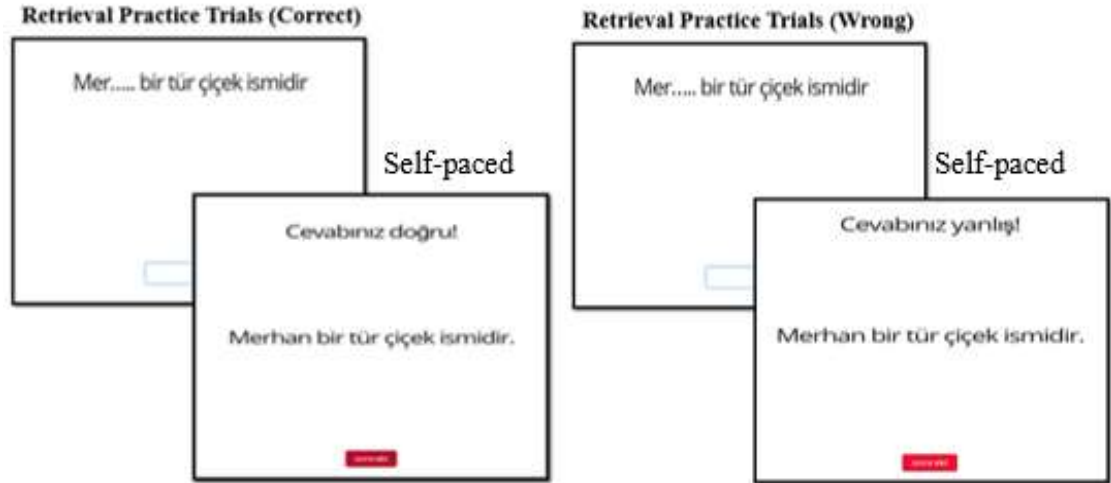
Figure 3. Display of retrieval practice trails and feedback screen in Experiment 2 and 3

After the truth-rating phase, participants completed a recognition memory task for 32 category statements that they received at both study and retrieval-practice phases. In each trial, a question asking the category information of the corresponding pseudoword, such as "Which of the following categories does Merhan belong to?" was placed on the screen. This question appeared with four options, consisting of two studied category names, one new category name, and the "I do not remember" option. All thirty-two questions were presented on screen randomly for each participant. The "I do not remember" button was always placed as a fourth option, while the correct option was placed in one of the other three locations randomly to eliminate the response bias.

Knowledge Check Phase

Merhan aşağıdaki kategorilerden hangisine aittir?

| Ülke ismi | Çiçek ismi | Matematik işlemi | Hatırlamıyorum |

Self-paced

Noxu aşağıdaki kategorilerden hangisine aittir?

| Ölçüm aleti | Element | Renk çeşidi | Hatırlamıyorum |
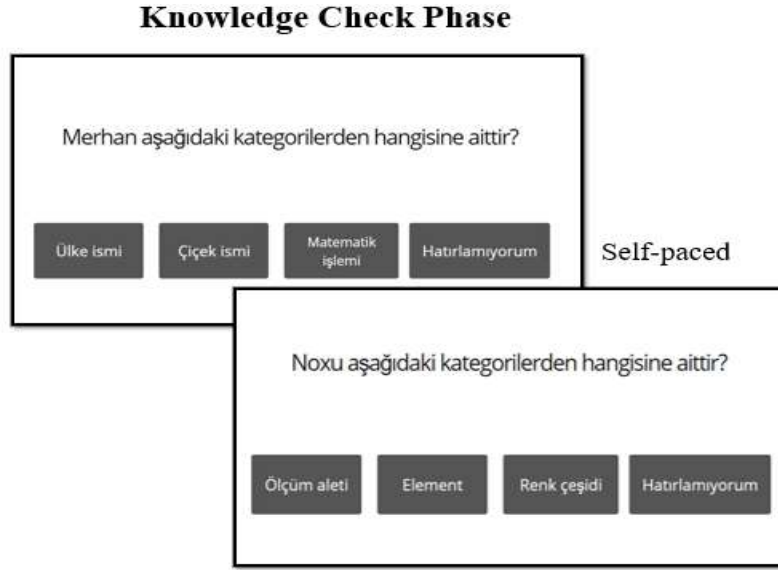
Figure 4. Schematic display of knowledge check trails in Experiment 2 and 3

4.4 Results

4.4.1 Familiarity ratings

Mean familiarity ratings for the category statements to be presented as congruent (M = 1.51, SD = .74) and incongruent (M = 1.53, SD = .79) fictitious fact statements showed that both type of category information was equally unfamiliar to participants. This result replicates the familiarity ratings of Experiment 1.

4.4.2 Retrieval practice

Each pseudoword in category statements repeated 3.76 times on average at the retrieval phase throughout Experiment 2, and there was no difference for the repetition of the category statements to be presented as old congruent (M = 3.79, SD = 2.36) and incongruent (M = 3.74, SD = 2.35) fictitious fact statements at the truth rating phase ($t(39)$ = .437, p = .662). This means that participants equally repeated the category statements for old congruent and old incongruent fictitious fact statements.

4.4.3 Truth ratings

Mean truth ratings were computed for each item type (Table 2). Truth ratings of old congruent statements ($M = 4.37$, $SD = .77$) were higher than the new ($M = 3.33$, $SD = .58$) and old incongruent ($M = 2.96$, $SD = .66$) statements (Figure 2). These ratings were analyzed as a function of item type (old congruent, old incongruent, new). A repeated measures one-way ANOVA revealed significant differences in truth ratings between the type of statements, $F(2, 78) = 68.701$, $MSE = .311$, $p < .001$, $\eta_p^2 = .638$. According to results of paired sample t-tests with Bonferroni correction, truth ratings of congruent statements were higher than new statements, $t(39) = 8.434$, $p < .001$, $d = 1.333$ and incongruent statements, $t(39) = 11.704$, $p < .001$, $d = 1.851$. Importantly, truth ratings for the incongruent statements were lower than the new statements ($t(39) = -2.858$, $p = .020$, $d = -.452$). These results showed that the illusory truth effect was due to both higher ratings given to the old congruent than the new fictitious fact statements, and lower ratings given to the old incongruent than new fictitious fact statements (for similar results, see Garcia-Marquez et al., 2015; Silva et al., 2017).
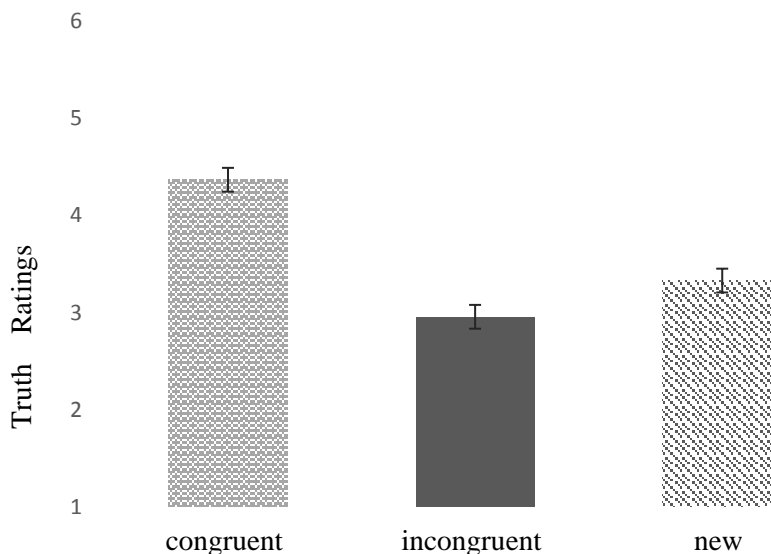
Figure 4. Mean truth ratings by item type (old congruent vs. old incongruent vs. new). Error bars display the standard errors of the means.

We conducted correlation analysis for each participant between the repetition time and truth ratings for the 32 categories and related fictitious fact statements. Results displayed similar pattern with Schwartz (1982); individual correlations between the repetition times and truth ratings in Experiment 2 showed no significant relationship for old congruent ($t(39) = .394, p = .696$) and old incongruent fictitious fact statements ($t(39) = .466, p = .737$).

4.4.4 Truth rating response times

Table 2 shows the descriptive statistics of response times for each item type. Median response times for truth ratings were computed; truth ratings for old congruent statements were allocated lesser time ($Mdn = 5080, SD = 1488$) than old incongruent statements ($Mdn = 6114, SD = 1798$), and new statements were allocated the least amount of time ($Mdn = 4939, SD = 1655$).

Median response times were analyzed as a function of item type (old congruent, old incongruent, new) in a within subject design. Results of one-way repeated measures ANOVA showed that participants' response times significantly differed between item types, $F(2, 78) = 20.747, MSE = 794058.868, p < .001, \eta_p^2 = .347$. Paired sample t-tests with Bonferroni correction revealed that response times for incongruent statements were significantly longer than congruent statements ($t(39) = 5.157, p < .001, d = .815$) and new statements ($t(39) = 5.568, p < .001, d = .880$). The difference between response times between old congruent and new statements was not significant ($t(39) = .762, p = 1.00$).

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Table 2

Mean (SD) of truth ratings and Median (SE) response times in milliseconds in Experiment 2

Item type	Truth ratings	Response times
congruent	4.37 (.78)	5080 (235)
incongruent	2.96 (.66)	6114 (284)
new	3.33 (.58)	4939 (261)

4.4.5 Knowledge check

Participants' recognition memory performance on the knowledge check task we placed at the end of the experiment was extremely high. Participants accurately recognized 95% of the 32 pseudoword categories ($M = 30.32$). Specifically, recognition performance of the participants for old congruent and old incongruent categories did not differ, $t(39) = .635$, $p = .529$.

4.5 Discussion

Experiment 2 showed that participants rated fictitious fact statements containing congruent details with the category statements as truer than the factual statements they encountered for the first time. Thus, participants showed the illusory truth effect. Importantly, old congruent fictitious fact statements were rated as less true compared to the new statements, as previous studies also showed (e.g., Bacon, 1979; Garcia-Marquez et al., 2015; Silva et al., 2017). Differentiation in truth ratings for old congruent and old incongruent fictitious fact statements showed that participants noticed the congruence and incongruence in the fictitious fact statements at the truth

rating phase and gave their ratings accordingly. However, if they used familiarity as a criterion for their truth judgments, ratings for the old congruent and the old incongruent fictitious fact statements should have been similar to each other and higher than the new fictitious fact statements (Garcia-Marquez et al., 2015). Therefore, the general picture of the truth ratings at the current experiment depicts that, participants utilized recollection in their truth judgments.

Response times for truth ratings showed that participants allocated significantly more time to rating the incongruent fictitious fact statements than old congruent and new ones. Therefore, current results suggest that the old congruent items did not create fluent processing while old incongruent items created disfluent processing.

Previous studies also showed that each repetition increases the effect size of the illusory truth effect; people believed that the given information was truer when it was repeated more than two times compared to the less repeated information (e.g., Hasher et al., 1977; Henkel & Mattson, 2011). These findings were not supported by the results of the current study; there was no significant correlation between the repetition of the category statements at the retrieval-practice phase and the truth ratings.

Current results are noteworthy in two ways. First, the illusory truth effect was replicated with a different manipulation, in which participants were presented with completely novel materials that they were lack of corresponding semantic references in their memory. Even Though Unkelbach and Rom (2017) employed similar material to see the effect of prior knowledge on the illusory truth effect by using

pseudowords, they repeated critical statements as exact verbatim repetition. However, our manipulation included partial repetition of category statements in which we also tested whether participants could notice congruence by recollecting the category information related to fictitious facts and give their truth ratings in accord with the recollected details. To our knowledge, this is the first demonstration of the illusory truth effect with this kind of material and manipulation.

Secondly, people showed a recollection-based illusory truth effect by noticing the congruence and incongruence of the factual statements only when the retrieval-practice phase was added. This result is important because it shows that the mere repetition of pseudowords does not affect people's truth judgments when they lack prior conceptual knowledge about the given information. In Experiment 1, the illusory truth effect was not obtained possibly because of the participants did not have any existing references for the novel information. Thus, we can emphasize that familiarity could only affect truth judgments when people have prior conceptual knowledge; similarly, Unkelbach and Rom (2017) argued in their *referential theory*.

CHAPTER V

EXPERIMENT 3

Studies show that both recollection and familiarity processes play a role in the illusory truth effect; however, their weight of impact changes as a function of time between study and truth rating phases. Garcia-Marquez and her colleagues (2015) showed that people could rely on both of these processes while judging the truthfulness of the given information. In their study, they assigned participants into two different time interval conditions; in one condition, participants gave truth ratings in the same session, whereas in another condition, participants gave truth ratings one week later. Their results showed that when participants were asked to rate the truthfulness of a given statement, they rely on recollection processes if the truth rating is obtained in the same session, and participants detect the contrasting details between the statements they were exposed to in the study phase and the truth rating phase. However, participants primarily relied on the familiarity processes in the one-week delay condition and gave their truth rating regardless of whether the statement was congruent with its original version or not. These results are essential since they showed that recollection and familiarity are not mutually exclusive regarding their effect on this illusion, yet people use both of these processes interchangeably as a function of time.

Given that, Experiment 3 was conducted with the aim of examining the effect of time on recollection and familiarity processes in the illusory truth effect. If one week is sufficient for the newly-learned information, pseudowords, and relevant category information to be forgotten, participants may depend more on familiarity than recollection for rating old congruent and incongruent fictitious fact statements. If recollection impairs after a week, participants should give higher truth ratings to old items than new items, independent of congruence with the category information. Thus, the recollection-based illusory truth effect obtained in Experiment 2 could change into the familiarity-based illusory truth effect when a longer time interval was placed between study and truth rating phases. However, if they could remember the pseudowords and their categories after one week, the findings should be similar to the same-session findings such that old incongruent fictitious fact statements should be assigned lower truth ratings than new fictitious fact statements, and old congruent fictitious fact statements should be assigned the highest truth ratings.

5.1 Participants

Sixty-seven students who did not participate in the pilot, Experiment 1 and 2 between the ages of 18 and 30 (Men; 11, $M_{age} = 22.37$, $SD = 2.94$), were recruited to experiment from Bilkent University and different Universities (e.g., Samsun 19 Mayıs University, Middle East Technical University, Boğaziçi University) either for course credit or gift card lottery. Due to the results of G*Power (Faul et al., 2007) number of the participants recruited to the current experiment was enough to observe the anticipated interaction within the current design (parameters: $\alpha = .05$, $1 - \beta = .80$, repeated measures correlation = .20)

We replaced three participants before analyzing the results; one of them did not return for the second session, two of them failed to follow instructions. Sixty-four participants were included in the analyses in total. All of them were native Turkish speakers.

5.2 Materials & Design

Experiment 3 was identical to Experiment 2; the only difference in this experiment was the addition of a new variable: time interval. The design was a 3 (item type: old congruent, old incongruent, new) x 2 (time interval: same-session retention vs. 1-week-retention) mixed design with the time interval as a between-subjects factor. We randomly assigned participants into two conditions. In the same-session retention condition, participants completed the truth ratings and recognition memory (knowledge check) task in the same session as the study and retrieval-practice phase. In the one-week retention condition, participants returned one week later for truth ratings and knowledge-check phases.

5.3 Procedure

The procedure of Experiment 3 in the same-session retention condition was identical to Experiment 2; for the one-week retention condition, we only excluded the distractor phase. In this condition, participants returned to the second session to complete the truth rating phase and the knowledge-check phase. Each participant in this condition was tested by the same experimenter in the second session as well. After completing the second session (one week later), participants were given a

debriefing and thanked. For the participants who did not return for the second

session, a debriefing document was sent to their e-mail addresses.

5.4 Results

5.4.1 Familiarity ratings

Participants' familiarity ratings for category statements were similar for the

categories of congruent (M = 1.45, SD = .41) and the incongruent fictitious fact

statements (M = 1.47, SD = .43) that were presented at the truth rating phase. These

ratings showed that participants were unfamiliar with the information we provided

them within the category statements at the study phase. This result is almost identical

to the familiarity ratings in Experiment 1 and 2.

5.4.2 Retrieval practice

Each pseudoword in category statements repeated 4.15 times on average at the

retrieval practice phase in same-session retention condition at Experiment 3, and

there was no difference between the repetition of the category statements to be

presented as old congruent (M =4.32, SD =2.65) and incongruent (M = 4.47, SD =

3.17) fictitious fact statements at the truth rating phase (t(31) = 1.173, p = .250). This

means that participants equally repeated the category statements for old congruent

and old incongruent fictitious fact statements.

Moreover, each pseudoword in category statements repeated 4 times on average at

the retrieval practice phase in the one-week retention condition. Category statements

to be presented as old congruent (M = 3.82, SD = 2.04) and incongruent (M = 3.99,

SD = 2.40) fictitious fact statements were repeated similarly, and there was again no

significant difference between the repetition time of the pseudowords and their categories for old congruent and old incongruent fictitious facts statements ($t(31) = 1.267$, $p = .215$).

5.4.3 Truth ratings

As Figure 3 depicts, old congruent statements ($M = 4.27$, $SD = .77$) received higher truth ratings than old incongruent ($M = 3.21$, $SD = .82$) and new statements ($M = 3.09$, $SD = .64$) across both same and one week retention conditions. Mean truth ratings (Table 3) were analyzed in a 3 (item type: old congruent, old incongruent, and new fictitious fact statements) x 2 (session: same-session retention and one-week retention) mixed ANOVA with the last factor as between-subject measures. Results of ANOVA revealed a main effect of item type, $F(2, 124) = 59.779$, $p < .001$, $n_p^2 = .491$ and a significant interaction between the item type and the session, $F(2, 124) = 4.205$, $p = .017$, $n_p^2 = .064$. Yet, the main effect of the session was not significant ($F(1,62) = 1.404$, $p = .241$). To understand the difference revealed in ANOVA paired sample t-tests with Bonferroni correction conducted. Results showed that truth ratings of old congruent fictitious fact statements were significantly higher than old incongruent ($t(63) = 8.991$, $p < .001$, $d = 1.124$) and new ($t(63) = 9.792$, $p < .001$, $d = 1.224$), fictitious fact statements across sessions. However, old incongruent fictitious fact statements were not rated falser than the new fictitious fact statements ($t(63) = .963$, $p = .339$, $d = 1.124$) in contrast to Experiment 2.

Table 3

Mean (SD) truth ratings and Median (SE) response times in milliseconds for each item type in Experiment 3 by truth rating session.

Item type	Truth ratings		Response times	
	Same-session	One-week Later	Same-session	One-week Later
congruent	4.51 (.79)	4.02 (.67)	5889 (284)	6312 (317)
incongruent	3.12 (.83)	3.31 (.82)	6965 (393)	6979 (451)
new	3.16 (.65)	3.02 (.64)	6059 (389)	6232 (393)

As Table 3 shows, lower truth ratings were given to old congruent statements in the one-week retention condition than the same session condition, explaining the significant interaction between the item type and session. A decrease in truth ratings could indicate the forgetting factor over the category information presented to the participants in the first session when participants gave a truth rating one week later (for similar results, see Silva et al., 2017).

Figure 5. Mean truth ratings by time interval (same-session retention vs. one-week retention) and item type (old congruent vs. old incongruent vs. new). Error bars display the standard errors of the means.

To test whether repeated exposure to critical category information inflated truth ratings for the fictitious fact statement related to them, we conducted a correlation analysis between the number of repetition and the truth ratings among each participant for the 32 statements. Results were similar to Experiment 2; we found no correlation between repetition in retrieval practice task and truth ratings for old congruent ($t(31) = .939$, $p = .355$) and old incongruent ($t(31) = -.889$, $p = .381$) for same-session retention. Similarly, there was no significant correlation between the repetition and truth ratings for old congruent ($t(31) = .611$, $p = .546$) and old incongruent fictitious fact statements ($t(31) = -1.667$, $p = .106$) either in one-week retention condition.

5.4.4 Truth rating response times

As Figure 4 depicts, median response times for old incongruent statements ($Mdn = 6972$, $SD = 2375$) were higher than old congruent ($Mdn = 6101$, $SD = 1706$) and new statements ($Mdn = 6146$, $SD = 2201$) across both same-session and one-week retention conditions. Median response times for truth ratings were analyzed in a 3 (item type: old congruent, old incongruent and new statements) x 2 (session: same-session retention and one-week retention) mixed ANOVA with the last factor as between subject measures. Results of ANOVA revealed a significant main effect of item type, $F(2, 124) = 15.387$, $p < .001$, $n_p^2 = .199$, yet, main effect of session was not significant $F(1,62) =. 172$, $p = .680$, $n_p^2 = .003$, and there was no significant interaction between item type and session $F(2, 124) = .678$, $p = .509$.

According to the results of the *t*-tests, we found that difference between the response times was because old incongruent fictitious fact statements rated in significantly longer time than the old congruent ($t(63) = 5.345$, $p < .001$, $d = .668$) and new ($t(63) =4.213$, $p < .001$, $d = .527$) fictitious fact statements. Yet, there was no significant difference between the response times of old congruent and new fictitious fact statements ($t(63) = .266$, $p = .791$), these statements rated in almost equal time.
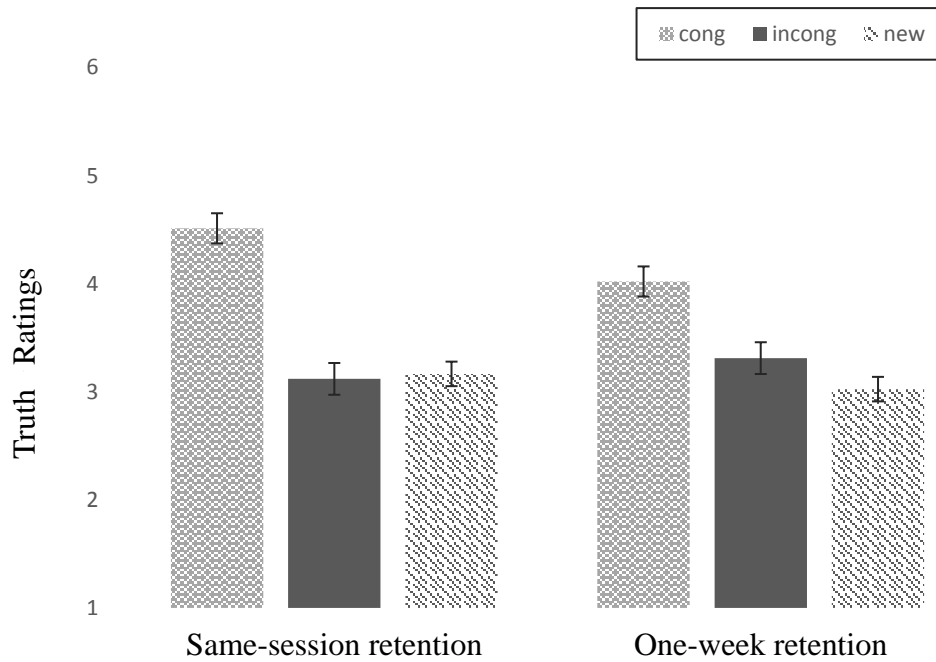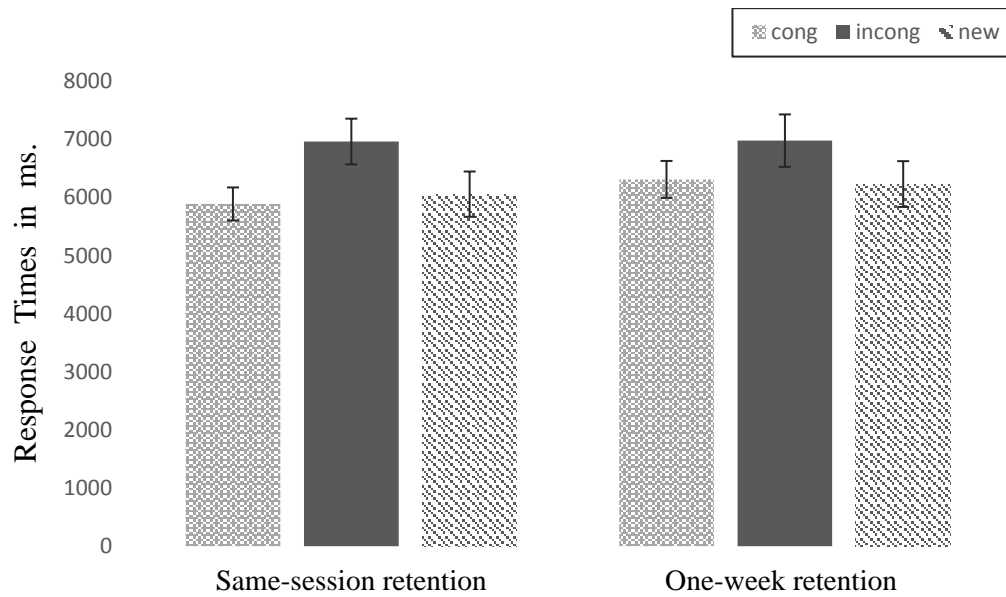
Figure 6. Median response times by time interval (same-session retention vs. one-week retention) and item type (old congruent vs. old incongruent vs. new). Error bars display the standard errors of the means.

5.4.5 Knowledge check

Participants' recognition memory performance on the knowledge check task was extremely high for the same-session retention condition. Participants recognized 96% of the 32 pseudoword categories correctly ($M = 30.72$). However, their accuracy dropped to 76% after one week ($M = 24.32$); participants in the one-week retention condition did not perform as accurately as participants in the same-session condition for 32 pseudoword categories.

Importantly, recognition performance for old congruent categories significantly better than the old incongruent categories $t(31) = 3.388$, $p = .002$, $d = .53$, in one-week retention condition. However, recognition performance between old congruent and old incongruent items did not differ in same-session retention condition $t(31) = 1.824$, $p = .078$.

5.4.6 Conditional analysis of truth ratings

Conditional truth ratings were also computed to see if the truth ratings differentiated between the correctly and incorrectly recognized category information across time (same-session retention vs. one-week retention). These analyses were conducted to understand how the forgetting factor affected truth ratings, especially in the one-week retention condition.

Truth ratings were computed for inaccurately recognized category information for each participant. The proportion of incorrect answers collected from each participant at the same-session retention condition was too low to conduct a meaningful analysis (N = 6); however, at the one-week retention condition, this proportion was enough (N = 26). When we computed the truth ratings for the one-week retention condition, truth ratings were similar for old congruent ($M = 3.40$, $SD = 1.09$) and old incongruent ($M = 3.35$, $SD = .88$) fictitious fact statements. A paired sample t-test revealed that this difference between truth ratings of old congruent and incongruent items were not meaningful ($t(25) = .191$, $p = .850$) in one-week retention condition.

Moreover, correlation analysis between the recognition memory performance and truth ratings was conducted to see whether memory for the category information was related to the perceived truth of the fictitious fact statements containing either congruent or incongruent semantic details. The result showed that memory performance and truth ratings of the participants were strongly correlated $r(24) = .62$, $p = .001$.

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5.5 Discussion

Experiment 3 showed that participants rated old congruent fictitious fact statements as truer than the old incongruent and new fictitious fact statements in both same-session and one-week retention conditions. Therefore, we successfully obtained the illusory truth effect. However, ratings given to old congruent items decreased about *.49* points in the one-week retention condition. When we compared these ratings with the knowledge check performance in the one-week retention condition, it is obvious that recollection of category information was also impaired. Due to that, it is possible that the drop in truth ratings was because of the impaired recollection. This particular assumption was reinforced by the results of conditional truth rating analysis. When we analyzed the truth ratings for the fictitious fact statements that related category information was not recognized, old congruent and old incongruent fictitious fact statements showed similar truth ratings. In other words, participants assigned the condition that they were required to give truth ratings after one week of initial exposure to category information gave almost equal truth ratings to statements containing old information regardless of their congruence with the category information. Importantly, this analysis implied that participants evaluated the truth value of the fictitious fact statements based on congruence between the semantic details in statements and the category information only when they could recollect the category information.

The influence of recollection was also observed when unconditional, and conditional truth ratings were compared; old congruent fictitious fact statements at the one-week retention condition received higher truth ratings ($M = 4.02$) than the conditional truth ratings ($M = 3.35$). Due to mean differences in old congruent fictitious fact

statements, conditional truth ratings implied that participants employed recollective process when deciding the truthfulness of the fictitious fact statements. However, in the case of forgotten category information, truth ratings for old congruent and old incongruent fictitious fact statements were almost equal. However, we could not conclude that these truth ratings were given based on familiarity since they were not higher than the ratings of the new items.

Response times for truth ratings formed a similar pattern to Experiment 2; incongruent fictitious fact statements were allocated longer time than old congruent and new ones significantly. This variability of response times may imply that remembering the initial category details and comparing them with the details in the current statement may require extra processes in which cause extra time for decision for the truth value for those statements.

Another important finding is that there was no correlation between the repetition and the truth ratings. Participants in both same and one-week retention conditions performed retrieval practice after the study phase, and they were presented with the category statements several times unless they provided the correct version of the pseudowords in those statements. When we analyzed the truth ratings for either old congruent or old incongruent fictitious fact statements, considering the repetition of category information related to them, we found no correlation between the repetition times of category information and the truth ratings given to related fictitious fact statements. So, statements related to more repeated categories did not receive higher truth ratings or vice versa. This particular finding is not in line with the previous studies showing that repetition of the critical material inflates truth ratings (Henkel &

Mattson, 2011; Dechêne et al., 2010; Begg et al., 1992). However, in the current study, similar results were also obtained for Experiment 2.

In the knowledge check phase, however, participants remembered category information that they presented with the congruent details better than the categories related to incongruent items in the one-week retention condition. However, their memory performance did not differ in the same-session retention condition for those item types. This specific result was intriguing considering that there was no significant difference in repetition time for congruent and incongruent category statements. Also, truth ratings and the repetition of category information were not correlated. One potential explanation for this result could be related to the conceptual fluency created by the congruent meaning that old congruent fictitious statements provided, that might help participants remember those categories better. Since conditional truth analysis showed that participants gave truth ratings based on the recollected details for old congruent fictitious fact statements, recollection of related category information might serve as extra retrieval practice for those statements as well.

CHAPTER VI

GENERAL DISCUSSION

6.1 Reminder of the Aims and the Results

The current study sought to understand how a lack of prior knowledge

(corresponding references) about the category information affects the perceived truth

of the statements containing congruent and incongruent semantic details related to

those initially presented categories. Another aim was to understand how the

contributions of recollection and familiarity to the illusory truth effect change when

truth ratings are delayed. Therefore, we tested whether the availability of the

corresponding references affects the perceived truth of related and novel information,

along with episodic representation theories of familiarity, by providing pseudowords

(Experiment 1). Moreover, we also examined whether we could obtain the illusory

truth effect after new references are integrated into the knowledge network by

manipulating the encoding efficiency with retrieval practice (Experiment 2). Lastly,

the role of recollection and familiarity processes in this illusion was examined with

time manipulation (Experiment 3).

Previous studies showed that the perceived truth of the repeated information is higher

than the novel information basically due to repetition-based familiarity (Fazio et al.,

2015; Fazio et al., 2020; Hasher et al., 1977; Garcia-Marquez et al., 2015; Parks & Toth, 2006; Scholl et al., 2014). Repetition is considered as the key factor producing this illusion regardless of the factual content of the repeated information (Fazio et al., 2015; Fazio et al., 2019). Yet, Unkelbach and Rom (2017) demonstrated this was not the case when people lack some corresponding references about the elements of the given statements. In line with their conclusion, Experiment 1 showed that if the category referent does not exist in one's knowledge network, just repetition did not produce the illusory truth effect. Particularly, statements having either congruent or incongruent semantic details with the studied category statements were not judged as truer than the new statements when participants lack of corresponding references. Therefore, Experiment 1 did not show the illusory truth effect due to undifferentiated truth ratings given to old and new materials. These results interpreted as when people lack corresponding references for some elements of an expression (i.e., pseudowords) and network binding them with related categories, one exposure with the critical material was not enough to observe repetition-based familiarity to repeated material, as opposed to claims of the episodic representation theories (e.g., Shiffrin & Steyvers, 1997).

Metacognitive studies generally use reaction time as a measure of fluency, and lower reaction times are considered as an indication of fluent processing (Castel et al., 2007; Mueller et al., 2016; Besken et al., 2019; Undorf et al., 2017). Response times of truth ratings in Experiment 1 displayed a similar pattern for old congruent, old incongruent, and the new fictitious fact statements; they were rated in equal time. Therefore, the lack of response time differences implies that when the category

referent (i.e., pseudowords) does not already exist in one's knowledge network, repetition of these cues does not necessarily produce processing fluency.

The results of Experiment 1, however, are supported by the assumptions of the referential theory of Unkelbach and Rom (2017). They specifically suggested that when the corresponding references for the semantic features of an expression did not exist in one's memory, the participant should evaluate the truth value of given information as "*do not know*" or "*unsure*". Yet, it is important to stress that these responses are highly related to the measurement scales employed in the study. Considering the claim of Unkelbach and Rom (2017) on the information having no conceptual references in the knowledge network, *"do not know"* or *"unsure"* responses can only be obtained with odd truth scales due to the lack of midpoint in even scales. Truth ratings obtained in Experiment 1 for old congruent ($M = 3.68$), old incongruent ($M = 3.57$) and new ($M = 3.61$) fictitious fact statements corresponds to a point in between the "*3 = possibly false*" and "*4 = possibly true*" responses. Considering that the current study used an even truth scale (6-point), these ratings would correspond to an "*unsure*" response on an odd scale as they suggested.

Experiment 2, however, showed that when the category referent was integrated into the knowledge network, the truth illusion may emerge. Particularly, when retrieval practice was added to the experimental procedure, this enabled participants to learn pseudowords and their categories. After, they used the category information while deciding about the truthfulness of the fictitious fact statements by using the congruence of the statements to the learned category information as a cue. So, in contrast to Experiment 1, participants in Experiment 2 used category information to

determine the truthfulness of the statements at truth rating phase. When they encountered factual statements having congruent and incongruent details with the category information, participants assigned lower truth ratings to old incongruent statements than the new statements. Besides, they assigned the highest truth ratings to old congruent statements compared to both old incongruent and new statements; hence, we obtained a recollection-induced illusory truth effect. Crucially, these findings again supported the conclusion of Unkelbach and Rom (2017) since Experiment 1 showed that mere repetition of the critical material is not enough to observe the illusory truth effect unless the category information is learned or already existed in one's semantic memory (Experiment 2).

When we pitted episodic representation theories against existing representation theories of familiarity, the results of the three experiments conducted in the current study are in favor of existing representation theories. Previous research investigating the mechanisms evoking a familiar feeling to repeated material employed basic materials as pseudowords, non-words, or shapes (respectively, Arndt et al., 2008; Gardiner & Java, 1990; Yonelinas & Jacoby, 1995), etc., and they provided supportive results for the episodic representation theories of familiarity. However, the materials of the current study were factual statements that contain quite detailed and complex information compared to those materials that the previous studies used. Regarding this distinction between the research materials of current and previous studies, it is possible that episodic representation theories may be more appropriate for explaining underlying processes of familiarity for more basic materials like words or shapes.

In Experiment 3, participants gave their truth ratings either in the same session or after a week; thus, how the contribution of familiarity versus recollection to the illusory truth effect changes as a function of time was examined. The results were quite similar when the truth ratings were given in the same session or after one week. Participants assigned to the same-session retention and one-week retention condition displayed a recollection-based illusory truth effect because, in both time intervals, they gave higher truth ratings to old congruent fictitious fact statements than old incongruent and new fictitious fact statements. For the one-week retention condition, these results were in line with the findings of Silva et al. (2017, Experiment 2) due to a similar pattern observed in between the truth ratings of paraphrased versions of contradictories and new statements. According to their results, participants rated contradictory paraphrase statements as true as new statements and less true than the exact repetition of studied statements when ratings were obtained after one week of initial session. They discussed these results within the scope of topic repetition and impaired recollection. In detail, they suggested that when both topic and the appearance of the repeated information changed (paraphrased contradictions), topic repetition was not enough to obtain the illusory truth effect for repeated statements in case of impaired recollection of original materials. Considering the materials used in the current study, old incongruent fictitious fact statements resemble their paraphrased contradictory statements because old incongruent statements were not providing the same meaning but only the topic, and due to repetition of the pseudowords from category statements, these statements were not similar to original statements in the appearance as well. In line with their arguments, Experiment 3 showed that after one-week retention of initial exposure, old incongruent fictitious fact statements were rated as true as the new ones, yet, ratings for old congruent

fictitious fact statements were rated truer than those. To conclude, it is possible that repetition of the topic after a delay of one week did not provide a salient cue for memory retrieval when the presented details did not match conceptually with the learned category information. So, participants did not differentiate the truth ratings for old incongruent and new fictitious fact statements.

For the same-session retention condition in Experiment 3, it was surprising that participants did not use recollection of the category information they learned at the beginning of the experiment for old incongruent fictitious fact statements in contrast to Experiment 2. Silva and her colleagues employed exact verbatim repetition, paraphrased versions of the original statements, and contradictory statements. Comparing the materials and repetition manipulation of the current study with Silva et al. (2017), pseudowords and the partial repetition manipulation (i.e., repetition of pseudowords) of the current study were more complex and required more effort than in their study. Considering that, it is possible that both partial repetitions of critical materials and detection of congruence required for truth ratings made it difficult to observe the illusory truth effect within Experiment 3 for old incongruent fictitious fact statements. This argument can be supported by the meta-analysis of Dechêne et al. (2010), reporting the partial repetition manipulation produces a smaller effect on the illusory truth effect.

When we compared Experiments 2 and 3 (for the truth ratings obtained in the same session) difference between these results may also be interpreted within the scope of processing fluency. Response times that we observed at Experiment 2 and 3 showed that participants allocated significantly longer time to old incongruent fictitious fact

statements than the old congruent items and new ones. From the perspective of fluency literature, it makes sense that old incongruent statements constitute the disfluent information processing and might require more effortful memory search to reject the truthfulness of these statements. In a similar vein, it is possible that old incongruent fictitious fact statements could require more mental effort for recollecting details of related category information; thus, participants might be reluctant to exert that effort for remembering the related category information. Moreover, previous studies show that people are prone to give true judgments (Unkelbach, 2007; Bond & DePaulo, 2008) even though they could recollect the factually correct information (Fazio et al., 2015; Fazio et al., 2020). As Gilbert (1991) also suggested that rejecting information is the second step and requires more mental processes, old incongruent statements in Experiment 3 might not be further processed than the new ones.

Due to the difference between the recognition performance of participants in same-session retention and the one-week retention condition at the knowledge check task, we observed that memory for the category information becomes more impaired as time passes. In order to clarify how the memory gets impaired through longer intervals, conditional analyses were performed to understand the influence of recollection on truth ratings, especially after one week of the initial exposure to category information. Results showed that when the category information was recollected, truth ratings were given due to the congruence between the semantic details of the factual statements and the category information. Yet, when only truth ratings of statements for which the related category information was not recognized, the ratings assigned to old incongruent and old congruent fictitious fact statements

approached each other in the one-week retention condition. In other words, participants gave almost equal ratings to the statements either having congruent ($M = 3.35$) or incongruent ($M = 3.32$) semantic details with the category information when they failed to retrieve the information.

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Overall, the current set of experiments showed that the referential theory is supported with the current results and these results are also in favor of existing representation theories of familiarity. We obtained compelling evidence regarding the deterministic effect of prior knowledge on the illusory truth effect. Experiments 1 and 2 demonstrated that when the category statements, having a pseudoword as the category referent, presented to the participants just one time, repetition of the category referent as a cue of the related category was not sufficient for obtaining the illusory truth effect (Experiment 1). However, when these pseudowords were learned through retrieval practice, newly learned information was used as a judgment criterion for the truth ratings, and ratings were given on the basis of recollection (Experiment 2). Moreover, the effect of the recollection on this illusion was observable after one week if the new material was efficiently learned (Experiment 3).

6.2 Limitations and Future Directions

Even though the current study contributed considerably, there are also some issues that further studies can examine in detail. To begin, the context that all the material presented in a counterbalanced way is suggested to decrease the effect size of the illusory truth effect (Silva et al., 2017; Dechêne et al., 2010). When all the repetition type manipulated in within-subject participants are thought to exposed all the cues that changes in the strength or appropriateness for to be a judgment criterion

(Whittlesea, 1993), thus, all of these cues are not considered in the same degree while giving the truth judgments.

Silva et al. (2017) manipulated both perceptual and conceptual similarity of the repeated materials with the original materials by creating contradictory and paraphrased versions of original statements. When they provided participants with all of these repetition manipulations in a within-subject design, the observed effect of the truth illusion was reduced. Comparing these results with the results of the between-subject design manipulations that they employed in the first experiment and the findings of the Garcia-Marquez et al. (2015), their conclusion apparently meaningful. According to Whittlesea (1993), mnemonic cues like fluency are interpreted as a judgment criterion unless it is considered as related to that judgment, and truth judgments are related to the semantic interpretation of the information in their nature. Therefore, cues stemming from conceptual manipulations are more relevant sources to truth judgments than cues stemming from perceptual manipulations. When these two types of cues are provided together as in heterogeneous context, perceptual fluency-related cues became irrelevant to the truth judgments, compared to conceptual fluency-related cues (Dechêne et al., 2010). Therefore, again why there was no difference between the ratings of old incongruent and new fictitious fact statements in Experiment 3 might be related to the within-subject manipulation we employed. In this scenario, congruent details might encourage the use of recollective processes, while incongruent details failed to do so. Therefore, for future studies investigating the difference that between-subject and within-subject design regarding the illusory truth effect would provide fruitful results.

Another hypothetical limitation of the current study is the sampling pool. Experiments 1 and 2 used the same sampling pool as Bilkent University students; however, Experiment 3 recruited participants from different sampling pools like participants of a variety of students in other universities. With this in mind, we argue that the motivational tendencies of the participants recruited from different universities may differ from each other as well. Since recollection of details about the past encounters with certain material is an effortful and conscious process, disfluency might decrease this motivation for old incongruent fictitious fact statements and could also be affected by the current motivation of participants.

Previous studies also showed that when the critical items are repeated more than one time, truth ratings for those items also increased steadily (Hassan & Barber, 2021; Koch & Zerback, 2013; Henkel & Mattson, 2011). Compared the results of Experiment 2 and 3 with those previous studies, it is intriguing that we have found no correlation between the number of repetitions and the truth ratings. However, these results brought some important points into the discussion. Previous studies exactly repeated the critical statements several times, while in the current study, only category information was repeated several times in the retrieval practice task. With this manipulation, we intended to create corresponding references for pseudowords and link them with the category information. Further, we tested that whether participants use this newly learned information for detecting congruence at the truth rating phase. This distinction between current and previous studies is crucial and implies that exact verbatim repetition for an expression having elements relying on existing semantic references in memory inflates the truth rating while repeating an

expression having some elements that are not corresponding to an existing semantic reference does not. Moreover, this retrieval practice task that participants were exposed to critical items repeatedly enabled them to learn and create concept nodes for novel information and they used this information as a basis for the upcoming truth evaluation. However, how lack of prior knowledge affects the relation between the repetition and truth ratings is still an open question and requires further research to examine this issue with different repetition manipulations and materials.

The repetition-induced illusory truth effect shows that these judgments are affected by personal interpretations more than factual knowledge (Fazio et al., 2015; Fazio et al., 2019). Therefore, understanding metacognitive processes in the illusory truth effect are also important to assess the relationship between the metacognitive awareness on memory processes underlying this illusion. Memory processes, namely recollection, and familiarity, were repeatedly shown that underly the illusory truth effect (Hasher et al. 1977; Bacon, 1979; Begg et al. 1985; Arkes et al., 1991; Fazio et al., 2015; Pennycook et al. 2018; Hassan & Barber, 2021), and researchers have frequently recruited remember/know the procedure to measure these processes (e.g., Rajaram & Geraci, 2000; McCabe & Balota, 2007; McCabe et al., 2011).

Remember and know judgments are suggested to be governed by different memory systems as episodic and semantic memory, respectively (Tulving, 1985). To gauge recollection and familiarity processes when participants indicated that they had seen an item before, they were asked whether they "Remember" and "Know" the items (Rajaram & Geraci, 2000). "Remember" judgment refers to recollection and indicates that participants had an episodic experience of having seen the item before,

whereas "know" judgments are indicative of a feeling of familiarity without having the exact episodic experiential details (Yonelinas et al. 1998). It is also shown that Know judgments are affected by conceptual fluency more than the Remember judgments (Rajaram & Geraci, 2000). In Experiment 3, participants showed impaired recollection for initially presented category information, and this also affected the truth ratings. Regarding that, especially after one week of initial exposure, asking participants whether they actually recollect the initial details or just feel familiar with the repeated information might produce insightful results for further understanding on the effect of awareness of these memory processes in the illusory truth effect.

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APPENDICES

A. LIST OF PSEUDOWORDS IN EXPERIMENT 1, 2 AND 3

Pseudowords

1. Unelid	2. Septian	3. Uagi
4. Soloren	5. Cübuz	6. Intelna
7. Aleressa	8. Oapa	9. Sislaf
10. Lisun	11. Fazimol	12. Nekavin
13. Noxu	14. Çenjin	15. Suhanik
16. Uzalgi	17. Oahi	18. Ahuss
19. Yanpoka	20. Danguç	21. Gorealm
22. Chumpati	23. Osale	24. Vasco
25. Krage	26. Ötrüz	27. Ahoks
28. Futheci	29. Gürvet	30. Çernik
31. Tarjest	32. Belluna	33. Satkavon
34. Avaks	35. Peption	36. Pruvia
37. Utukan	38. Merhan	39. Hüdyen
40. Hexteria	41. Hysleria	42. Gumonce
43. Sculus	44. Emalin	45. Denples
46. Sorson	47. Mulpir	48. Ebbare
49. Mosatik	50. Salzasin	51. Dergad
52. Hazimice	53. Kornuz	54. Polder

55. Etalar	56. Opsak	57. Bonnane
58. Aferj	59. Risula	60. Mahrif
61. Zanon	62. Cospara	63. Sophile
64. Bonya		

A.1 EXCLUDED PSEUDOWORDS

Pseudowords

1. Amest	2. Evalür	3. Teputa
4. Bocilile	5. Ahizm	6. Fasiduz
7. Husket	8. Uaka	9. Nelazon
10. Rizon	11. Ulgamru	12. Nelayân
13. Grob	14. Zegan	15. Uliratha
16. Pesker	17. Niporan	

B. LIST OF CATEGORIES IN EXPERIMENT 1, 2 AND 3

Categories from Van Overshelde et al. (2004)	New categories
1. A precious stone	1. A member of diplomacy
2. A unit of time	2. A type of clothes
3. A relative	3. A harbor name
4. A unit of distance	4. A measuring instrument
5. A metal	5. A poisonous animal
6. A type of reading material	6. A fairytale character
7. A military title	7. A rodent
8. A four-footed animal	8. A planet satellite
9. A type of fabric	9. A type of money given by government
10. A color	10. A war strategy
11. A kitchen utensil	11. A language
12. A building for religious services	12. A historical event
13. An article of furniture	13. A medical procedure
14. A fruit	14. A knitting technique
15. A weapon	15. A kind of shellfish
16. A type of dwelling	16. A kind of fragrance
17. An alcoholic beverage	17. An ancient city name
18. A country	18. A sports equipment
19. A crime	19. A dessert name
20. A member of clergy	20. A mathematical operation

21. A substance for flavoring food

22. An occupation or profession

23. A natural earth formation

24. A sport

25. A weather phenomenon

26. A chemical element

27. A musical instrument

28. A kind of money

29. A type of music

30. A bird

31. Non-alcoholic beverage

32. A type of dance

33. A vegetable

34. A type of footwear

35. An insect

36. A flower

37. A disease

38. A tree

39. A type of ship/boat

40. A snake

41. A college or university

42. A drug

43. A liquid

44. A thing made of wood

45. A football team name

21. A mythological creature

22. A kind of make-up material

23. A method of meditation

24. A type of bacteria

25. A game rule

26. An ancient religious belief

27. A dessert

28. A kind of cutting tool

29. A rugby penalty

30. A communication tool

31. A festival name

32. A flying vehicle

33. A kind of chemical

46. A gardener's tool

47. A carpenter's tool

48. A part of a building

B.1 EXCLUDED CATEGORIES

1. A part of a building	2. A kind of cutting tool
3. A communication tool	4. A tree
5. A carpenter's tool	6. An ancient religious belief
7. A type of bacteria	8. A method of meditation
9. A weather phenomenon	10. A natural earth formation
11. A building for religious services	12. A type of reading material
13. A metal	14. An alcoholic beverage
15. A kind of chemical	16. A game rule
17. A natural earth formation	

C. LIST OF CATEGORY STATEMENTS IN EXPERIMENT 1, 2 AND 3

Category statements

1. Unelid değerli bir taştır.	2. Mosatik bir yılan türüdür.
3. Soloren bir askeri ünvandır.	4. Septian bir meslek türüdür.
5. Aleressa bir liman ismidir.	6. Cübuz bir spor dalına verilen isimdir.
7. Lisun bir kumaş türüdür.	8. Oapa bir kıyafet türüdür.
9. Noxu bir renktir.	10. Fazimol bir tür elementtir.
11. Uzalgi bir mutfak aletidir.	12. Çenjin bir tür müzik enstrümanıdır.
13. Yanpoka bir mobilya ismidir.	14. Oahi bir müzik türüdür.
15. Chumpati bir meyvedir.	16. Danguç bir kuş türüdür.
17. Krage bir silah türüdür.	18. Osale alkolsüz bir içecek çeşididir.
19. Futheci siyasetçilere verilen bir isimdir.	20. Ötrüz bir dans türüdür.
21. Tarjest bir tür barınaktır.	22. Gürvet bir tür sebzedir.
23. Avaks uçan bir araca verilen isimdir.	24. Belluna bir ayakkabı çeşididir.
25. Utukan bir akrabalık derecesidir.	26. Peption bir böcek türüdür.
27. Hexteria bir ülke ismidir.	28. Merhan bir tür çiçek ismidir.
29. Sculus bir tür suça verilen isimdir.	30. Hysleria bir hastalık ismidir.
31. Sorson din adamlarına verilen bir isimdir.	32. Emalin bir tür uyuşturucu maddedir.
33. Mulpir bir balık türüdür.	34. Suhanik bir tür baharattır.
35. Salzasin bir çeşit teknedir.	36. Ahuss odundan yapılmış bir şeye verilen isimdir.
37. Uagi bir zaman birimidir.	38. Gorealm dört ayaklı bir hayvandır.

39. Intelna bir üniversite ismidir.

40. Vasco bir futbol takımıdır.

41. Sislaf bir ölçüm aletidir.

42. Ahoks Rugbyde bir cezadır.

43. Nekavin sıvı bir maddedir.

44. Çernik bir tür bahçıvan aletidir.

45. Satkavon zehirli bir hayvanı türüdür.

46. Zanon bir tür eski para birimidir.

47. Pruvia bir masal kahramanıdır.

48. Kornuz bir örgü tekniğidir.

49. Hüdyen bir uzaklık birimidir.

50. Opsak bir deniz kabuklusudur.

51. Gumonce bir kemirgen türüdür.

52. Risula bir tür koku vericidir.

53. Denples bir gezegen uydusunun ismidir.

54. Cospara bir antik şehir isimdir.

55. Ebbare devlet tarafından verilen bir paradır.

56. Polder bir spor aletidir.

57. Dergad bir savaş taktiğidir.

58. Bonnane bir tatlı ismidir.

59. Hazimice bir dildir.

60. Mahrif bir matematik işlemidir.

61. Etalar tarihi bir olaydır.

62. Sophile bir mitolojik canlıdır.

63. Aferj tıbbi bir operasyondur.

64. Bonya bir tür makyaj malzemesidir.

D. LIST OF FICTITIOUS FACT STATEMENTS IN EXPERIMENT 1, 2, AND 3

Congruent Fictitious Statements	Incongruent Fictitious Statements
1. Unelid Avrupa pazarında yüksek rakamlara satılır.	Unelid Avrupa pazarında çok düşük rakamlara satılır.
2. Soloren 12. yüzyıl Britanya'sında savaştan başarıyla dönen şövalyelere verilirdi.	Soloren 12. yüzyıl Britanya'sında duvar resimleri yapan sanatçılar için kullanılırdı.
3. Aleressa Güney Avrupa'da büyük gezi yatlarının dinlenme rotasında yer alır.	Aleressa Güney Avrupa'da büyük motosiklet turlarının rotasında yer alan bir dağdır.
4. Lisun Asya'da sadece imparatorluk ailesinin kıyafetlerinin yapımında kullanılırdı.	Lisun Asya'da sadece imparatorluk ailesinin evlerinin yapımında kullanılırdı.
5. Noxu masallarda geçen ve ölümlülerin göremeyeceği söylenen bir tona sahiptir.	Noxu masallarda geçen ve ölümlülerin duyamayacağı söylenen bir melodiye sahiptir.
6. Uzalgi arkeolojik kazılarda bulunmuş ve yemek yapmak için kullanıldığı düşünülmüştür.	Uzalgi arkeolojik kazılarda bulunmuş ve bebekleri sırtta taşımak için kullanıldığı düşünülmüştür.
7. Yanpoka Eskimo kültüründe misafire özel yatak olarak kullanılır.	Yanpoka Eskimo kültüründe kalın buzun kırımında kullanılır.

8. Chumpati eski Aztek yazıtlarında yabani çilek olarak geçer.

Chumpati Eski Aztek yazıtlarında ambar olarak geçer.

9. Krage Birinci Dünya Savaşı zamanında Almanlar tarafından bombalamada kullanılmıştır.

Krage Birinci Dünya Savaşı zamanında Almanlar tarafından hazırlanmış antlaşmalardandır.

10. Futheciler Türk beyleri tarafından meclis ve devlet yönetiminde görevlendirilirdi.

Futheciler Türk beyleri tarafından özellikle meclis toplantılarında giyilirdi.

11. Tarjest tayga ormanlarında bir kuş türü tarafından sarmaşıklardan yapılır ve yuva olarak kullanılır.

Tarjest tayga ormanlarında bir kuş türü tarafından sarmaşıklardan toplanır ve beslenme amaçlı tüketilir.

12. Avaks pervaneleri sayesinde havada yükselip ilerleyebilen bir sisteme sahiptir.

Avaks dönen pervaneleri sayesinde su altında ilerleyebilen bir sisteme sahiptir.

13. Utukan Hitit dilinde ailenin en yaşlı ferdi için kullanılırdı.

Utukan Hitit dilinde sınır köylerini ifade etmek için kullanılırdı.

14. Hexteria La Fontaine masallarında bahsi geçen zenginlikler diyarıdır.

Hexteria La Fontaine masallarında bahsi geçen fakir bir köydür.

15. Sculusun cezası Vatikan engizisyonu tarafından canlı olarak yakılmaktı.

Sculus Vatikan hükümeti tarafından para verilerek ödüllendirilirdi.

16. Sorson Göktürk'lerde Kağan'ın karar vermesi için danıştığı diyanet üyesidir.

Sorson Göktürk'lerde kağanın karar vermesi için danıştığı askeriye üyesidir.

17. Mosatikler çölde kumun altına

Mosatikler çölde deve yolu ile önemli

saklanarak avlarını beklerler açık sarı renktedirler.

tıbbi malzemelerin ticaretini yaparlar.

18. Septian 19. yüzyıl Avrupa'sında rahip-doktorlara denirdi.

Septian 19. yüzyıl Avrupa'sında kan alma aletine denirdi.

19. Cübuz Kıpçak Türklerinde toprak zeminde güreşe benzer şekilde oynanır.

Cübuz Kıpçak Türklerinde toprağın bereketini arttırmak için seremoniyle yakılır.

20. Oapa Afrika toplumlarında zenginler tarafından düğünlerde giyilir.

Oapalar Afrika toplumlarında zenginler tarafından düğünlerde çalıştırılırlar.

21. Fazimol tadı kokusu ve rengi olmayan bir soy gazdır.

Fazimol tadı kokusu ve rengi olmayan asidik bir bileşimdir.

22. Çenjin Orta Asya'da ozanlar tarafından kahramanlık hikayeleri anlatılırken çalınır.

Çenjin Orta Asya'da ozanlar tarafından kahramanlık hikayelerini anlatırken takılır.

23. Oahi Amerikan yerlilerinin vurmalı çalgılarla yaptığı törenlerden türemiştir.

Oahi Amerikan yerlilerinin törenlerinde taktıkları takılardan türemiştir.

24. Danguçlar yüksek ağaç tepelerine yaptıkları yuvalar ve geniş kanatları ile tanınırlar.

Danguçlar yüksek ağaç tepelerine tırmanışları ve hızlı koşuşlarıyla tanınırlar.

25. Osale Japon'lara özgüdür ve ham orman meyvelerinin suyu sıkılarak yapılır.

Osale Japon'lara özgüdür ve ham orman meyvelerinin yaprakları sarılarak yapılır.

26. Ötrüz Kırgız düğünlerinde halay

Ötrüz Kırgız düğünlerinde gelin

benzeri bir koreografiyle sergilenir.

tarafından bereket için kırılır.

27. Gürvet killi toprakta yetişir ve kökleri et yemeklerinde kullanılır.

Gürvet killi toprak altlarında toplanır ve eğimli yamaçlardan nehre akar.

28. Belluna Latin dansçıları tarafından giyilir ve topukları tok bir ses çıkartır.

Belluna Latin şarkılarında geçişleri belli etmek için çalınır ve tok bir ses çıkarır.

29. Peption larvaları ağaç kabukları arasında koloniler halinde yaşar.

Peption ağaç kabukları arasında büyüyen bir mantardan şifa vermek için yapılır.

30. Merhân baharın gelmesi ile birlikte kurak topraklarda yeşerir ve kısa sürede açar.

Merhân baharın gelmesi ile birlikte kurak topraklarda esmeye başlar.

31. Hysleria kişiden kişiye kan yolu ile bulaşan bazı mikroplardan kaynaklanır ve ölümcül olabilir.

Hysleria kişiden kişiye kan yolu ile buluşan bazı mikroplarla savaşmada kullanılır.

32. Emalin kişide kısa süreli halüsinojen etki yaptığından bazı tarikatlarca kullanılır.

Emalin kısa sürede gürleştirici etki yaptığından saç bakım ürünlerinde kullanılır.

33. Mulpirler sıcak denizlerde mercan çevrelerinde koloniler haline yaşarlar.

Mulpirler sıcak denizlerde küçük balıkların saklandığı mercan adalarını oluştururlar.

34. Salzasin buz denizlerinde ilerleyebilecek bir şekilde balık tutmak için geliştirilmiştir.

Salzasin buz denizlerinde görülen balıkları gözlemlemek için dürbün olarak kullanılır.

35. Uagi Maori kabilelerinin dilinde saniye kelimesine karşılık gelir.

Uagi Maori kabilelerinin dilinde ekmek kelimesine karşılık gelir.

36. Intelna doğa içinde dağınık kampüs yerleşkelerinden oluşur.

Intelna doğa içinde dağınık bir katedral ve kiliselerden oluşur.

37. Sislaf büyük yüklerin tartılmasında kullanılır ve elektrikle çalışır.

Sislaf büyük yüklerin paketlenmesinde kullanılır ve elektrikle çalışır.

38. Nekavin kaynatıldığında buharı zehirleyici bir özelliğe sahiptir.

Nekavin elmasa yakın sertlikte olduğundan kırılması çok zordur.

39. Suhanik Persler tarafından yemeklere acı tat vermek için kullanılırdı.

Suhanik Persler tarafından geometrik ölçüm yapmak için kullanılırdı.

40. Ahuss İskoçların ölülerini gömmek için kullandığı bir çeşit ahşap tabuttur.

Ahuss İskoçların ölülerini gömmek için kullandığı bir çeşit mermer ahittir.

41. Gorealm orta dünya literatüründe yer alan fantastik bir kurttur.

Gorealm orta dünya literatüründe yer alan bir fantastik bir kuştur.

42. Vasco Meksika liginde yer alır ve başarılı bir kadroya sahiptir.

Vasco Meksika liginde özel başarı gösteren oyunculara denir.

43. Ahoks alan oyuncu beli bir süre boyunca maçlara katılamaz.

Ahoks oyuncuların kondisyonlarını arttırma amacıyla uygulanır.

44. Çernik Doğu Anadolu köylerinde ekin biçmek için kullanılır.

Çernik Doğu Anadolu köylerinde ekinlerde gübre olarak kullanılır.

45. Satkavon sert dikenli ve ufak bir gövdeye sahiptir ve iğnesi

Satkavon dikenli kaktüs benzeri bir gövdeye sahiptir ve kurak topraklarda

ölümcüldür.

yetişir.

46. Pruvia Hansel ve Gratel'de onları yemeye çalışan cadının ismidir.

Pruvia Hansel ve Gratel'de onların kaybolduğu ormanın ismidir.

47. Hüdyen Mısır'da çölde iki kervan arası mesafeyi ifade etmek için kullanırdı.

Hüdyen Mısır'da iki ay dönümü arasındaki gün sayısını ifade etmek için kullanılırdı.

48. Gumonce adındaki faremsi bu türün Buzul Çağı'nda soyu tükenmiştir.

Gumonce adındaki bambumsu bu türün Buzul Çağı'nda soyu tükenmiştir.

49. Denples Jüpiter'in etrafında dönüşünü ortalama iki yılda tamamlar.

Denples Jüpiter'in üzerindeki lav çukurlarında yoğuşma nedeniyle oluşur.

50. Ebbare bursu Osmanlı'da belli yaşa gelen öksüzlere verilirdi.

Ebbare Osmanlı'da asgari görevini yerine getirmemiş öksüzlere uygulanırdı.

51. Dergad yöntemi Hunlar tarafından Çinlilerle girdikleri muharebelerde kullanılmıştır.

Dergad Hun'lar tarafından Çin'lilerle girdikleri ticari ilişkilerde kullanılmıştır.

52. Hazimice gramer ve fonetik yapı olarak Göktürkçe'ye benzer.

Hazimice ölçü ve uyak yapısı olarak Divan şiirlerine benzer.

53. Etalar ayaklanması Kral Justinian zamanında Konstantinapolis'te soylular tarafından çıkarılmıştır.

Etalar mahkemeleri Kral Justinian zamanında Konstantinapolis'te yer alan tapınak benzeri yapılardı.

54. Aferj Orta Çağ karanlık dönemlerinde anestezi olmadan

Aferj Orta Çağ karanlık dönemlerinde makineler olmadan üretilirdi.

yapılırdı.

55. Zanon şehir devletleri tarafından ticarette alım satım aracı olarak kullanılmıştır.

Zanon şehir devletlerinde gemi güzergahlarını düzenleme aracı olarak kullanılmıştır.

56. Kornuz göçebe Türk boylarında kilim işlemek için bir teknik olarak kullanılırdı.

Kornuz göçebe Türk boylarında çömlek yapmak için tezgah olarak kullanılırdı.

57. Opsaklar yumurtlamak için yüzerek soğuk okyanus akıntılarını takip ederler.

Opsaklar yavrulamak için uçarak sıcak iklimlere göç eder.

58. Risula tütsüsü yogiler tarafından meditasyonda kullanılır.

Risula çalgısı yogiler tarafından meditasyonda kullanılır.

59. Cospara kenti Antalya taraflarında yapılan yeni kazılarda ortaya çıkarılmıştır.

Cospara Antalya taraflarında yeni kazılarda parşömenler halinde çıkarılmıştır.

60. Polder uzun atlama ve cirit atma gibi müsabakalarda sopa olarak kullanılır.

Polder uzun atlama ve cirit gibi müsabakalarda süre tutmakla görevlidir.

61. Bonnane İtalyanlara özgüdür, hamur, şeker ve kremayla yapılır.

Bonnane İtalyanlara özgüdür ve acı mevsim sebzeleriyle yapılır.

62. Mahrif Farsça'da kartezyen çarpım işlemine verilen isimdir.

Mahrif Farsça'da evani türü çini sanatına verilen isimdir.

63. Sophile'in insanların rüyalarına girip ruhlarını çaldığına inanılırdı.

Sophile sendromu insanların rüyalarında gördüklerini gerçek sanmasıyla tanımlanır.

64. Bonya yaban mersini özünden yapılır ve dudakları renklendirmek için kullanılır.		Bonya Huş ağacından çıkarılıp şarap fıçısı yapımında yapıştırıcı olarak kullanılır.

E. PSEUDOWORDS IN PILOT EXPERIMENT WITH TRUTH RATINGS

Category congruent pseudowords	Mean	Category incongruent pseudowords	Mean
1. Nelazon	4,85	1. Mosatik	1,68

2.	Nelayân	4,74	2.	Satkavon	1,68
3.	Lisun	4,5	3.	Opsak	1,71
4.	Oapa	4,97	4.	Nekavin	1,76
5.	Hysleria	4,82	5.	Ahuss	1,79
6.	Osale	4,68	6.	Zanon	1,82
7.	Soloren	4,65	7.	Salzasin	1,88
8.	Uagi	4,71	8.	Mahrif	1,88
9.	Pesker	4,88	9.	Aleressa	1,88
10.	Rizon	4,47	10.	Dergad	2
11.	Oahi	4,41	11.	Pruvia	2
12.	Tarjest	4,26	12.	Aferj	2,12
13.	Futheci	4,47	13.	Ebbare	2,15
14.	Belluna	4,85	14.	Çernik	2,15
15.	Gürvet	4,68	15.	Kornuz	2,18
16.	Fasiduz	5,06	16.	Vasco	2,26
17.	Yanpoka	4,88	17.	Sislaf	2,41
18.	Hexteria	3,88	18.	Bonya	2,47
19.	Sculus	4,47	19.	Risula	2,47
20.	Krage	4,71	20.	Polder	2,47
21.	Cübuz	4,65	21.	Etalar	2,53
22.	Evalür	4,82	22.	Bonnane	2,56
23.	Utukan	4	23.	Denples	2,56
24.	Fazimol	4,44	24.	Cospara	2,68
25.	Septian	4,62	25.	Intelna	2,68
26.	Peption	4,59	26.	Avaks	2,68

27. Sorson	4,76	27. Hazimice	2,68
28. Danguç	4,85	28. Gumonce	2,76
29. Noxu	4,03	29. Ahoks	2,85
30. Teputa	4,76	30. Sophile	2,88
31. Çenjin	4,88	31. Mulpir	2,97
32. Ötrüz	4,97	32. Emalin	3
33. Uliratha	4,09	33. Hüdyen	3,18
34. Grob	4,91	34. Uaka	3,24
35. Chumpati	4,79	35. Niporan	3,29
36. Uzalgi	4,68	36. Ahizm	3,38
37. Gorealm	3,91	37. Husket	3,59
38. Suhanik	4,82	38. Bocilile	3,62
39. Merhân	4,82	39. Ulgamru	3,71
40. Unelid	4,56	40. Zegan	3,74
		41. Amest	3,94