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THE EFFECT OF REPEATED EXPOSURE, PICTURE PRESENCE AND
CONTEXT REINSTATEMENT ON TRUTH JUDGMENTS

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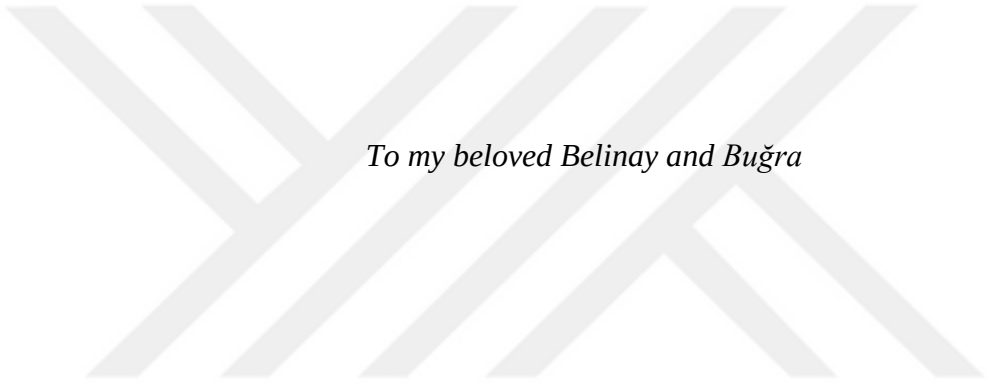
THE EFFECT OF REPEATED EXPOSURE, PICTURE PRESENCE AND
CONTEXT REINSTATEMENT ON TRUTH JUDGMENTS

A Master's Thesis

by

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The Department of Psychology
İhsan Doğramacı Bilkent University
Ankara
September 2022



To my beloved Belinay and Buğra

THE EFFECT OF REPEATED EXPOSURE, PICTURE PRESENCE AND
CONTEXT REINSTATEMENT ON TRUTH JUDGMENTS

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

by

Elif Hilal Kurt

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THE DEPARTMENT OF
PSYCHOLOGY
İHSAN DOĞRAMACI BİLKENT UNIVERSITY
ANKARA

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By Elif Hilal Kurt

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Psychology.

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ABSTRACT

THE EFFECT OF REPEATED EXPOSURE, PICTURE PRESENCE AND CONTEXT REINSTATEMENT ON TRUTH JUDGMENTS

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With the spread of fake news on social media platforms, it becomes critical to unveil the factors that might influence our truth judgments. Previous research showed that repeated exposure and picture presence can bias individuals to believe that the information is true. However, when frequent social media postings are taken into consideration, there are three issues that need to be specified further in order to understand the underlying mechanisms of our truth judgments. The first is to investigate whether repeated exposure of pictures increases truth ratings or not. Second, it is important to uncover the joint effects of repetition and picture presence on truth judgments as it can be frequently seen in social media postings. Third, little is known about how a detail change (e.g., accompanying picture) in repeated information is reflected on truth judgments. In a series of three experiments, we aimed to find an answer for the abovementioned questions. In Experiment 1, we tested whether prior exposure to pictures would increase truth ratings for the associated statements. The repetition of pictures did not increase truth ratings but their mere presence did. In Experiment 2, we explored the simultaneous effect of

repetition and picture presence on truth judgments. Contrary to Experiment 1, repetition of statements increased truth ratings but the presence of pictures did not produce a significant change. Finally, Experiment 3 aimed to understand whether a context change (e.g., picture details) in the repeated information would affect truth ratings or not. As a manipulation, either a detail was changed in the accompanying picture (changed context) or it was repeatedly exposed with the same picture (reinstated context). The results showed that statements with reinstating context were given higher truth ratings than statements with changed context. The results and the future research are discussed in the context of the truthiness effect, the illusory truth effect and the context reinstatement.

Keywords: the illusory truth effect, the truthiness effect, context reinstatement, truth judgment

ÖZET

TEKRARLI GÖSTERİM, FOTOĞRAF VARLIĞI VE BAĞLAM DEĞİŞİKLİĞİNİN DOĞRULUK YARGILARI ÜZERİNDEKİ ETKİSİ

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Yalan haberlerin sosyal medya platformlarında yaygınlaşması sonucunda doğruluk yargılarımızı etkileyebilecek faktörleri ortaya çıkarmak kritik bir hale gelmiştir. Önceki araştırmalar, tekrarlı gösterimin ve bilgiye eşlik eden resimlerin, bireyleri bilginin doğru olduğuna inanmaya yönetebileceğini göstermektedir. Ancak sık sık rastlanılan sosyal medya paylaşımları göz önüne alındığında, doğruluk yargılarımızın altında yatan mekanizmaları anlamak için incelenmesi gereken üç konu vardır. Birincisi, bilgiye eşlik eden fotoğraflara tekrarlı bir şekilde maruz kalmanın doğruluk yargısını artırıp artırmadığını araştırmaktır. İkinci olarak, günlük hayatta yaygın olarak karşılaştığımız tekrarlı gösterimin ve bilgiye eşlik eden fotoğrafın doğruluk yargısı üzerindeki simültane etkilerini araştırmaktır. Üçüncüsü, tekrarlanan bilgilerdeki bir ayrıntı değişikliğinin (örneğin; eşlik eden fotoğraf) doğruluk yargılarına nasıl yansıdığını anlamaktır. Üç deneyden oluşan seride, yukarıda belirtilen sorulara bir cevap bulmak amaçlanmıştır. Birinci deneyde fotoğraflara önceden maruz kalmanın, eşlik ettiği bilgiler için belirtilen doğruluk yargılarını

artırıp artırmadığı test edilmiştir. Sonuçlar, fotoğrafların tekrarlı gösteriminin doğruluk yargılarını artırmadığı ancak mevcudiyeti sebebiyle artırdığını göstermektedir. İkinci deney, tekrarlı gösterimin ve fotoğraf varlığının doğruluk yargısı üzerindeki aynı anda oluşan etkisini araştırmaktadır. İlk deneyin aksine, ifadelerin tekrarının doğruluk yargısını artırdığı ancak fotoğraf varlığının bir fark yaratmadığı gözlemlenmiştir. Son olarak üçüncü deney, tekrarlanan bilgilerdeki bir detay değişikliğinin (örneğin, fotoğraf detayı), doğruluk yargısını etkileyip etkilemeyeceğini araştırmaktadır. Deneyde manipülasyon olarak, ya bilgiye eşlik eden fotoğrafta bir ayrıntı değiştirilmiştir (değişen bağlam) ya da bilgi aynı fotoğraf ile tekrarlı bir şekilde gösterilmiştir (aynı bağlam). Sonuçlar, aynı detay ile tekrar eden ifadelere, detayı değiştirerek tekrarlayan ifadelere göre daha yüksek doğruluk yargısı verildiğini göstermiştir. Sonuçlar ve geleceğe yönelik araştırmalar; doğruluk (truthiness), yanıltıcı doğruluk etkisi (illusory truth effect) ve bağlamın aynı şekilde vurgulanması (context reinstatement effect) bağlamında tartışılmıştır.

Anahtar Sözcükler: yanıltıcı doğruluk etkisi, doğruluk etkisi, bağlamın aynı şekilde vurgulanması, doğruluk yargısı

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CHAPTER I

INTRODUCTION

“The influence of repetition on crowds is comprehensible when the power is seen which it exercises on the most enlightened minds. This power is due to the fact that the repeated statement is embedded in the long run in those profound regions of our unconscious selves in which the motives of our actions are forged. At the end of a certain time we have forgotten who is the author of the repeated assertion, and we finish by believing it.”

[Gustave Le Bon, The Crowd: A Study of the Popular Mind, 1895]

How often do you find yourself evaluating the truthfulness of the information you have just learned? We are exposed to an enormous amount of information in today's world. Therefore, judging whether a piece of information is true or not becomes critical in our lives. Using social media as a news source is reported to be increasing continuously across the world (Newman et al., 2021) and an analysis made on 126,000 Twitter posts showed that the diffusion of false information was faster than the true ones (Vosoughi et al., 2018). Accordingly, the way that the information is presented in these sources can influence individuals' truth judgments quite easily. With easy access to various social media platforms, it is very likely that we might be exposed to certain information repeatedly regardless of its truth status. As indicated by Begg et al. (1992), unless there is an ambiguity, repeated information is regarded as truer even if it is from an unreliable source compared to novel information. Recent

studies show that repetition of both true or fake news increases the perceived accuracy of individuals (Pennycook et al., 2018; Smelter & Calvillo, 2020). Pennycook et al. (2018) also indicated that an inclination to believe repeated information can be observed with naturalistic stimuli, so that social media postings could be an example of it. Another possibility is that the information can be presented with an accompanying picture that might influence our validation of its truthfulness as well. Several studies found that the mere presence of a picture along with the information might bias individuals to believe that the information is true (Newman & Zhang, 2020).

Considering all the possible misleading factors, it becomes critical for individuals to judge whether the information is true or not at certain instances. For example, with the recent pandemic, we were exposed to a vast amount of health related issues and it was vital for us to distinguish the true information from the fake ones. However, as Brashier and Marsh (2020) indicated, our truth judgments are constructed and might be open to various ways of misleading. While judging the truth status of information, we might be drawing inferences from various cues (i.e., pictures, context, fluency), and therefore, it is essential for us to understand what kind of factors are influential in our truth rating processes. The context that the information is presented or the cues that accompany information (i.e., pictures) could be critical while validating the truth status. Therefore, it is important to investigate which specific cues or underlying memory processes play a critical role while validating the truth status of information even if we are not sure of its accuracy.

To better demonstrate the factors that might inflate truth judgments, let's take a social media platform as an example. The social media platform "Twitter" could be considered as an example that we might possibly come across with fake news as well as true ones. In the medium of Twitter, there are three possible ways of coming across information; seeing the information along with a picture, seeing a picture only, or seeing the information only. What if we see the information repeatedly? Previous studies give an answer for this question: repetition leads individuals to believe that the information is true (Hasher et al., 1977; Begg et al., 1992). However, there raises another question: Is the effect of repetition specific to verbal information or could it be still observed when pictorial information repeats? This is one of the questions that the current study aims to investigate. The second question is what if we see repeated information along with a picture? The literature gives a partial answer: presence of pictures might bias people to believe that the information is true (Newman et al., 2012; Newman et al., 2015). However, when repetition and picture presence occur simultaneously, would one of them supersede the other? Finally, the third question is what if a detail (e.g., picture) changes along with verbally repeated information? Would truth ratings differ according to the change or would repetition be the only influential factor? This is the third question that the current study aims to investigate.

As indicated, the current study aims to answer the above-mentioned questions. In the following section, repetition will be discussed within the scope of *the illusory truth effect*, pictures within the scope of *the truthiness effect* and context within the scope of *the context reinstatement effect*. Each of these effects will be discussed with their proposed theoretical accounts as well as with various seminal studies. Following

that, the aims of the current study will be explained in detail by pointing out the regarding research questions.

1.1 The Illusory Truth Effect

The influence of repetition on our truth judgments is widely discussed in various works of researchers over many years. Repetition is regarded as one of the robust effects that influence our truth judgments. It is demonstrated by the study of Hasher et al. (1977) for the first time as a phenomenon called “*the illusory truth effect*”; the tendency to perceive repeated information as truer than novel information. Hasher et al. (1977) investigated whether repetition would have any effect on the validity ratings of participants. Accordingly, participants were given 3 sets of 60 factually true and false statements and asked to give a truth rating on a 7-point scale. The statements were chosen from different categories like arts, demography, religion, or sports. For example, in the category of history; a factually true statement was like “Kentucky was the first state west of the Alleghenies to be settled by pioneers” and a false statement was like “The People’s Republic of China was founded in 1947”. 20 of these statements were repeatedly exposed and 40 of the statements were novel to the participants. Their results revealed that regardless of the information being true or false, people were inclined to give higher truth ratings to repeated statements than to new statements. In other words, repetition was the dominant factor for rating the truth status of statements.

As described in the review of Dêchene et al. (2010), in a typical illusory truth effect paradigm, participants are presented with a list of statements at the exposure phase and -possibly- asked to rate the statements in a certain way (e.g., rating the

interestingness or familiarity). After an interval varying from minutes to weeks, participants are asked to rate the truth status of information at the truth rating phase. At that phase, in addition to the previously exposed statements, new statements are also presented to evaluate on a Likert-scale. Accordingly, the truth ratings given for new and old statements are compared in order to understand whether there is a truth effect or not.

This illusory truth effect is further replicated and demonstrated by other experiments (Bacon, 1979; Begg et al., 1992; for meta-analysis, see Dechêne et al., 2010).

Regardless of the truth status of the information, participants produce increased truth ratings when the information is repeatedly shown. Thus, the illusory truth effect is proposed to be mediated by repetition (Nadarevic, 2022) with a medium effect size ($d = 0.53$; Dêchene et al., 2010). According to previous studies, the illusory truth effect is observed even when the repetition occurs within minutes (Begg et al., 1985; Brown & Nix, 1996; Fazio et al., 2015), weeks (Garcia-Marquez et al., 2015), or months (Schwartz, 1982). Moreover, the effect was shown to occur with trivia statements (“House mice can run an average of four miles per hour”; Bacon, 1979), consumer products (“Crest toothpaste removes caffeine stains from teeth”; Johar & Roggeveen., 2007) and fake news headlines (“Trump questions Russia’s election meddling on Twitter”; Pennycook et al., 2018).

A more recent study by Pennycook et al. (2018) aimed to demonstrate whether the truth ratings given for fake news headlines are influenced by repeated exposure. In their study, participants were given true and false news headlines with a Facebook post format. All headlines were provided with accompanying pictures and some of

them also included warnings about the fake status of the headline. During the exposure phase, participants were asked to rate the interestingness of the headlines on a 6 point scale (1= very uninteresting, 6= very interesting). At the truth rating phase, old headlines were presented again along with new headlines and participants were asked to give a truth rating on a 6 point scale (1= definitely false, 6= definitely true). Their results showed that, compared to the new headlines, repeated headlines were given higher truth ratings. The same line of results were obtained even when the information was presented with a fairness status warning. Their study was important in terms of demonstrating the effect of repetition on social media postings and individuals' tendency to believe in fake news.

When considering the previous studies, it is critical to point out that the type of information that is used in these studies is generally verbal (Corneille et al., 2020; Unkelbach et al., 2017; Unkelbach et al., 2019). In other words, the illusory truth effect is shown to be robust for verbatim repeated information. However, from a real life perspective, we might be repeatedly exposed to different types of information; e.g., verbal or pictorial. Accordingly, it should be taken into consideration that the proposed theoretical accounts for the illusory truth effect mainly focuses on repetition of verbal information rather than pictorial. So, why does this repetition bias individuals to believe information?

1.1.1 Theoretical Accounts

The underlying mechanism of the illusory truth effect is explained by various theoretical accounts. While Hasher et al. (1977) asserted the critical role of frequency of occurrence, Bacon (1979) highlighted the importance of subjective recognition,

Arkes et al. (1991) focused on the convergent validity and familiarity, and Begg et al. (1992) asserted on the repetition-induced familiarity. Later, Reber and Schwarz (1999) put the account of processing fluency forward by claiming that the ease of processing was the influential factor on truth judgments. This account is further supported by studies that manipulated fluency with rhyming statements (McGlone & Tofiqbakhsh, 2000) or fluency as an interpreted experience (Unkelbach, 2007). With these supporting findings, processing fluency is a prominently attributed account of the illusory truth effect (Dêchene et al., 2010). Accordingly, the current study will mainly focus on processing fluency while discussing the illusory truth effect.

1.1.1.1 Fluency Account

The ease that people experience while processing a statement is defined as processing fluency such that repeatedly exposed statements seem more fluent than non-repeated statements (Fazio et al., 2015). Previous studies have stated that the feeling of ease that arises with fluency is one of the factors that underlie the truth effect. The processing fluency is proposed to increase truth judgments in various studies.

One of the first studies that underlie the effect of processing fluency on truth judgments was conducted by Reber and Schwarz (1999). During their study, participants were asked to give a truth rating for the statements with high visible colors (e.g., blue & red) or low visible colors (e.g., green & yellow). Their aim was to investigate if easy-to-perceive statements would get higher truth ratings than difficult-to-perceive statements. The results showed that easily perceived statements

(high visible colors) were judged to be truer than difficult-to-perceive statements (low visible colors). This showed that when a visual manipulation (e.g., contrast, visibility) is matched with ease of processing, the feeling of ease might boost truth judgments. This influence of fluency is observed with different types of fluent processing as well. For example, the truth ratings were observed to increase when there was an ease of retrieval (Begg et al., 1992) or linguistic ease (McGlone & Tofighbakhsh, 2000).

The ease of processing was shown to enhance truth judgments, however, how does ease of processing enhance them? Two explanations were put forward for this question: either fluency has an inherent positivity or the experience of fluency is interpreted and then reflected on truth judgments. A study conducted by Unkelbach (2007) aimed to investigate whether fluency is a learned interpretation of experience that is reflected on truth judgments for repeated statements. In this study, participants were presented with 60 statements during the presentation phase. Then, during the learning phase, the truth status of those statements were presented either with a high contrast or low contrast. That is, some of the statements were labeled as true with high contrast, some of them were labeled as false with high contrast, or the vice versa with low contrast. At the testing phase, participants were provided with 120 statements, 60 old and 60 new, and they were asked to respond whether the statement was “new or old” and whether it was “true or false”. The aim was to differentiate whether reverse manipulation of fluency would reflect on truth judgments which would demonstrate that interpretation of fluency was reflected on truth judgments. The results showed that the reverse manipulations were reflected on truth judgments; positive correlation between fluency and truth was reflected as “yes, true” to old

statements whereas reverse correlation was reflected as “yes, true” to new statements. These results were important for demonstrating responsibility of processing fluency on the illusory truth effect and the reflection of interpreted fluent processing on truth judgments.

Later, Unkelbach and Rom (2017) proposed a new theory for explaining the effect of processing fluency on the illusory truth effect; the referential theory. According to this theory, judged truth depends on two main components; corresponding references obtained from a statement and coherence of these references with each other. It is suggested that if a statement has coherent corresponding references, it would be judged as ‘true ’but in case there are less references, inclination towards ‘false ’ increases. According to the example of Unkelbach et al. (2019), the statement “The thigh bone is the longest bone in the human body” is coherent because it could be easily predicted that the human body consists of bones and their length might change. However, the statement “The gross domestic product of Bolivia is \$10” is incoherent since not everyone has prior knowledge about that information nor it is predictable (p. 249). In this sense, the repetition of statements was proposed to create more coherently linked references in memory than new statements. Accordingly, the reason behind giving higher truth ratings to repeated statements was based on these greater coherently linked references.

In order to test their hypotheses, Unkelbach and Rom (2017) conducted an experiment by manipulating the number of references for statements. Their primary aim was to understand whether the number of references is linked to the illusory truth effect or not. In their study, participants were assigned to one of the three conditions: low number of references (judging whether the statement was at right or

left), standard reference (reading and filling some part of the statements), and high number of references (stating how the statement relates to the participants). Then, at the truth rating phase, participants were presented with the statements again and asked to rate whether the statement was true or false. The results showed that as the number of references increased, the difference between truth ratings for old and new statements increased. With a novel approach to fluency, their study put an emphasis on the role of activating coherently linked references while judging the truth of information.

Although the proposed theoretical accounts and conducted studies explain how repetition influences truth judgments, there is still an uncertainty of how repetition of accompanying pictures might influence the truth judgments for associating statements. As we consider repetition in daily life instances, not only verbal information repeats in social media posts, but also pictures. Therefore, one needs to consider the possible influence of repeated pictures on truth judgments. However, before focusing on repetition of pictures, there is a need to understand how the mere presence of pictures influences truth judgments.

1.2 The Truthiness Effect

Truthiness effect is described as an increased tendency to believe that a claim is true when non-probative information is provided along with the claim (Newman et al., 2012). One of the first experiments about truthiness effect is conducted by Newman et al. (2012) with the aim of investigating how providing immediate truth judgments for a claim is affected by the presence of a related but nonprobative picture. In their first experiment, participants were given claims about whether a celebrity person is

dead (e.g., This famous person is dead) or alive (e.g., This famous person is alive).

The celebrity names were either familiar or unfamiliar to the participants. Half of the claims were presented with a picture of the famous person and the other half without a picture. In total, 80 celebrity names were provided; 40 as familiar and 40 as unfamiliar. Participants were asked to rate the truth status of the claim within 3 seconds. The results showed that when an unfamiliar celebrity name was accompanied by a nonprobative picture, a truth bias was observed. For the claim of “this famous person is alive”, participants gave higher truth ratings when the claim was presented with a picture, compared to when it was presented without a picture. Accordingly, their study demonstrated that observing the truthiness effect is possible when a claim is presented with a nonprobative picture.

This truthiness effect was replicated several times (Fenn et al., 2013; Newman et al., 2015) however, the average effect size is small ($d = 0.23$, for a review see, Newman & Zhang, 2020). Similar to the illusory truth effect, the truthiness effect is observed with various claims ranging from general knowledge statements to future predictions (Newman & Zhang, 2020), and it was observed to last even for several days (Fenn et al. 2013).

1.2.1 Underlying Mechanisms

In order to explain the underlying mechanism of the truthiness effect, various possibilities were put forward: e.g., pictures having an inherent trust or cognitive fluency (Newman & Zhang, 2020). Just like in the illusory truth effect, truthiness effect is widely explained with the fluency account. The following section will

mainly focus on why cognitive fluency is a widely used explanation for the truthiness effect rather than the “inherent trust” mechanism.

1.2.1.1 Pictures Being Inherently Trustworthy

Even if it is not probative, pictures might bias people to believe in information. This is explained as an inherent trust that the pictures contribute to increase belief. The study of McCabe and Castel (2008) provided support for this notion. In their study, participants were given neuroscience articles along with scientific reasoning for arguments either with a brain picture or not. They were asked to rate whether they agree with the scientific reasoning on a 4-point likert scale (1= “strongly disagree”, 4= “strongly agree”). The results showed that reasonings with pictures were given higher rates than reasoning without pictures. However, in the study of Newman et al. (2012), one of their experiments revealed a conflicting result for the account of inherent trust for pictures. In their study, participants were given information about celebrities and asked to give a truth rating for the statements. One of the groups were given information along with a non-probative picture and the other group were given non-probative verbal descriptions. For example, for the statement of “This person is alive” either a non-probative picture of a celebrity was given or a description like “musician, microphone, black hair” was provided. The results showed that regardless of the non-probative information being pictorial or verbal, the truth ratings increased. Their study was important for revealing that the increase in belief was not due to the inherent trust for pictures, but rather the richness of semantic context was dominant in making these increased truth judgments.

As the findings on 'pictures having inherent trust 'were mixed, a further explanation was put forward: cognitive fluency mechanism. Just like in the illusory truth effect, it was suggested that observing a truthiness effect was due to fluency that the presence of pictures provide. Below it is explained how pictures lead to fluency with the empirical studies supporting it.

1.2.1.2 Cognitive Fluency Mechanism

One of the prevalent assumptions of the truthiness effect is that pictures facilitate processing, and make information more fluent, which in turn increase truth ratings. In order to examine whether fluency is the underlying mechanism of the truthiness effect, Newman et al. (2015) put a hypothesis forward: if it is the fluent processing, statements with related pictures would bias participants to respond as "true" whereas statements with unrelated pictures would bias them to respond as "false". The reason behind this hypothesis was attributed to cognitive effort: disfluency requires more cognitive effort and several previous studies have shown that this effort leads to lower judgments than items that require less effort (Reber & Schwarz, 1999; Yue et al., 2013). Therefore, Newman et al. (2015) proposed that unrelated pictures would require more cognitive effort and this disfluency would be reflected as "false" response on the truth judgments, and the vice versa would happen for related -thus, fluent- pictures.

In order to test this, participants were presented with trivia statements either along with a related picture, unrelated picture or without a picture. The aim was to investigate whether the truth ratings would differ for relatedness and whether the fluency level would be reflected differently on truth judgments. For the related

condition, the statement of “The liquid metal inside a thermometer is mercury” was combined with a picture of a thermometer; for the unrelated condition, the statement was paired with a picture of a lizard; and for the no-picture condition, the statement was presented without a picture. The results were not in line with their prediction: for the related condition, participants had bias to respond as “true”. However, for statements with an unrelated picture, there was not a bias to respond as “false”. They further suggested that it was due to the presence of related pictures that might have created a feeling that all pictures were somehow related to the statement. They conducted another experiment by manipulating the picture presence as within-subjects and relatedness as between-subjects. This time, they obtained the expected results: relatedness led to “truthiness” and unrelatedness led to “falsiness”. This study revealed two important findings: first, rather than the mere presence of a picture, its relatedness or probative features were shown to be critical for the truthiness effect; second, compared to unrelatedness, relatedness increases fluent processing.

The above-mentioned study emphasized the importance of fluency as an underlying mechanism for the truthiness effect. Accordingly, the truthiness and the illusory truth effect converge on the same point: fluency. When we think of real life examples, seeing the information repeatedly or with an accompanying picture does not always occur separately. Rather, it is quite common to see the repeated information with an accompanying picture. Therefore, studies investigating the effect of repetition and picture presence in different experiments might reveal valuable information regarding their mere effect, but their joint effect remains to be questioned. Smelter and Calvillo (2020) investigated the effect of repetition and picture presence in the same study with separate manipulations.

In their study, Smelter and Calvillo (2020) aimed to investigate how true and false news headlines are rated when they repeat versus when they appear with a picture. In their first experiment regarding pictures, they presented participants with 28 true and false news headlines either with a picture or not. Participants were asked to rate the truthfulness of the headlines. Their results showed that the presence of pictures increased perceived truth for both true and false headlines. In their third experiment regarding repetition, participants were presented with 48 true and false headlines again, either for once or repeatedly. The results showed that repetition increased perceived truth, therefore, the illusory truth effect was observed. Considering the effects of repetition and picture presence separately, Smelter and Calvillo (2020) indicated that pictures and repetition can have “pervasive effect” on truth judgments (p. 1069). However, this indication was made according to two different experiments that investigated the effect of pictures and repetition separately.

When we look at the previous experiments investigating the effect of repetition and picture presence, their separate manipulations reveal an expected pattern; repeated statements receive higher truth ratings than novel ones, and similarly, statements with pictures receive higher truth ratings than statements without pictures. However, there is still an important question to ask: although the previous studies showed the influence of truthiness and illusory truth effects on truth judgments, what would their joint effects reveal? Would their effects be additive on each other or would one of them supersede the other? To our knowledge, only one study investigated the joint effects of truthiness and the illusory truth effect on truth judgments. The study is described below in more detail.

1.3 The Joint Effect of Truthiness and the Illusory Truth Effect

A previous study by Nadarevic et al. (2020) aimed to investigate the joint effect of pictures, repetition and the source. In their first experiment, the aim was to investigate the possible joint effects of source reliability and picture presence on truth judgments. Accordingly, participants were given 60 statements to indicate a truth rating: 20 statements with lay source (unreliable) and non-probative pictures, 20 with lay source and without pictures; 20 with expert source (reliable) and non-probative pictures, and 20 with expert source and without pictures. The truth ratings were indicated on a 6-point scale: 1 (“definitely false”) to 6 (“definitely true”). The results revealed that statements with expert sources were given higher truth ratings than statements with lay sources, however, the presence of pictures did not create any difference. They further aimed to investigate how truth ratings would change if repetition is also added to the combination of source and picture presence. Therefore, participants were presented with 30 general knowledge statements and asked to rate the interestingness of each on a Likert-scale from 1 (“little interesting”) to 6 (“very interesting”). After distraction, participants were directed to the truth judgment phase. At that phase, participants were given 60 statements: 30 old and 30 new. Some of these old and new statements were presented either with or without a picture, and either with lay or expert source signs. Then, they were asked to give a truth rating on a Likert-scale from 1 (“definitely false”) to 6 (“definitely true”). The results revealed that repetition and expert source led to higher truth judgments, however, the presence of pictures did not create any difference.

The study of Nadarevic et al. (2020) revealed two important findings; if there is repetition and an indication of expert source, the effect of picture presence on truth

judgments disappears. However, there raises a further question to ask: as their first experiment revealed that the effect of expert source supersedes the truthiness, could the results of their second experiment be due to the dominance of source manipulation on other variables? In other words, what would be the effect of pictures if the repetition and picture presence were manipulated only? This is the second question in mind to investigate.

Turning back to the possibilities in social media postings, it is not always the case that the details in the repeated information stays exactly the same. Instead, there is a possibility that some of the details (e.g., accompanying pictures) might change while repeating. Would that change inflate our truth judgments or would the mere effect of repetition be enough to inflate truth judgments? There is a need to discuss the extent to which details contribute to truth judgments while repeating the information. This detail change is discussed below with a phenomenon called the context reinstatement effect.

1.4 Context Reinstatement

While we are encoding information, it certainly occurs within a context. When the context that the information is learned is reinstated at the time of test, our memory performance increases (Smith & Vela, 2001). Context is defined as “any type of information that accompanies encoding and retrieval but is not itself a target of either encoding or retrieval” (Hanczakowski et al., 2014, p.85). For example, the pictures that accompany information could be regarded as a context. We are not machines that simply learn information, but beings that can also make judgments on the learned information. Therefore, while making judgments about the information we just encoded or retrieved, taking the possible influence of the context is also crucial.

It is probable that reinstatement or change of context can also change memory performance. In the literature, the context reinstatement effect is defined as “the enhanced memory performance found when the context information paired with a target item at study is re-presented at test” (Hanczakowski et al., 2015, p.788). This context reinstatement effect is further studied with feelings of knowing and judgments of learning in order to investigate whether reinstatement increases the judgments for the metacognitive judgments. The details of the studies are discussed below.

The study of Hanczakowski et al. (2017) aimed to investigate whether reinstatement of a context increases people’s Feelings of Knowing (FOK) judgments which refers to “people’s conviction that certain inaccessible information is stored in memory” (p. 59). Their study consisted of three phases; study phase, cued-recall test and recognition test. During the study phase, participants were presented with cue-target word pairs and black-and-white photographs. They were asked to study the cue-target word pairs for remembering them at a later phase. During the cued-recall test, the cue words were presented either with reinstated, repaired or novel photographs (contexts). Then, participants were asked to type the target words or indicate a FOK judgment from 1% to 100% if they do not remember. At the recognition phase, the target words were presented without pictures and participants were asked to select the cue words from a list of five words. The results showed that the FOK judgments given for reinstated context were higher than repaired and novel contexts. They further indicated that these results are a demonstration that “metacognitive processes are shaped by the overall volume of memory accessed at retrieval” (p. 59).

Later, Hanczakowski et al. (2018) aimed to investigate whether reinstatement of a context increases people's Judgments of Learning (JOL) which refers to "a prospective confidence judgment concerning subsequent cued-recall performance" (p. 2). The experiment consisted of two study phases and two cued-recall phases. During the first study phase, participants were given cue-target word pairs against the background of photographs and asked to indicate a JOL, confidence that they will remember this information in a later memory test. Then at the cued-recall test, the cue words were presented on the same background picture from the previous phase and participants were asked to write the target word. The second study-test cycle was similar to the first one but with a small change; the words were presented either in the reinstated context with the same pictures, repaired context with changed pictures or novel contexts with new pictures. The results showed that JOLs given for reinstated context were higher than repaired context condition.

As the findings on the context reinstatement effect affect metamemory judgments, this might also provide some clues for the truth judgments. How would our truth judgments be affected when a context is reinstated? When we consider daily life examples, it is possible to come across with information whose context is reinstated. For example, one might come across with a news headline "A new virus called MOVID-17 is spreading across the world" along with a non-probative picture of a virus. It is probable to see this news headline with the same picture repeatedly on different social media platforms. However, there is another possibility that while repeating, some of its details might change. For example, the headline might stay exactly the same but the accompanying picture might change; a slightly different non-probative virus picture could be added to this headline. In such a case, would our

truth judgments differ according to the context (e.g., picture) or would the mere presence of pictures be enough to perceive it as true?

Although previous research has shown that repetition can bias our truth judgments, it would add another dimension if we investigate whether the effect of repetition varies according to the changes in the context that the information is repeated.

The effect of context reinstatement on FOK and JOL judgments could be interpreted from the perspective of *feelings-as-information theory* of Schwarz (2012). This theory mainly asserts that people interpret their subjective experiences as evidence of truth. For example, in the study of Unkelbach et al. (2011), participants were repeatedly exposed to positive and negative statements and asked to give a truth rating. The repetition increased truth ratings for both types of statements but the truth ratings for positive statements were higher than negative statements. In addition to positivity or negativity, the experienced ease could be a subjective experience. Therefore, if the reinstatement of a context reinstatement increases subjective ease, this experience could also be reflected in truth judgments, similar to judgments such as feeling-of-knowing and judgments of learning.

1.5 Aims of the Current Study

The current study had three aims. The first aim was to replicate the illusory truth effect with accompanying pictures rather than statements. Although previous research has shown that repetition increases the tendency to believe in information (Hasher et al., 1977; Nadarevic et al., 2020), it is still a matter of question whether the effect of repetition extends to pictorial information as well. The underlying mechanism of the illusory truth effect is often explained through the ease of processing that repetition elicits. However, there is still a need to specify whether

this ease of processing would be experienced with the repetition of accompanying pictures and whether this perceived ease would be reflected on truth judgments. Experiment 1 used the classical illusory truth effect paradigm but participants initially saw only pictures rather than statements. It is hypothesized that since repetition was found to be a robust effect (Dechene et al., 2010), this effect would extend to pictures as well. Besides, repetition of pictures should increase ease of processing, which in turn would increase truth judgments when the repeated picture is presented along with novel verbal information. Therefore, statements with repeated pictures should receive higher truth ratings than statements with new pictures and without pictures.

The second aim was to investigate the joint effects of repetition and picture presence on truth judgments. The study of Nadarevic et al. (2020) showed that the presence of pictures did not create a difference in truth judgments when it was simultaneously manipulated with the source credibility and repetition. However, it is still unclear whether this indifference of picture presence on truth judgments was due to the domination of source credibility manipulation. Accordingly, the second experiment aimed to replicate the study of Nadarevic et al. (2020) but only with manipulating repetition and picture presence simultaneously in order to clarify which one supersedes the other. In order to investigate, the classical illusory truth effect paradigm was used but at the truth rating phase, some of the statements appeared with a picture. Considering the previous findings on the illusory truth effect and the truthiness effect, two hypotheses are put forward. First, it is expected that repeated statements will be given higher truth ratings than new statements since repetition was shown to be a robust effect and replicated in many studies (Dechêne et al., 2010).

Second, repetition and picture presence are expected to have an additive effect on each other such that repeated statements with pictures would get higher truth ratings than repeated statements without pictures. The reason behind this expectation leans on the stance of Newman et al. (2012); pictures provide semantic richness and makes imagination easier, therefore, the associating statement is perceived as more plausible. In this way, presence of a picture along a repeated statement is predicted to increase truth judgments because it provides a semantically rich context, which might increase perceived ease for the participants.

Finally, the third aim of the current study was to investigate whether there would be a difference in truth ratings if the context (e.g., accompanying pictures) repeats exactly the same or with small change in the accompanying picture's detail. For example, if a statement of "A goldfish called Fred was 41-year-old" is repeatedly exposed with the same picture of a fish at both phases versus with a changed picture in the truth rating phase, would there be a difference in truth ratings? It is hypothesized that if it is the effect of mere presence of a picture, the truth ratings would not vary in repeated or changed contexts, however, if it is the reinstatement of the exact context, statements presented with the reinstated pictures should be rated as truer than statements with the changed pictures.

CHAPTER II

PILOT EXPERIMENT

The pilot study focused on two different aims. The first aim was to check whether the statements that will be presented in the actual experiment were in fact unknown to the participants by asking them to give a truth rating. This is important, because if participants have prior knowledge about these statements, the truth judgments may be artificially inflated. According to Dechêne et al. (2010), participants have to be uncertain about the truth status of the information in order to avoid basing their judgments on their prior knowledge. In addition, the study of Pennycook et al. (2018) revealed that if statements are implausible, repetition does not increase truth ratings. Therefore, using unknown and plausible statements was crucial for obtaining illusory truth effects.

The second aim was to check whether the pictures accompanying statements were non-probative, in other words, whether they were providing any evidence about the truth status of the statements, as the study specifically focuses on pictures that should not produce further evidence for the statements.

2.1 Participants

Thirty-six participants participated voluntarily in the pilot study. Since all participants complied with the criteria, the results of 36 participants were analyzed

accordingly (18 women; $M_{\text{age}} = 36.23$, $SD = 10.26$, $Mdn_{\text{age}} = 36$). All participants had at least a high school degree (4 highschool graduates, 17 undergraduate students, 12 graduate students; completed or continuing). Three participants did not want to indicate their education levels, therefore education levels of 33 participants were included only.

2.2 Materials

2.2.1 True Statements

In total, 90 statements were gathered for 9 different categories; 17 of these statements were selected from the study of Tauber et al. (2013) which included general knowledge norms. A part of the general knowledge norms provided by the study of Tauber et al. (2013) has also been used in other studies related to the illusory truth effect with statements with unknown truth status (e.g. Brashier et al., 2020). The analysis on these statements showed that the likely to be unknown statements were recalled by only 1% of the participants. The rest of the 73 statements were chosen from different internet sources and the truth status of each statement was further checked. (See Appendix A for the full list of statements).

2.2.2 Categories

In total, 9 categories were used for the categorization of statements; animals, plants, nature, sports, space, general knowledge, music, phobias. The study primarily used categories that we frequently encounter in our daily lives (e.g. social media platforms, news platforms etc.). For each category, 10 true but unknown statements were selected. For example, for the category of nature, participants evaluated statements such as “The river that flows through Rome is Tiber”.

2.2.3 Non-probative Pictures

Each statement was accompanied by a non-probative picture. The pictures were chosen from different internet sources which had creative commons license. For example, the statement of “Kaninhop is a sport where rabbits are the players” is accompanied by a picture of a rabbit only. Therefore, the pictures did not give a clue about the truth status of the statements. (See Appendix A for the full list of pictures).

2.3 Design

A within-subject design was used in the pilot experiment. The same statements and pictures were presented to all participants with a random order. Only one statement and picture were presented per page. Participants progressed by clicking the continue button.

2.4 Procedure

The pilot study was conducted online via Qualtrics. The survey consisted of 90 statements accompanied by a picture. Participants were required to answer three questions; 1. Have you heard of this information before? 2. Do you think this information is correct? 3. Does the picture prove the accuracy of the information? For answering these questions, participants were required to give an answer on a 4-point Likert scale (*1 = absolutely no, 2 = probably no, 3 = probably yes, 4 = absolutely yes*). The option of “neutral” or “unsure” was not included in the Likert scale since previous meta-analysis by Dechêne et al (2010) showed that if a scale includes indifference points, the illusory truth effect decreases.

At the beginning of the survey, participants were provided a consent form and informed that they are free to quit the survey at any time. A brief instruction was also provided as follow;

“It has been observed that the accuracy of the information presented as general knowledge facts in social media is affected by different factors. We aim to see the impact of different presentation formats on certain information. If you would like to participate in the study, you will be presented with different pictures and information, and you will be asked to specify a level of accuracy for each information.”

Following the consent, participants were asked 3 demographic questions; gender, age and education level. Then they were directed to the survey questions; one question was presented per page. At the end of the survey, participants were provided a debriefing and thanked.

2.5 Results

2.5.1 Familiarity Ratings

The first question of the survey (Have you heard of this information before?) aimed to measure if participants are familiar with the given information or not. Only statements that received an average familiarity rating of 2.5 or less were included in the main study. All statements complied with this criteria.

2.5.2 Truth Ratings

The second question of the survey (Do you think this information is correct?) aimed to measure the truth ratings of participants for each statement. Therefore, the

statements with mean truth rating above 2.5 were excluded. In total, 9 statements out of 90 were excluded.

2.5.3 Picture Ratings

The last question of the survey (Does the picture constitute evidence for the accuracy of the information?) aimed to measure if the pictures provide any evidence for the truth status of the statements. A picture was considered non-probative, only if it received a familiarity rating less than 2.5. All pictures complied with this criteria.

The mean ratings for familiarity, truth and accompanying pictures are presented in Appendix A.

CHAPTER III

EXPERIMENT 1

As the meta-analytic review of Dechêne et al. (2010) revealed, repetition of statements can inflate truth judgments of individuals. However, there raises a question; is this inference tied to verbal information only or could it be pictorial as well?

The current experiment relied on two main research questions. The first research question aimed to investigate if repetition of pictorial information leads to the illusory truth effect. In other words, the aim is to explore whether the truth judgments given for an unknown information are affected by prior exposure to a non-probative picture which comes along with the information at a later time again. As repetition was shown to be a robust effect and as the fluency was proposed to be the underlying mechanism of this effect, it is hypothesized that repetition of pictures would increase ease of processing, and thus, truth ratings.

The second question aimed to understand if the presence of a non-probative picture along with true but unknown information affects truth judgments of individuals. We aimed to replicate the truthiness effect with non-probative pictures that accompany true-but-unknown statements. Previous studies (Newman et al., 2012; Newman et al., 2018; Cardwell et al., 2016; Fenn et al., 2013) found that non-probative pictures

increase truth judgments of individuals for different kinds of information (e.g., trivia claims, future predictions). It was also shown that people tend to base their truth judgments on the cues that come along with a statement. Pictures are one of these strong cues that people use to base their rates since they are representative of real life (Brashier & Marsh, 2020). Therefore, in line with the previous studies, it is hypothesized that statements presented with pictures would be given higher truth ratings than statements without pictures.

Mangus (2018) proposed that in order for non-probative pictures to be effective, the accompanying statements are required to be unknown. Therefore, we used non-probative pictures that accompany true-but-unknown information in Experiment 1 in order to replicate the illusory truth effect as well as understanding truth judgments are influenced by being priorly exposed to a picture.

3.1 Participants

Thirty-nine Bilkent University students between ages 18 and 30 (Women; 25, $M_{age} = 22.54$, $SD = 2.14$) were recruited in exchange for course credit. All participants were native speakers of Turkish and had a normal or corrected-to-normal vision. All of the experimental procedures were approved by Bilkent University Ethics Committee.

3.2 Apparatus

All stimuli were presented on ASUS computers using E-Prime 2.0 software. Participants were asked to use only a keyboard connected to the computer.

3.3 Design

We used a within-subjects design so that all participants were exposed to the same stimuli with a counterbalanced order. The independent variable was the item type at test (repeated pictures, new pictures, or not pictures) along with a statement. The dependent variable was truth judgments which was measured on a 1 (absolutely not true) to 4 (absolutely true) scale. According to previous studies, the truthiness effect is observed to be larger when statements with pictures were presented along with statements without pictures, therefore, a within subject design was more plausible (Dechêne et al., 2010). The order of the statements was randomized across all study trials. The list of statements were divided into three groups; repeated pictures, new pictures and without pictures. For the repeated and new pictures groups, three statements and pictures from each of the nine categories were used. For the without picture group, three statements from each of the nine categories were used but no pictures were included.

3.4 Materials

Eighty-one pictures and statements obtained from the pilot study were used in this experiment. At the encoding phase, thirty-three pictures were used which were considered as repeated/old pictures. Three of the pictures were used as primacy items and the other three were used as recency items. The primacy and recency items were chosen from excluded materials. According to Hasher et al. (1977), it is critical to put buffer items before and after the repeated-non/repeated statements since they are more likely to be recalled. Therefore, in order to attribute validity ratings to the repetition manipulation, primacy and recency items were added. At the truth rating phase, participants were exposed to all eighty-one statements; twenty-seven of them

with old pictures, twenty-seven with new pictures and the last twenty-seven without pictures. The old, new and no-picture groups were counterbalanced across three conditions and were presented to an equal number of participants.

3.5 Procedure

The experiment was conducted face-to-face in Bilkent University psychology laboratories. All the health precautions were taken due to COVID-19. Participants and the experimenter had to wear masks during the experiment.

Before starting the experiment, participants were asked to sign an informed consent and answer two demographic questions. For demographics information, age and gender were asked. After signing the informed consent, participants were given a verbal instruction about the stages of the experiment. The actual aim of the experiment was not explained since it would affect their strategy while making truth judgments. Rather they were informed that the study aims to investigate whether presenting information in various formats is affected by different factors. Before beginning, participants were told to observe each picture and read each sentence carefully. The experiment began after answering participants' further questions.

The experiment consisted of three phases: encoding, distractor and truth rating (see in Figure 1). In the encoding phase, participants were exposed to thirty-three pictures. The first and the last three pictures were used to control primacy and recency effects. Participants were asked to rate the interestingness of each picture from 1 to 4 on a scale (*1 = not interesting at all, 2 = not very interesting, 3 = somewhat interesting, 4 = very interesting*) within 5000 ms. Participants were

informed that after typing their choice, they do not have to press any key for proceeding to the next picture. The pictures proceeded automatically after 5000 ms.

During the distractor phase, participants were asked to solve basic math questions (e.g., $17+44 = ?$, $19*3=?$) as many as possible within 3 minutes. After typing the result, participants pressed ENTER to proceed to the next question. The aim was to eliminate any primary memory effects as possible.

In the final phase, the truth rating phase, participants were asked to rate the truthfulness of the 81 statements on a scale from 1 to 4 (*1 = absolutely not true*, *2 = probably not true*, *3 = somewhat true*, *4 = absolutely true*). There was not a time limit for typing the answer. 27 of the statements were presented with pictures which were priorly exposed during the encoding phase. Other 27 of the statements were presented with new pictures which were not priorly exposed. The rest of the 27 statements were presented without a picture. All of the statements were presented in a different random order for each participant. Participants had to press ENTER after typing their truth ratings.

Before debriefing, participants were asked to answer 3 questions about the experiment on a sheet of paper provided by the experimenter. The questions were as follows: 1. What is the aim of this study? 2. Did you use any strategy while answering the questions? 3. What might be the aim of using pictures in the experiment? The aim of asking these questions was to make sure that participants were not aware of the exact aim of the study and the materials used within the experiment. After answering these questions, participants were debriefed about the

aim of the study. They were informed that all the statements they have read were true and the main aim was to investigate whether being priorly exposed to a picture increases our truth judgments if they are later presented with unknown information and whether the presence of pictures along with an unknown information affects our truth judgments.

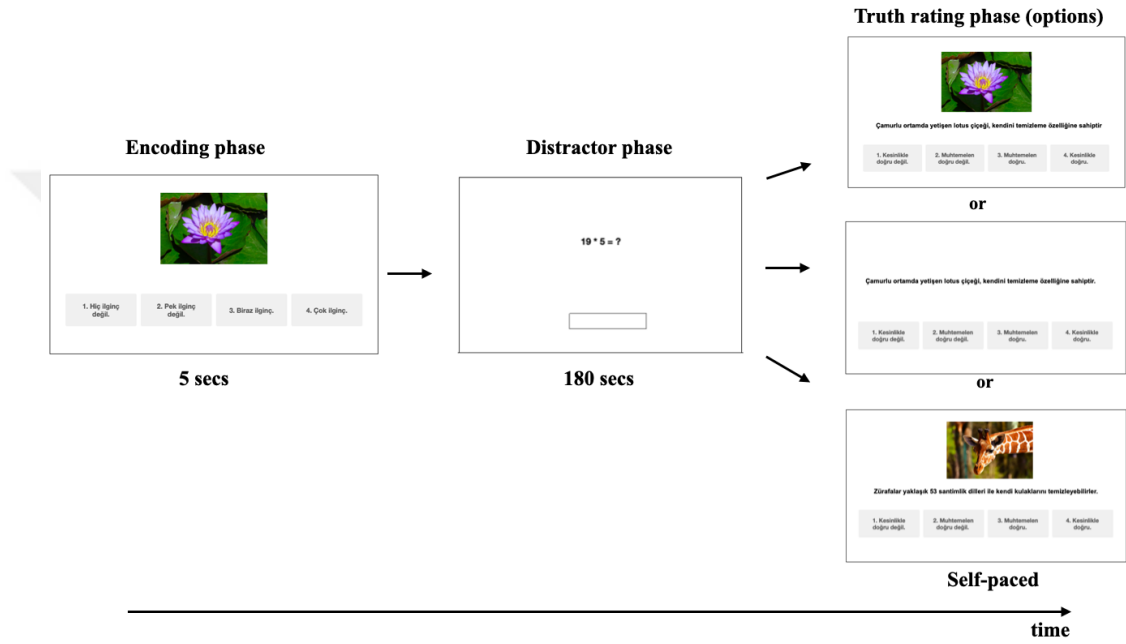


Figure 1. Schematic display of Experiment 1 for each condition.

3.6 Results

The alpha level was set at .05 for all statistical tests.

3.6.1 Truth ratings

The descriptive statistics of truth ratings for each condition is shown in Table 1a.

For analyzing the significance of truth ratings as a function of item type (repeated, new, nopicture), one-way repeated measures ANOVA was used. The results revealed a significant difference between the means for truth judgments given for statements with repeated, new and no pictures $F(2, 76) = 7.75$, $MSE = .03$, $p = .001$, $\eta_p^2 = .17$.

Paired samples t-tests were further conducted to compare truth ratings given for statements with repeated, new and no pictures. The results revealed that the truth ratings given for statements with repeated pictures were significantly higher ($M = 2.68$, $SE = .04$) than the truth ratings given for statements without pictures ($M = 2.55$, $SE = .03$), $t(38) = -3.67$, $p = .001$, $d = .59$. Similarly, the truth ratings given for statements with new picture ($M = 2.65$, $SE = .04$) were significantly higher than the truth ratings given for statements without picture ($M = 2.55$, $SE = .03$), $t(38) = -2.81$, $p = .008$, $d = .45$. Contrarily, there was not a significant difference between the truth ratings given for statements with repeated pictures ($M = 2.68$, $SE = .04$) and statements with new pictures ($M = 2.65$, $SE = .04$), $t(38) = -0.86$, $p = .396$, $d = .14$. The results revealed that the repeated exposure of pictures did not have an impact on truth judgments of participants. Therefore, no illusory truth effect is observed for non-probative pictures when pictures are presented once or twice along with a statement. Participants rated statements with pictures higher than statements without pictures, regardless of whether the picture was presented in the initial exposure phase or not.

3.6.2 Truth ratings response times (RT)

The descriptive statistics of response times for each condition is shown in Table 1a. The median response times for each condition (repeated, new, no picture) were analyzed via one-way repeated measures ANOVA. Since Mauchly's test indicated a violation of the assumption of sphericity, $\chi^2(2) = 13.14$, $p = .001$, the results were reported according to Greenhouse-Geisser estimates. The results revealed that there was a significant difference between the response times across three conditions, $F(1.5, 58.5) = 4.58$, $MSE = 1620224.44$, $p = .022$, $\eta_p^2 = .11$. Paired samples t-test

revealed that response times for new pictures ($Mdn = 5762$, $SE = 225$) were significantly longer than repeated pictures ($Mdn = 5438$, $SE = 203$), $t(38) = 3.11$, $p = .004$, $d = .50$. Similarly, response times for statements without pictures ($Mdn = 5731$, $SE = 200$) were significantly longer than repeated pictures ($Mdn = 5438$, $SE = 203$), $t(38) = 3.01$, $p = .005$, $d = .48$. In contrast, there was not a significant difference between the response times of statements with new pictures and no pictures, $t(38) = 0.21$, $p = .833$, $d = .03$.

Table 1a

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

Picture type	Truth ratings	Response times
repeated	2.68 (.04)	5438 (203)
new	2.65 (.04)	5762 (225)
no picture	2.55 (.03)	5731 (200)

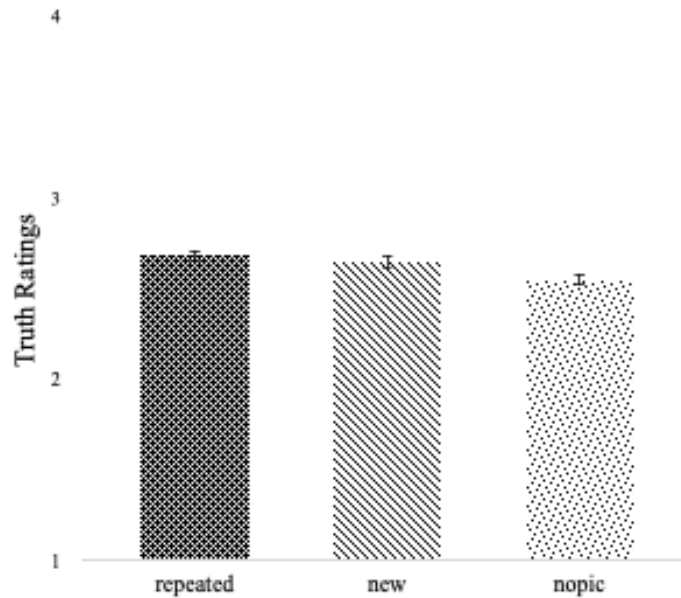


Figure 2. Mean truth ratings for statements by picture type (repeated pictures vs. new pictures vs. without pictures). Error bars display the standard errors of the means.

3.6.3 End of Survey Questions

In the current experiment, the presence of pictures was important in terms of investigating whether they inflate truth ratings or not. Although the actual aim was masked by asking about the “interestingness” of pictures at the beginning of the experiment, there could be participants who were aware of the actual aim. Therefore, a further analysis was conducted for the third question of the survey (“what might be the aim of using pictures in the experiment?”) in order to understand whether being aware of the aim of picture presence was reflected differently on truth ratings or not. Participants’ answers for the question were coded either as 0 (could not identify the aim) or 1 (correctly identified the aim). Each of the “0” and “1” scores were analyzed separately. The results are discussed below with the comparison between participants who “correctly identified” versus “participants who could not identify.”

3.6.3.1 Truth ratings of correct identification

The descriptive statistics are shown in Table 1b. 12 out of 39 participants could correctly identify the actual aim of picture presence. One-way repeated measures ANOVA was conducted again for participants who made the right predictions about the picture presence. The aim was to understand whether being aware of the actual aim did inflate participants' truth ratings. The results showed that there was not a significant difference between the means for truth judgments given for statements with repeated, new and no pictures $F(2, 22) = 3.13$, $MSE = .02$, $p = .064$, $\eta_p^2 = .22$. Participants who correctly identified the aim were not biased either by repetition or picture presence. The descriptive statistics for this group trends in the same way as the whole group for the truth ratings. As the number of aware participants are low, this analysis should be approached with caution. The results might have produced the exact same pattern if the number of aware participants were higher.

3.6.3.2 Truth ratings RT of correct identification

The response times for each group were analyzed with one-way repeated measures ANOVA and the results revealed that there was not a significant difference between the response times of truth judgments given for statements with repeated, new and no pictures $F(2, 22) = 1.31$, $MSE = 425444.08$, $p = .291$, $\eta_p^2 = .11$.

Table 1b

Mean (SE) of truth ratings and Median (SE) response times in milliseconds in
Experiment 1. (Participants who made correct identification)

Picture type	Truth ratings	Response times
repeated	2.63 (.05)	5440 (304)
new	2.64 (.04)	5778 (341)
no picture	2.50 (.07)	5840 (268)

3.6.3.3 Truth ratings of no identification

27 out of 39 participants could not correctly identify the actual aim of picture presence. Therefore, their truth ratings were analyzed separately in order to understand whether they are a representative of the general line of results. The descriptive statistics are shown in Table 1c. The results showed that there was a significant difference between the means for truth judgments given for statements with repeated, new and no pictures $F(2, 52) = 4.90$, $MSE = .03$, $p = .011$, $\eta_p^2 = .16$. The truth ratings given for statements with old pictures ($M = 2.71$, $SE = .05$) were significantly higher than statements without pictures ($M = 2.57$, $SE = .04$). However, there was not a significant difference between the truth ratings of statements with old pictures and statements with new pictures ($p = 1.00$). Furthermore, there was not a significant difference between statements with new pictures and statements without pictures ($p = .136$).

3.6.3.4 Truth ratings RT of no identification

The results revealed that there was a significant difference between the response times of truth judgments given for statements with repeated, new and no pictures $F(2, 52) = 3.47$, $MSE = 215988.46$, $p = .038$, $\eta_p^2 = .12$. The response time given for statements with repeated pictures ($Mdn = 5438$, $SE = 263$) was significantly lower than statements with new pictures ($Mdn = 5756$, $SE = 292$). However, there was not a significant difference between the response time given for statements with new pictures and statements without pictures ($p = 1.00$). Similarly, there was not a significant difference between the response time given for statements with repeated pictures and statements without pictures ($p = .124$).

Table 1c

Mean (SE) of truth ratings and Median (SE) response times in milliseconds in Experiment 1. (Participants who could not make correct identification)

Picture type	Truth ratings	Response times
repeated	2.71 (.05)	5438 (263)
new	2.66 (.05)	5756 (292)
no picture	2.57 (.04)	5683 (266)

3.7 Discussion

The current study aimed to investigate two issues: 1) Does the repetition of non-probative pictures that come along with a statement increase truth ratings of

participants? 2) Does the presence of a non-probative picture along with an unknown statement increase truth ratings?

For investigating these aims, participants were exposed to pictures at the encoding phase and later were asked to rate the truthfulness of a statement appearing with new or old pictures. According to the literature, repetition increases truth ratings of individuals (Begg et al., 1985; Brown & Nix, 1996; Pennycook et al., 2018) and this effect was found to be robust (for meta-analysis, see Dechêne et al., 2010). In contrast to the previous studies, the results of the current study did not reveal an illusory truth effect. This finding could be due to three reasons. First, it is critical to highlight that most of the previous studies used statements as a repeating stimuli; however, the current study revealed that the mere repetition of pictures may not result in illusory truth effects. Therefore, the type of repeated information could be influential on an individual's tendency to believe in a statement's veracity. Tversky (1973) asserted that while encoding different kinds of information (e.g., pictures versus statements), there could be different strategies of organizing them in memory and this way of organization could change the efficacy of encoding in different situations. A change in the type of information that is encoded could potentially be reflected on truth ratings. After repeated exposure, retrieval of non-probative pictures could not be effective in perception of truth, however retrieval of to-be-rated information could be.

Second, in most of the illusory truth paradigms, the "to-be-rated" information repeats rather than the accompanying cue. However, in Experiment 1, participants made truth predictions on the information that they saw later rather than the repeating

picture. The tendency to perceive repeated information as true could be prevalent when the judgments are made on the information that repeats rather than the accompanying information or cue.

Third, since some of the participants were aware of the actual aim of the experiment, it is probable that they purposely did not give higher truth ratings to the statements with repeating pictures.

Another aim of the current study was to replicate the truthiness effect with non-probative pictures. For the presence of non-probative pictures, several studies revealed that people tend to be biased when an information is combined with a picture that does not provide any evidence about the veracity of the claim (Fenn et al., 2013, Newman et al., 2012). The results were in line with previous studies; the mere presence of pictures increased individuals' truth ratings for unknown statements from various categories. Statements that appear with non-probative pictures were rated to be truer than statements that appear without pictures. Therefore, the truthiness effect was observed in Experiment 1, in contrast to the illusory truth effect.

In general, the median response times for statements with repeated pictures were less than statements with new pictures and without pictures. This line of results could be interpreted with fluency; repetition makes the process more fluent, fluency leads to ease of processing and the response time decreases. Various studies showed that compared to newly seen statements, repeated statements were judged more quickly (Scholl et al., 2014; Unkelbach & Greifeneder, 2018). Although the repeating information was pictorial in the current experiment, the response times were similar

to the results of studies that used verbal information. Therefore, it could be deduced as well as verbal information, repetition of pictorial information led to an ease of processing and thus, quicker response.

The analysis on response times of participants who could not identify the actual aim showed that there was a significant difference between statements with repeated pictures and statements with new pictures. However, there was not a significant difference between the response times given for statements with repeated pictures and statements without pictures. Again, as the number of aware participants are low, there might be an issue of power for the non-significant results. A higher number of aware participants could create the same pattern as well as increasing the power of results.

The fluency theories have claimed that the reason behind giving higher truth ratings to the repeated information is due to ease of processing (Fazio et al., 2015; Unkelbach, 2007). In that line of logic, the results of Experiment 1 showed that response times for repeated pictures were shorter due to ease of processing.

Similarly, when there was no repetition, the response time given for statements with new pictures or without pictures did not differ. Therefore, repetition of pictures could be regarded as a factor for ease of processing. However, then, we would expect the truth ratings for repeated pictures to be higher. That was not the case in Experiment 1. Accordingly, it could be predicted that when a pictorial information repeats, ease of processing may not be sufficient to increase truth ratings or there could be other factors like familiarity or context that contribute to truth ratings.

CHAPTER IV

EXPERIMENT 2

The second aim of the current study was to shed more light on the simultaneous effects of repetition and pictures on truth judgments. Although the repetition of statements was shown to increase truth judgments in various studies (for a review, see; Nadarevic., 2022), their joint effect of repetition and picture presence was shown by Nadarevic et al. (2020) such that there was not an effect of picture presence on truth judgments when it simultaneously occurred with repetition and source label. Despite this finding, repetition and expert source labels were shown to have an additive effect on truth judgments. However, the joint effect of repetition and picture presence on truth judgments still remains unclear since the “source label” manipulation in that study could have dominated the effect of pictures. Investigating their joint effect might be critical as the social media postings that we frequently encounter might repeat with pictures rather than repeating only as a statement. Moreover, it is possible to encounter information on social media without a source indication, so that solely manipulating repetition and picture presence might constitute a good real life instance.

Accordingly, the first research question of Experiment 2 is whether the effect of repetition would supersede the effect of pictures on truth judgments when they co-occur in the same context. It is expected that repetition and picture presence will

have an additive effect on truth judgments such that repeated statements with pictures will get higher truth ratings than repeated statements without pictures, because picture presence was shown to increase truth ratings in previous studies, similar to the illusory truth effect (Brashier & Marsh., 2020). In addition, Newman et al. (2015) suggested that the presence of pictures along with a statement increases fluency and the semantic richness of information (Newman et al., 2012) which might contribute to the increase in truth judgments. Therefore, repetition and picture presence might boost fluent processing and this experience is expected to be reflected in higher truth ratings, as opposed to the finding of Nadarevic et al. (2020).

The second research question is whether the truthiness and the illusory truth effect will be replicated individually as in previous studies. It is expected that repeated statements will be given higher truth ratings than novel statements. For the presence of pictures, it is expected that statements with pictures would be given higher truth ratings than statements without pictures. That is, the truthiness and the illusory truth effect should be replicated in the current study with non-probative pictures and true-but-unknown statements from various categories.

4.1 Participants

Forty Bilkent University students between ages 18 and 30 (Women; 25, $M_{age} = 20.25$, $SD = 1.86$) were recruited in exchange for course credit. All participants were native speakers of Turkish and had normal or corrected-to-normal vision.

4.2 Apparatus

All stimuli were presented on ASUS computers using E-Prime 2.0 software.

Participants were asked to use only a keyboard connected to the computer.

4.3 Design

Experiment 2 had a 2 (Repetition: yes, no) x 2 (Picture presence: yes, no) within-subjects design. The independent variables were repetition of statements and presence of pictures. The dependent variable was truth judgments which was measured on a 1 (absolutely not true) to 4 (absolutely true) scale. The order of the statements was randomized across all study trials. The list of statements were divided into four groups; repeated statements with pictures, repeated statements without pictures, new statements with pictures and new statements without pictures. For the repeated and new statement (with picture) groups, four statements and pictures from each of the nine categories were used. For the repeated and new statement (without picture) groups, four statements from each of the nine categories were used but no pictures were included.

4.4 Materials

Seventy-two pictures and statements obtained from the pilot study were used in this experiment. At the encoding phase, thirty-six statements were used which were considered as repeated/old statements. As in the previous experiment, three additional statements were used as primacy items and another three were used as recency items. At the truth rating phase, participants were exposed to all seventy-two statements; eighteen of old statements with pictures, eighteen of old statements without pictures, eighteen of new statements with pictures and eighteen of new

statements without pictures. The lists were counterbalanced across participants for both repetition and picture presence, and presented to an equal number of participants in each counterbalance condition.

4.5 Procedure

All the COVID-19 precautions were taken as in Experiment 1 and participants were directed to the experiment after signing the informed consent.

The experiment consisted of three phases, similar to the first experiment: encoding, distractor and truth rating (*see in Figure 3*). In the encoding phase, participants were exposed to forty-two statements and asked to read these statements carefully.

Participants were asked to rate the interestingness of each statement from 1 to 4 on a scale (*1 = not interesting at all, 2 = not very interesting, 3 = somewhat interesting, 4 = very interesting*) within 8000 ms. Participants were informed that after typing their choice, they do not have to press any key for proceeding to the next statement. The program proceeded statements onto the next trial automatically after 8000 ms.

The distractor phase was the same as in Experiment 1. At the truth rating phase, participants were asked to rate the truthfulness of the 72 old or new statements that were either presented with or without a picture on a scale from 1 to 4 (*1 = absolutely not true, 2 = probably not true, 3 = somewhat true, 4 = absolutely true*). All of the statements were presented with a random order. Participants had to press ENTER after typing their truth ratings. This phase was self-paced.

Before debriefing, participants were asked to answer the same 3 questions that were also asked in Experiment 1, followed by the debriefing.

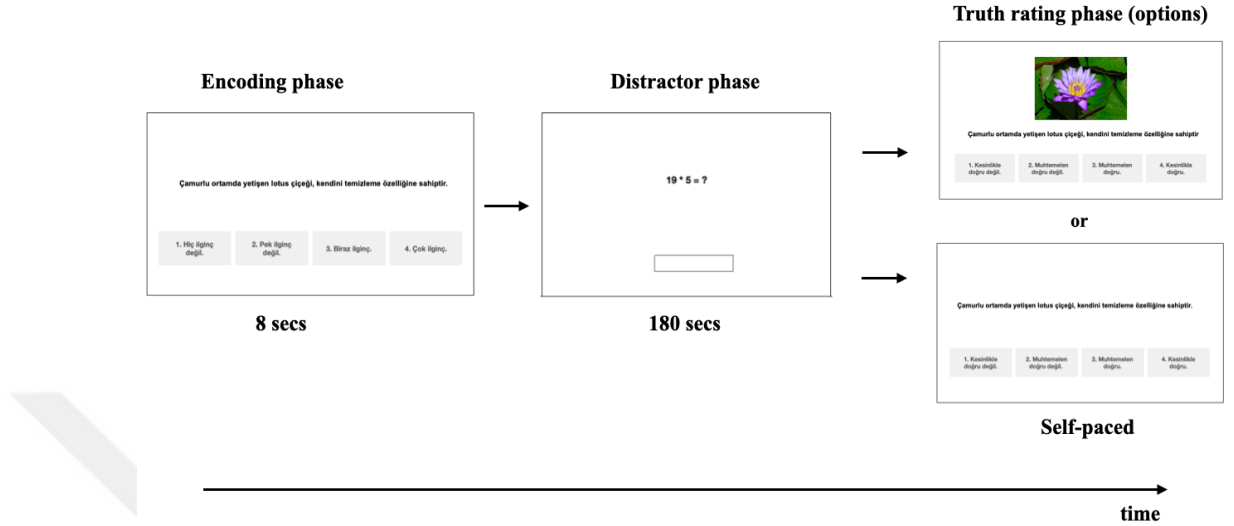


Figure 3. Schematic display of Experiment 2. The figure depicts the condition of repeated statements with and without a picture.

4.6 Results

4.6.1 Truth ratings

The alpha level was set at .05 for all statistical tests. The descriptive statistics of mean truth ratings for each condition is shown in Table 2a.

A two-way repeated-measures ANOVA was conducted to examine the effect of repetition and pictures on truth judgments. The results revealed that there was a significant main effect of repetition on participants' truth ratings $F(1, 39) = 54.82$, $MSE = .29$, $p < .001$, $\eta_p^2 = .58$, indicating that repetition significantly increased truth ratings. The mean truth ratings of repeated statements ($M = 3.26$, $SE = .08$) were significantly higher than new statements ($M = 2.63$, $SE = .04$). However, the presence of pictures had no main effect on truth ratings $F(1, 39) = 2.80$, $MSE = .08$, p

= .102, $\eta_p^2 = .07$. Furthermore, there was not a significant interaction between repetition and picture presence $F(1, 39) = .20$, $MSE = .02$, $p = .661$, $\eta_p^2 = .01$. As a consequence, repetition was an evident factor for increasing truth ratings however, the presence of pictures did not create a difference.

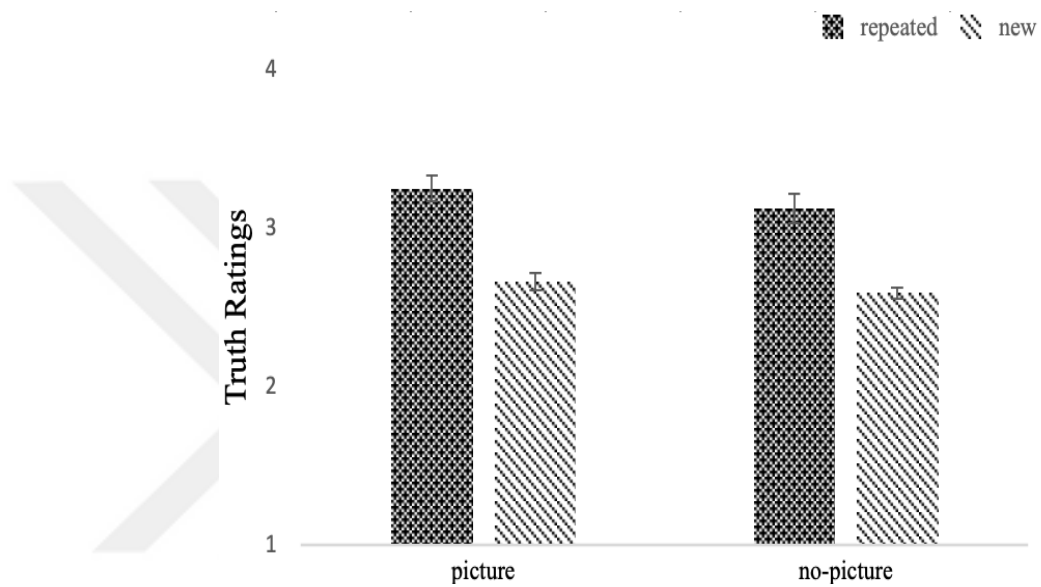


Figure 4. Mean truth ratings (repetition: yes, no; picture presence: yes, no). Error bars display the standard errors of the means.

Table 2a.

Mean (SE) of truth ratings in Experiment 2.

	Truth Ratings	Repetition	
		Yes	No
Picture Presence	Yes	3.29 (.08)	2.67 (.05)
	No	3.23 (.08)	2.58 (.04)

4.6.2 Truth ratings RT

The descriptive statistics of response times for each condition is shown in Table 2b.

The median response times for each condition (repeated: yes, no; picture presence: yes, no) were analyzed via two-way repeated measures ANOVA. There was a significant main effect of repetition on participants' response times, $F(1, 39) = 106.60$, $MSE = 703947.38$, $p < .001$, $\eta_p^2 = .73$. The response time given for new statements ($Mdn = 5552$, $SE = 229$) were significantly longer than repeated statements ($Mdn = 4183$, $SE = 196$).

Similar to repetition, there was a significant main effect of picture presence on participants' response times, $F(1, 39) = 7.38$, $MSE = 273139.40$, $p = .010$, $\eta_p^2 = .16$. Participants responded slower when there were pictures ($Mdn = 4980$, $SE = 212$) than when there were no pictures ($Mdn = 4755$, $SE = 200$). This shows that the presence of pictures led participants to rate at a longer time. There was no significant

interaction between repetition and presence of pictures $F(1, 39) = .13$, $MSE = 293128.90$, $p = .724$, $\eta_p^2 = .00$.

Table 2b.

Median (SE) of response times in milliseconds in Experiment 2.

	Response Times	Repetition	
		Yes	No
Picture Presence	Yes	4310 (208)	5649 (242)
	No	4055 (202)	5455 (230)

4.6.3 End of Survey Questions

4.6.3.1 Truth ratings of correct identification

The descriptive statistics for mean truth ratings is shown in Table 2c.

29 participants out of 40 correctly predicted the aim of using pictures. When their responses were analyzed only, the two-way repeated measures ANOVA results revealed that there was a significant main effect of repetition on participants' truth ratings $F(1, 28) = 34.61$, $MSE = .27$, $p < .001$, $\eta_p^2 = .55$. Participants gave higher truth judgments to repeated statements ($M = 3.19$, $SE = .09$) than new statements ($M = 2.62$, $SE = .04$). Alongside, picture presence had no main effect on truth ratings $F(1, 28) = 2.84$, $MSE = .10$, $p = .103$, $\eta_p^2 = .09$ and there was not a significant interaction between repetition and picture presence $F(1, 28) = 2.12$, $MSE = .14$, $p = .156$, $\eta_p^2 = .07$.

Table 2c

Mean (SE) of truth ratings in Experiment 2. (Participants who made correct identification).

		Repetition	
		Yes	No
Picture Presence	Truth Ratings		
	Yes	3.25 (.09)	2.66 (.06)
	No	3.12 (.10)	2.59 (.04)

4.6.3.2 Truth ratings RT of correct identification

The descriptive statistics for median response time for truth ratings is shown in Table 2d. According to the results of two-way repeated measures ANOVA, there was a significant main effect of repetition on participants' response times, $F(1, 28) = 60.74$, $MSE = 863845.66$, $p < .001$, $\eta_p^2 = .68$. The response time given for new statements ($Mdn = 5585$, $SE = 278$) were significantly higher than repeated statements ($Mdn = 4240$, $SE = 240$).

Furthermore, there was a significant main effect of picture presence on truth rating response times, $F(1, 28) = 5.29$, $MSE = 294074.49$, $p = .029$, $\eta_p^2 = .02$. The responses were longer when there was a picture ($Mdn = 5028$, $SE = 256$) than when there was not ($Mdn = 4797$, $SE = 243$). Finally, there was no significant interaction between

repetition and presence of pictures $F(1, 28) = .42$, $MSE = 275623.81$, $p = .521$, $\eta_p^2 = .02$.

Table 2d

Median (SE) of response times in milliseconds in Experiment 2. (Participants who made correct identification)

		Repetition	
		Yes	No
Picture Presence	Response Times		
	Yes	4324 (242)	5733 (304)
	No	4156 (260)	5438 (265)

4.6.3.3 Truth ratings of no identification

The descriptive statistics for mean truth ratings is shown in Table 2e.

11 participants out of 40 could not correctly predict the actual aim of using pictures.

The results revealed that there was a significant main effect of repetition on participants' truth ratings $F(1, 10) = 21.27$, $MSE = .35$, $p = .001$, $\eta_p^2 = .68$.

Participants gave higher truth judgments to repeated statements ($M = 3.45$, $SE = .12$) than new statements ($M = 2.63$, $SE = .11$). Although picture presence had no main effect on truth ratings $F(1, 10) = .07$, $MSE = .03$, $p = .804$, $\eta_p^2 = .01$, there was a significant interaction between repetition and picture presence $F(1, 10) = 10.40$, $MSE = .02$, $p = .009$, $\eta_p^2 = .51$.

Table 2e

Mean (SE) of truth ratings in Experiment 2. (Participants who could not make correct identification)

	Truth Ratings	Repetition	
		Yes	No
Picture Presence	Yes	3.40 (.14)	2.70 (.10)
	No	3.50 (.11)	2.57 (.12)

4.6.3.4 Truth ratings RT of no identification

The descriptive statistics for median response time for truth ratings is shown in Table 2f.

There was a significant main effect of repetition on participants' response times, $F(1, 10) = 70.78$, $MSE = 319951.30$, $p < .001$, $\eta_p^2 = .88$. The response time given for new statements ($Mdn = 5466$, $SE = 413$) was significantly longer than repeated statements ($Mdn = 4031$, $SE = 338$). Furthermore, there was not a significant main effect of picture presence on truth rating response times, $F(1, 10) = 1.94$, $MSE = 241437.61$, $p = .194$, $\eta_p^2 = .16$. Finally, there was not a significant interaction between repetition and presence of pictures $F(1, 10) = 3.05$, $MSE = 278493.38$, $p = .234$, $\eta_p^2 = .23$.

Table 2f

Median (SE) of response times in milliseconds in Experiment 2. (Participants who could not make correct identification)

	Response Times	Repetition	
		Yes	No
Picture Presence	Yes	4273 (423)	5430 (372)
	No	3789 (261)	5502 (481)

4.7 Discussion

Experiment 2 aimed to explore the joint effect of repetition and picture presence on truth judgments. Although it was hypothesized that repetition and picture presence would have an additive effect on each other, the results showed that the effect of repetition superseded the effect of pictures on truth judgments. Therefore, these results were in line with the findings of Nadarevic et al. (2020) in which the effect of picture presence was indifferent when it was manipulated simultaneously with repetition and source label.

In terms of observing the truthiness and illusory truth effects, the results were the exact opposite of Experiment 1. Repeated statements were rated to be truer than newly seen statements, thus, there was an illusory truth effect. It is obvious that this contradiction between Experiment 1 and 2 was due to the type of repeated information; verbal vs. pictorial.

Just like the previous studies revealing illusory truth effects (Fazio et al., 2015; Hasher et al., 1977), the current study revealed that repeated exposure of statements increased perceived truth of participants.

However, as opposed to Experiment 1, the presence of pictures did not increase perceived truth. This line of results contradict previous truthiness effect studies which showed an inflated perceived truth in the presence of pictures (Newman et al., 2012; Smelter & Calvillo, 2020; Zhang et al., 2021; for a review, see Newman & Zhang, 2020). This could be due to the within-subject manipulation of picture presence as the study of Newman et al. (2015) showed that between-subject manipulation of picture relatedness results in experiencing fluency.

There is also a need to discuss the response times of truth ratings. In Experiment 2, the response times of new statements were longer than repeated statements as in Experiment 1. It could be then predicted that repetition led to ease of processing but it was reflected on truth ratings as well. In Experiment 1, although the response times for repeated pictures were lower than new pictures, this possible ease of processing was not reflected on truth ratings. Accordingly, it could be deduced that in order for repetition to be effective, the 'to-be-rated' information should repeat rather than the accompanying cue.

For participants who correctly identified the aim of using pictures, their responses did not vary from the rest, still there was an illusory truth effect but not truthiness. For participants who could not correctly identify the aim, the results were similar to

the previous analysis results except that there was an interaction between repetition and picture presence. This could be an indication that when participants are not aware of the aim of presenting pictures, an increase in truth ratings might depend on the presence of a picture along with a statement or not. Therefore, the truth ratings were given based on the combined effects of repetition and picture presence.

Furthermore, obtaining opposite results in Experiment 1 and 2 paves the way for asking whether the repetition of context (e.g., pictures) that accompanies information could be influential on truth ratings. Therefore, Experiment 3 further aims to investigate the possible influence of context on perceived truth.

CHAPTER V

EXPERIMENT 3

The results of Experiment 1 showed that repetition does not create a difference in truth ratings if the repeating information is pictorial, but the mere presence of pictures does create a difference. On the contrary, Experiment 2 showed that repetition increases truth ratings if the repeating information is verbal, but the mere presence of pictures did not create a difference. This contrast opens the way for a new question: when validating the truth status of repeated information, is there any contribution of the accompanying context (e.g., picture) on truth ratings or is it just the mere influence of repetition? In other words, if any change occurs in the accompanying context of the repeated information, would truth ratings change accordingly?

Accordingly, Experiment 3 aimed to investigate if it is the effect of repetition only that increases our truth judgments or if it is the reinstatement of a context that inflates our perceived truth. If it is the effect of repetition only, the truth ratings given for statements with changed or reinstated context would not differ. However, if there is an influence of context on truth judgments, the truth ratings given for statements with reinstated and changed context would differ from each other.

5.1 Participants

Forty university students between ages 18 and 30 (Women; 19 , $M_{age} = 22.07$, $SD = 2.76$) participated in exchange for course credit. All participants were native speakers of Turkish and had a normal or corrected-to-normal vision.

5.2 Design

A 2 (statement repetition: yes, no) x 3 (picture type: repeated, changed, new) within-subjects design was used. The independent variables were statement repetition and picture type whereas the dependent variable was truth ratings. Ten participants were assigned for each of the four conditions.

5.3 Materials

Seventy-two pictures and statements obtained from the pilot study were used in this experiment. The order of the statements was randomized across all study trials. The list of statements were divided into three groups; repeated statements with old pictures, repeated statements with new pictures, new statements with new pictures. For the repeated statements with old pictures and new statements with new picture groups, four statements and pictures from each of the nine categories were used. For the repeated statements with the new pictures group, novel pictures for each category were selected which were not included in the pilot experiment. At the encoding phase, thirty-six statements along with pictures were used which were considered as repeated/old statements and pictures. At the truth rating phase, participants were exposed to all seventy-two statements and pictures; eighteen priorly exposed statements and pictures, eighteen priorly exposed statements with novel pictures, and

thirty-six new statements with new pictures. All the groups were counterbalanced across eight conditions and were presented to an equal number of participants.

5.4 Procedure

As in the previous experiments, Experiment 3 consisted of the same phases; encoding, distractor and truth rating (*see in Figure 5*). There were small changes in encoding and truth rating phases. In the encoding phase, participants were exposed to forty-two statements along with pictures. The first and the last three statements with pictures were used to control primacy and recency effects. As in Experiment 1 and 2, participants were asked to rate the interestingness of each statement from 1 to 4 on a scale (*1 = not interesting at all, 2 = not very interesting, 3 = somewhat interesting, 4 = very interesting*) within 8000 ms. The statements proceeded automatically after 8000 ms. Following the distractor phase, participants were directed to the truth rating phase.

At the truth rating phase, participants were asked to rate the truthfulness of the 72 statements again on a scale from 1 to 4 (*1 = absolutely not true, 2 = probably not true, 3 = somewhat true, 4 = absolutely true*) in a self-paced manner. 18 of the old statements were presented with old pictures and the other 18 with new pictures. The rest of the 36 new statements were presented with new pictures which were not priorly exposed. All of the statements and pictures were counterbalanced across conditions.

At the end, participants were asked to answer the same 3 questions asked in the previous experiments. After answering these questions, participants were debriefed and thanked.

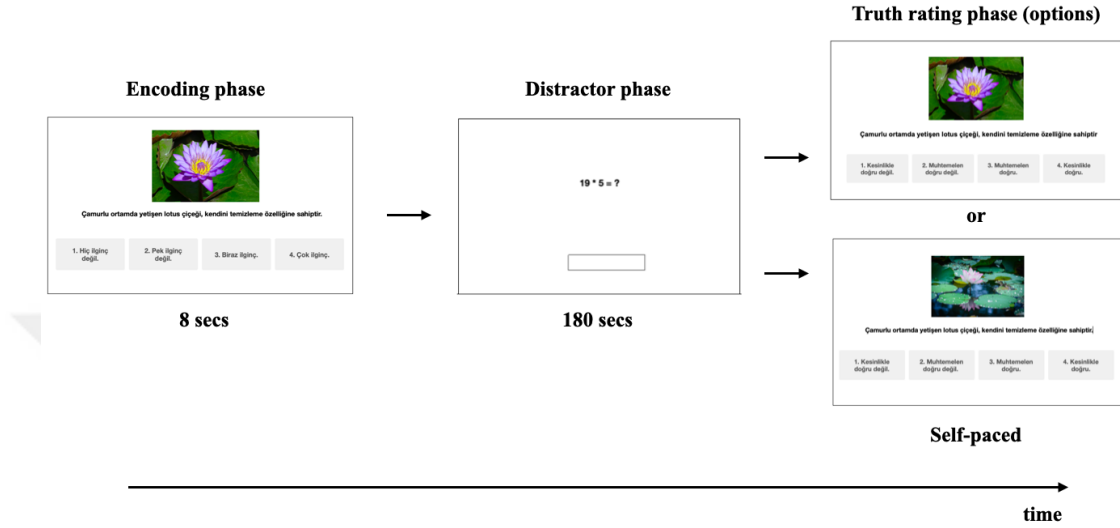


Figure 5. Schematic display of Experiment 3. The figure depicts the condition of repeated statements with the same and changed pictures.

5.5 Results

The alpha level was set at .05 for all statistical tests.

5.5.1 Truth ratings

The descriptive statistics are shown in Table 3a. For analyzing the significance of truth ratings as a function of item type (repeated-old picture, repeated-new picture, new-new picture), one-way repeated measures ANOVA was used. As Mauchly's test indicated a violation of the assumption of sphericity, $\chi^2(2) = 21.34, p < .001$, Greenhouse-Geisser correction was used while reporting. The results revealed a

significant difference between the means for truth judgments given for all groups

$F(1.4, 54.6) = 40.30, MSE = .09, p < .001, \eta_p^2 = .51$.

Bonferroni pairwise comparisons revealed that the truth ratings given for repeated statements with old pictures ($M = 3.22, SE = .08$) were significantly higher than repeated statements with new pictures ($M = 3.11, SE = .07$) and new statements with new pictures ($M = 2.66, SE = .04$). Furthermore, the mean truth ratings of repeated statements with new pictures ($M = 3.11, SE = .07$) were significantly higher than new statements with new pictures ($M = 2.66, SE = .04$). This showed that rather than the mere repetition, reinstatement of the context did create a difference in truth ratings.

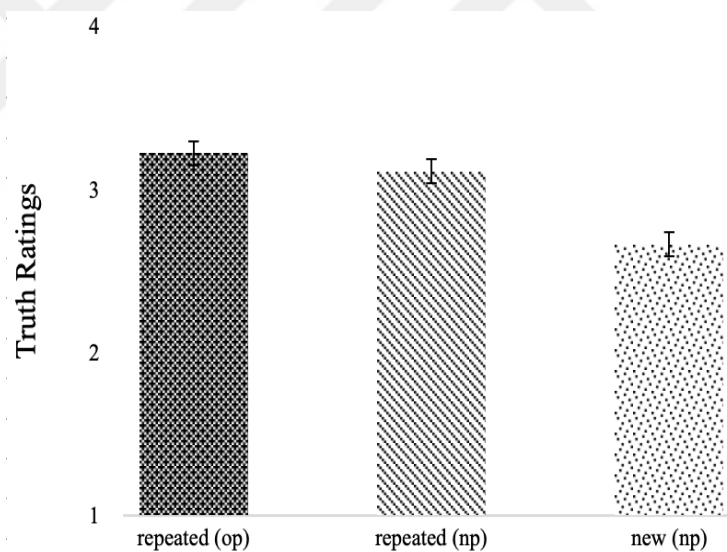


Figure 6. Mean truth ratings (op= old pictures, np= new pictures). Error bars display the standard errors of the means.

5.5.2 Truth rating RT

The descriptive statistics of response times for each condition is shown in Table 3a.

The rating times were analyzed as a function of statement type in one-way repeated

measures ANOVA, and it revealed a significant difference between the median response time of all statement types $F(2, 78) = 79.77, MSE = 24974290.5, p < .001, \eta_p^2 = .67$.

Furthermore, Bonferroni pairwise comparisons showed that the response time given for new statements with new pictures ($Mdn = 5105, SE = 204$) was significantly longer than repeated statements with new pictures ($Mdn = 4026, SE = 186$) and repeated statements with old pictures ($Mdn = 3566, SE = 163$). In addition, the response time given for repeated statements with new pictures ($Mdn = 4026, SE = 186$) was significantly lower than new statements with new pictures ($Mdn = 5105, SE = 204$).

Table 3a.

Mean (SE) of truth ratings and Median (SE) response times in milliseconds in Experiment 3.

Statement type	Truth ratings	Response times
repeated (old picture)	3.22 (.08)	5105 (204)
repeated (new picture)	3.11 (.07)	4026 (186)
new (new picture)	2.66 (.04)	3566 (163)

5.5.3 End of Survey Questions

5.5.3.1 Truth ratings of correct identification

12 out of 40 participants made a correct prediction about the aim of using pictures. Descriptive statistics of mean truth ratings are shown in Table 3b. The repeated measures ANOVA results revealed a significant difference between the means for truth judgments given for all groups $F(2, 22) = 40.30$, $MSE = .76$, $p < .001$, $\eta_p^2 = .50$. Post hoc analysis with a Bonferroni adjustment revealed that truth ratings given for repeated statements with old pictures ($M = 3.15$, $SE = .13$) were significantly higher than repeated statements with new pictures ($M = 2.93$, $SE = .09$) and new statements with new pictures ($M = 2.65$, $SE = .07$). However, there was not a significant difference between the truth ratings given for new statements with new pictures and old statements with new pictures ($p = .064$).

5.5.3.2 Truth ratings RT of correct identification

According to the repeated measures ANOVA results, there was a significant difference between the response time of truth judgments given for all groups $F(2, 22) = 31.30$, $MSE = 8180013.77$, $p < .001$, $\eta_p^2 = .74$. Bonferroni post hoc tests indicated that the response time given for new statements with new pictures ($Mdn = 5310$, $SE = 286$) was significantly longer than old statements with new pictures ($Mdn = 4277$, $SE = 247$) and old statement with old pictures ($Mdn = 3678$, $SE = 198$).

Table 3b.

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

Experiment 3. (Participants who made correct identification)

Statement type	Truth ratings	Response times
repeated (old picture)	3.15 (.13)	3678 (198)
repeated (new picture)	2.93 (.09)	4277 (247)
new (new picture)	2.65 (.07)	5310 (286)

5.5.3.3 Truth ratings of no identification

28 out of 40 participants could not correctly predict the actual aim of using pictures.

Descriptive statistics of mean truth ratings are shown in Table 3c. The repeated measures ANOVA results revealed a significant difference between the means for truth judgments given for all groups $F(2, 54) = 30.77$, $MSE = .09$, $p < .001$, $\eta_p^2 = .53$. The truth ratings given for repeated statements with old pictures ($M = 3.26$, $SE = .09$) were significantly higher than new statements with new pictures ($M = 2.67$, $SE = .05$). The truth ratings of old statements with new pictures ($M = 3.18$, $SE = .08$) were also significantly higher than new statements with new pictures ($M = 2.67$, $SE = .05$). However, there was not a significant difference between the truth ratings given for old statements with new pictures and old statements with old pictures ($p = .449$).

5.5.3.4 Truth ratings RT of no correct identification

According to the repeated measures ANOVA results, there was a significant difference between the response time of truth judgments given for all groups $F(2, 54) = 49.31$, $MSE = 342292.31$, $p < .001$, $\eta_p^2 = .65$. The response time given for new statements with new pictures ($Mdn = 5018$, $SE = 266$) was significantly longer than old statements with new pictures ($Mdn = 3919$, $SE = 243$) and old statement with old pictures ($Mdn = 3518$, $SE = 218$).

Table 3c.

Mean (SE) of truth ratings and Median (SE) response times in milliseconds in Experiment 3. (Participants who could not make correct identification)

Statement type	Truth ratings	Response times
repeated (old picture)	3.26 (.09)	3518 (218)
repeated (new picture)	3.18 (.08)	3919 (243)
new (new picture)	2.67 (.05)	5018 (266)

5.6 Discussion

The results of Experiment 3 showed that when a context is reinstated, the truth ratings increase. In general, the illusory truth effect is observed as in Experiment 2; repeated statements were given higher truth ratings than new statements. As in

previous experiments, the response time results show that repetition increased fluency and this interpreted fluency is reflected on truth judgments as well.

However, repetition was not the only contributor for truth ratings: the context also created a significant difference. When the non-probative pictures were reinstated both at the time of encoding and truth rating, the truth ratings increased. Although the statements were exactly repeated, the truth ratings were lower when there was a slight change in the accompanying non-probative pictures. However, the same line of results were not obtained when a separate analysis was made on the truth ratings of participants who could not correctly identify the actual aim of picture presence. Their results showed that there was still an effect of repetition on truth ratings but not its reinstatement. This could be an indication that participant who were aware of the actual aim of using picture did give higher truth ratings to the statements with a reinstated context purposely. Therefore, it could be important to consider that “masking” the actual aim while conducting an experiment could create different line of results.

These general pattern of results are important in two senses: when participants’ identification of the actual aim is disregarded, it might not be only the mere exposure of a non-probative picture that increases truth ratings but also its reinstatement. When we think from a real life perspective, being repeatedly exposed to fake news would influence our truth judgments but their contextual similarities or differences across different presentations may also cause fluctuations.

CHAPTER VI

GENERAL DISCUSSION

6.1 Summary and Interpretations of Results

The aim of the current study was to understand how truth judgments are influenced by repetition of pictures, simultaneous presentation of repetition and pictures, and context reinstatement. According to previous research, truth judgments were shown to increase when the information repeats, *the illusory truth effect*, (Hasher et al., 1977; Unkelbach et al., 2019) or when a non-probative picture accompanies the information, *the truthiness effect*, (Fenn et al., 2013; Newman et al., 2020). Although these effects were replicated in many studies, the current study aimed to answer the following three questions: 1) Would the illusory truth effect occur if the repeating information is pictorial rather than verbal?; 2) Would the effect of repetition supersede the effect of pictures if they co-occur in the same experimental manipulation?; 3) Would reinstatement of pictures along with information increase truth judgments compared to repeated statements with changed pictures? The stated questions were tested in a series of three experiments.

When we consider the daily life instances, -especially social media postings-, repetition of pictures is almost as common as the repetition of verbal information. Therefore, it is important to understand whether the the modality of repetition is important for the emergence of the illusory truth effect. Experiment 1 used the classical illusory truth effect paradigm, but instead of presenting participants with

verbal information, we used pictures. The aim was to explore whether being repeatedly exposed to pictures increase truth judgments as in previous studies in which verbal information was repeated. The results showed that the illusory truth effect did not emerge in this variation; statements with the repeated pictures did not produce higher truth ratings than statements with new pictures. However, the truthiness effect was apparent in this variation of the experimental paradigm; statements with pictures were given higher truth ratings than statements without pictures. Therefore, not repetition, but pictures 'mere presence increased the truth judgments. Moreover, the response times for statements with new pictures were longer than statements with repeated pictures.

The results were in line with the previous studies regarding the truthiness effect; the mere presence of a non-probative picture biased individuals to rate an unknown information as truer. Therefore, the hypothesis regarding picture presence was supported. However, the results were not in line with the illusory truth effect; repetition of pictures did not create an illusion to rate the information as truer. Although the results showed that repetition of pictures increased fluency (lower response times), the truth ratings did not increase. There could be various possible explanations for this contradiction. First, Unkelbach (2007) showed that fluency is not inherently positive but rather an interpreted experience. Using non-probative pictures might have not been positive or negative enough to interpret it as evidence of truth in Experiment 1. Instead, if the repeating pictures were probative, the interpretation of its fluency could have been reflected differently on truth ratings. Second, as indicated earlier, the type of information that repeats might be a matter for truth rating processes. Although the repetition of verbatim information was shown to be a robust effect, the current experiment revealed that repetition of

pictures -or being priorly exposed to pictures- does not increase truth ratings. Third, when the results are interpreted in terms of the referential theory of Unkelbach and Rom (2017), the reason for not observing the illusory truth effect could be due to the lack of coherently linked references as the repeated information was pictorial. Reading and encoding verbal information help to create coherently linked references in memory and repetition increases the coherence. However, in the case of encoding pictorial information, there is less chance of creating coherently linked references and thus, the repetition of pictures does not increase truth ratings although the perceived ease was increased.

Another point to discuss why Experiment 1 did not reveal an illusory truth effect could be that participants rated the pictures only at the encoding phase of the experiment. However, at the truth rating phase, they were asked to rate the truth status of the statements only. The way they rated and encoded the pictures might have crated a difference in their truth ratings as well. Simply asking the interestingness of the pictures might not be enough to encode a detail or create a judgment in their memory for later reflecting on their truth judgments. For example, if they were given photoshoped pictures or asked about a detail of the picture, the depth of encoding might be different and thus their truth ratings.

Finally, the aim of repeatedly exposing pictures to the participants was obvious for some of the participants and not for the others. As the results showed, the identification on the actual aim of picture presence was reflected differently on truth judgments although there was an experienced fluency regardless of participants' awareness. This could be a point to consider that checking participants's awareness on the aim of experiment might reveal different line of results compared to the general pattern.

As the illusory truth effect was not observed in Experiment 1, we further replicated it with statements as in the classical illusory truth effect paradigm in Experiment 2. Experiment 2 also considered the joint effects of repetition and picture presence reveal. Participants were exposed to statements at the encoding phase instead of pictures. At the truth rating phase the repeated and new statements were presented either with a non-probative picture or not. The results showed that repetition increased the perceived truth for statements which were in line with our prediction. However, as opposed to our prediction, the presence of pictures did not create a difference in truth ratings as in the study of Nadarevic et al. (2020). It could be predicted that the effect of pictures on truth judgments does not prevail when verbal information is repeated. The results can also be an indication that in the study of Nadarevic et al. (2020), the source label manipulation was not a dominant factor for the joint effect of repetition and picture presence. Rather, it could be predicted that pictures are ignored when a more dominant effect comes into play. Therefore, there was not an additive effect between repetition and picture presence, but rather, the effect of repetition displaced the effect of pictures on truth judgments.

Obtaining the illusory truth effect in Experiment 2 could be interpreted in terms of the referential theory of Unkelbach and Rom (2017). The referential theory mainly holds that repeated statements make it possible to create more coherently linked references than novel statements, and thus, higher truth ratings are given. As the statements in our study were unknown, it is probable that being repeatedly exposed to them increased their coherence in memory and this was reflected in the truth judgments. However, when we consider the referential theory in terms of repeating pictures, it is possible that the rated statements were still novel to the statements even

if they appeared with a repeating picture. Also, as the pictures were non-probative, creating linked references in the memory could be difficult and this could be why the repetition of statements increased truth judgments in Experiment 2 but not the repetition of pictures in Experiment 1.

Moreover, the response times for statements with pictures were longer than statements without pictures in the current study. However in Experiment 1, the response time for statements without pictures were longer than statements with repeated pictures. The decrease in response time both in repetition of statements and pictures could be another indication of ease of processing. This shows that the mere presence of pictures might not create ease of processing but their repetition can.

Experiment 3 aimed to investigate whether the context reinstatement changes judgments of truth. Therefore, participants were initially exposed to statements, along with some non-probative pictures. At the truth judgment phase, the accompanying pictures were changed for some of the repeating statements, but the rest were kept constant across encoding and truth judgment phases. The results showed that repeated statements with the reinstated pictures were given higher truth ratings than repeated statements with the changed pictures. Both of these conditions also produced higher truth judgments than new items. First of all, the results again demonstrated the illusory truth effect; repetition increased truth ratings. However, the current study also showed that the reinstatement of context additively increased the truth ratings. This is in line with the previous studies in which the reinstatement of context increased FOK judgments (Hanczakowski et al., 2017) and JOL (Hanczakowski et al., 2018). Therefore, these findings can be considered important

in terms of demonstrating that context reinstatement influences truth judgments, similar to some other metacognitive judgments. In addition, it could be also deduced that specificity of information plays a role in judging the truth in addition to the mere repetition of information. Accessibility to memory is one of the explanations for this context reinstatement effect. Hanczakowski et al. (2015) asserted that when a context is reinstated, there is a high chance of accessing memory both for the studied item and context. However, when context is not reinstated, there is less chance of accessing both in memory, rather just the studied items. This could be the case in Experiment 3. It is possible that the reinstated condition led to an easier accessibility to memory for both pictures and statements, however, the changed picture condition led to an easier accessibility just for repeated statements.

Furthermore, the response times given for repeated statements with changed pictures were longer than repeated statements with reinstating context. As predicted in the previous experiments, the decrease in response time due to context reinstatement can be a reflection of fluency. Repetition with the same context increased ease of processing and the ease of processing increased truth ratings.

In conclusion, Experiment 3 brought a new perspective to the illusory truth effect by demonstrating that reinstating with the exact context can further increase truth judgments rather than the mere repetition of statements. This could be an indication that the accompanying cues are taken into consideration while individuals give truth rating. However, there is also a need to consider that the effect of context reinstatement was not observed when participants were not aware of the actual aim. Individuals' expectations or predictions about the experimental materials might be

reflected differently on their judgments. Therefore, although the general pattern revealed an effect of context reinstatement, separate analysis on participants' identification status did not follow the general pattern.

6.2 Limitations and Further Studies

The reason behind not obtaining the illusory truth effect in Experiment 1 could be due to the way pictures are encoded. Perhaps, the rich semantic context of pictures led participants to attend to different features of a picture; e.g., either colors, shapes or objects. Therefore, the depth of encoding between statements and pictures might have been reflected differently in truth ratings. Further studies could manipulate the depth of encoding pictures (e.g., exposing more than once, asking to type a specific detail), and explore how it is reflected on truth judgments.

Another reason behind obtaining contradictory results between the experiments could be due to the “interestingness” masking that was used. Since some of the participants were aware of the actual aim of picture presence, they might have reflected their truth judgments differently on the statements compared to the participants who were unaware of the aim. Future studies could consider to use a different way of making in order to make the aim of experiment less obvious.

A truthiness effect was not observed in Experiment 2. This could be due to the within-subject manipulation of picture relatedness. In the study of Newman et al. (2015), the fluency was observed when the picture presence was manipulated as within-subjects and relatedness as between-subjects. Further studies could investigate whether between-subject manipulation of “statements with picture” and “statements without picture” conditions create a truthiness effect or not.

In Experiment 1 and 2, all of the participants were Bilkent University students. However, for Experiment 3, the students from other universities were also included. Although Bilkent University students had the motivation to gain extra course credits, there was not such motivation for students from other universities. Therefore, the current motivation of participants might have contributed to their performance or attention during the experiment.

True-but-unknown statements were used in all of the experiments in order to make sure that participants have no prior knowledge or they do not reflect any prior beliefs on their truth judgments. However, false or fake information can be frequently seen in social media postings. Therefore, further studies could replicate the experiments with false information in order to understand how repetition, picture presence and context change influences truth judgments.

Finally, as the current study mainly focused on how our truth judgments are influenced by various factors, it contributes considerably to understanding how false information in social media postings can bias individuals. However, the information was presented on a blank page rather than as a social media post format. In order to increase its applicability and generalizability, further studies could manipulate the presentation format of information in order to further investigate whether presentation format is influential on truth ratings or not.

6.3 Practical Implications and Conclusions

To conclude, this study shows that the type of information that repeats matter while validating the truth status of an information. Repetition of verbal information increases truth ratings but repetition of pictures does not. Moreover, repetition increases individuals' tendency to believe in information, especially if it reinstates

with its exact context. However, when repetition and picture presence co-occur in the same context, individuals ignore pictures while giving a truth rating.

These results can be implied to the social media postings that we frequently encounter. Being repeatedly exposed to fake news can increase individuals' tendency to believe in it. For example, a fake news on Twitter that is retweeted more than once, that is accompanied by a picture and that repeats with the same picture increases the probability of believing in it. Therefore, extra precautions should be taken in social media platforms in order to avoid the spreading of false or fake information.

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APPENDICES

A. LIST STATEMENTS IN PILOT STUDY AND MEAN RATINGS

(Q1= Truth Status, Q2 = Familiarity, Q3= Picture Presence)

Category	Statement	Q1	Q2	Q3
Animal	Su aygırları üzöldüklerinde terleri kırmızı renk alır.	1.59	2.63	2.18
Animal	Hamam böcekleri kafaları kopsa bile birkaç hafta daha yaşayabilirler.	2.32	2.74	2.38
Animal	İnekler, bir günde insanlardan iki yüz kat daha fazla gaz üretirler.	1.85	2.81	1.94
Animal	Zürafalar yaklaşık elli üç santimlik dilleri ile kendi kulaklarını temizleyebilirler.	1.82	2.64	2.13
Animal	İguanalar su altında yirmi sekiz dakika kalabilirler.	1.77	2.83	2.07
Animal	Devekuşlarının gözleri beyinlerinden büyüktür.	2.38	2.90	2.56
Animal	Bilinen en yaşlı Japon balığı, kırk bir yaşındaydı, adı da Fred'di.	1.38	2.55	1.84
Animal	Çekirgeler, arka bacaklarındaki delikler aracılığıyla duyarlar.	1.82	2.61	2.06

Animal	Tavşanlar kafalarını çevirmeden arkalarını görebilirler.	1.68	2.39	2.06
Animal	Kürlenmiş balık yumurtası için kullanılan terim Botargo'dur.	1.71	2.64	2.23
General Knowledge	"Don Juan"ı yazan şair aslında Lord Byron'dur.	1.44	2.36	2.03
General Knowledge	"Her hayata biraz yağmur yağmalı" dizesini yazan şair Henry Longfellow'dur.	1.65	2.73	2.25
General Knowledge	"Bing yüzlü adam" olarak bilinen aktör Lon Chaney'dir.	1.62	2.84	2.34
General Knowledge	Elwood P. Dowd, "Harvey" oyunundaki bir karakterdir.	1.42	2.69	2.00
General Knowledge	Bir mili dört dakikanın altında koşan ilk kişi Roger Bannister'dı.	1.53	2.63	2.13
General Knowledge	"Pinokyo" hikayesindeki Japon balığının adı Cleo'dur.	1.88	2.61	1.81
General Knowledge	"Gulliver'in Seyahatleri"ndeki devlerin ülkesi Brobdingnag'dır.	1.90	2.69	2.39
General	İlk buzlu dondurmayı icat eden kişi	1.59	2.56	1.96

Knowledge	Frank Epperson'dur.			
General Knowledge	Navajo dili, Na-Dené dil ailesine aittir.	1.46	2.63	2.16
General Knowledge	"Acı ve İlham" kitabının yazarı Irving Stone'dur.	1.56	2.70	1.71
Plants	İdolomantis diabolica, hayatta kalabilmek için çiçek şekline bürünen bir peygamberdevesi türüdür.	1.88	2.87	2.63
Plants	Ceset çiçeği olarak bilinen Titan Arum, kötü kokusu ile bilinmektedir.	2.03	3.03	2.24
Plants	Dünya üzerinde on beş bin farklı gül türü vardır.	1.82	2.53	1.94
Plants	Dünyanın en eski çiçeği, yüz yirmi beş milyon yıl öncesine dayanan bir su zambağıdır.	1.62	2.53	2.38
Plants	Çamurlu ortamda yetişen Lotus çiçeği, kendini temizleme özelliğine sahiptir.	2.40	3.00	2.50
Plants	Selaginella lepidophylla bitkisi hiç suya ihtiyaç duymadan yaşar.	1.55	2.63	2.27
Plants	Puya Raimondii bitkisi yalnızca yüz elli yılda bir çiçek açmaktadır.	1.73	2.93	2.50

Plants	Clathrus archeri, küresel dağılıma sahip bir mantardır.	1.55	2.70	2.16
Plants	Rafflesia (tuan-mudae), dünyada bilinen en büyük çiçektir.	1.55	2.67	2.39
Plants	Aristolochia Salvadorensis tropikal iklimde yetişen zehirli bir bitkidir.	1.73	2.73	2.26
Stones	Rodokrozit, doğada bulunan manganez karbonat mineralidir.	1.69	2.69	2.50
Stones	Peridot, olivin ailesinden bir mineraldir.	1.36	2.71	2.42
Stones	Aleksandrit, krizoberil grubu içerisinde yer alır.	1.36	2.77	2.25
Stones	Aragonit taşı, ismini İspanya'da bulunan Aragon'dan almaktadır.	1.64	2.83	2.29
Stones	Krizolit adı, "altın taş" anlamına gelmektedir.	1.56	2.62	1.97
Stones	Heliodor, doğada bulunan silikat grubuna ait doğal bir taştır.	1.59	2.74	2.50
Stones	Morganit taşı, Güney Kaliforniya'da keşfedilmiştir.	1.62	2.41	2.09

Stones	Tanzanit, doğada bulunan epidot mineral grubuna ait doğal bir taştır.	1.44	2.66	2.36
Stones	Krizopras, doğada bulunan yarı saydam bir kalsedon çeşididir.	1.58	2.71	2.50
Stones	Rodonit taşı, doğada bulunan lal taşlarının bir çeşididir.	1.79	2.77	2.46
Phobia	Ailurofobi, kedilerden korkmaya verilen addır.	1.72	2.57	2.03
Phobia	Amaksofobi, araba ya da taşıt korkusuna verilen addır.	1.64	2.50	1.87
Phobia	Astrafobi, şimşekten korkmaya verilen addır.	1.97	2.71	2.47
Phobia	Amatofobi, tozdan korkmaya verilen addır.	1.72	2.67	2.32
Phobia	Hipofobi, atlardan korkmaya verilen addır.	1.85	2.56	2.12
Phobia	Lepidopterofobi, kelebeklerden korkmaya verilen addır.	1.37	2.68	2.07
Phobia	Ofidiyofobi, yılanlardan korkmaya verilen addır.	1.76	2.65	2.46

Phobia	Talassofobi, deniz veya okyanustan korkmaya verilen addır.	1.76	2.53	2.19
Phobia	Siderofobi, yıldızlardan korkmaya verilen addır.	1.68	2.38	1.94
Phobia	Koulrofobi, palyaçolardan korkmaya verilen addır.	1.73	2.67	2.03
Space	Plüton'un en büyük uydusu Charon, Plüton'un yarısı kadardır.	1.82	2.74	2.52
Space	Jüpiter'in yörüngesinde yetmiş dokuz uydu vardır.	1.97	2.73	1.81
Space	Mars'ta bulunan Olympus Mons, güneş sisteminde keşfedilen en büyük dağdır.	1.63	2.72	2.00
Space	Satürn'ün küçük uydusu Enceladus, güneş ışığının %90'ını geri yansıtır.	1.59	2.61	1.97
Space	Uzayda ilk tüketilen meşrubat Coca Cola'dır.	1.63	2.21	1.93
Space	Uzaya ilk çıkan canlı memeli, 'Laika ' isimli bir köpektir.	1.94	2.67	2.09
Space	Tardigrad olarak bilinen hayvan, uzayda on gün yaşayabilmektedir.	1.91	2.69	2.15

Space	Dünyanın yörüngesini ilk tamamlayan kozmonot Gagarin'dir.	2.46	2.88	2.47
Space	Güneş dışında gökyüzündeki en parlak yıldız Sirius'tur.	2.57	3.00	2.42
Space	Sputnik, dünyanın ilk Sovyet yapay uydusudur.	2.71	2.97	1.94
Sports	Buzkashi, Afganistanın geleneksel sporlarından biridir.	1.64	2.70	2.19
Sports	Zorbing, Yeni Zelanda'ya ait bir spor dalıdır.	2.00	2.71	2.42
Sports	Slacklining, denge kurmanın amaçlandığı bir spor dalıdır.	1.56	2.36	2.28
Sports	Shin Kicking, sonradan bir spor dalına dönüşmüştür.	1.53	2.47	1.77
Sports	Limbo pateni, Çin'de düzenlenen bir ekstrem spordur.	1.58	2.69	2.10
Sports	Pesapallo, Finlandiya beyzbolu olarak bilinen bir spor dalıdır.	1.52	2.59	2.33
Sports	Bo-taoshi, Japonlara özgü bir spor dalıdır.	1.66	2.97	2,72

Sports	Kaninhop, tavşanların oynatıldığı bir spor dalıdır.	1.52	2.43	2.10
Sports	Octopush, sualtı hokeyinin kısa bir aparatla oynanan dalıdır.	1.44	2.36	1.94
Sports	Bossabal, İspanya’da icat edilen bir spor dalıdır.	1.56	2.83	2.50
Nature	Asya'nın en uzun nehri Yangtze'dir.	1.91	2.76	2.27
Nature	Güney Amerika'nın en yüksek dağı Aconcagua'dır.	1.70	2.67	2.42
Nature	Roma'nın içinden akan nehir Tiber'dir.	1.94	2.77	2.31
Nature	Doğada yaşayan en büyük canlı Armillaria ostoyae mantarıdır.	1.71	2.31	1.94
Nature	Sargasso Denizi, karaya kıyısı olmayan tek denizdir.	1.40	2.64	2.07
Nature	Sibirya’da dünya ormanlarının % 25’inden fazlası bulunmaktadır.	1.81	2.69	2.26
Nature	Bir buzdağının ortalama ağırlığı 20 milyon tondur.	1.85	2.66	2.40
Nature	And dağları, dünyanın en uzun sıradağı zinciridir.	2.39	3.00	2.56

Nature	Dünya'nın yüzey alanı en büyük şehri Hulunbuir'dir.	1.41	2.43	2.09
Nature	Aeaea Adası, İtalya'da bulunmaktadır.	1.71	2.56	2.18
Music	Glasharmonika, Benjamin Franklin tarafından icat edilmiş bir müzik aletidir.	1.42	2.50	2.16
Music	Theremin, manyetik dalgalarla ses çıkaran bir müzik aletidir.	1.89	2.55	2.09
Music	Elasticsynth, esneme ile oluşan sinyali sese dönüştüren bir müzik aletidir.	1.63	2.69	2.20
Music	Alphashere, İngiltere'de icat edilen bir müzik aletidir.	1.38	2.47	2.06
Music	Eigenharp, John Lambert'in icat ettiği bir müzik aletidir.	1.35	2.65	2.22
Music	Beatbearing, Peter Bennet tarafından icat edilen bir müzik aletidir.	1.49	2.48	2.06
Music	Hydraulophone, su basıncı ile çalışan bir müzik aletidir.	1.41	2.65	2.49
Music	Tenori-On, Japon sanatçılar tarafından üretilmiş bir müzik aletidir.	1.33	2.67	1.97

Music	Hang, İsviçre’de üretilen bir müzik aletidir.	1.91	2.73	2.19
Music	Array Mbira Bill Wesley tarafından üretilmiş bir müzik aletidir.	1.61	2.74	2.31



APPENDICES

B. LIST OF TRUE STATEMENTS AND PICTURES IN EXPERIMENT 1

Category	Statement	Picture
Animal	Su aygırları üzüldüklerinde terleri kırmızı renk alır.	https://cdn.pixabay.com/photo/2019/05/07/23/58/hippo-4187450_960_720.jpg
Animal	Hamam böcekleri kafaları kopsa bile birkaç hafta daha yaşayabilirler.	https://cdn.pixabay.com/photo/2018/08/31/18/34/cockroach-3645305_960_720.jpg
Animal	İnekler, bir günde insanlardan iki yüz kat daha fazla gaz üretirler.	https://cdn.pixabay.com/photo/2018/07/26/00/08/cow-3562617_1280.jpg
Animal	Zürafalar yaklaşık elli üç santimlik dilleri ile kendi kulaklarını temizleyebilirler.	https://cdn.pixabay.com/photo/2020/04/26/19/36/giraffe-5096872_1280.jpg
Animal	İguanalar su altında yirmi sekiz dakika kalabilirler.	https://cdn.pixabay.com/photo/2019/10/08/03/18/iguana-4534043_1280.jpg
Animal	Devekuşlarının gözleri beyinlerinden büyüktür.	https://cdn.pixabay.com/photo/2019/06/30/02/52/ostrich-4307189_1280.jpg
Animal	Bilinen en yaşlı Japon balığı, kırk bir yaşındaydı, adı da Fred'di.	https://cdn.pixabay.com/photo/2015/12/01/09/13/goldfish-1071839_1280.jpg
Animal	Çekirgeler, arka bacaklarındaki delikler aracılığıyla duyarlar.	https://cdn.pixabay.com/photo/2017/08/06/19/55/grasshopper-2595730_1280.jpg
Animal	Tavşanlar kafalarını çevirmeden arkalarını görebilirler.	https://cdn.pixabay.com/photo/2019/05/08/15/40/rabbit-4188924_1280.jpg

Animal	Kürlenmiş balık yumurtası için kullanılan terim Botargo'dur.	https://cdn.pixabay.com/photo/2012/06/19/19/18/salmon-50301_1280.jpg
General Knowledge	"Don Juan"ı yazan şair aslında Lord Byron'dur.	https://upload.wikimedia.org/wikipedia/commons/a/a0/Byron%2C_George_Gordon_%281788-1824%29%3B_alias_Lord_Byron%2C_schrijver_en_dichter%2C_Mauzaisse%2C_Jean-Baptiste%2C_Felixarchief%2C_12_12873.jpg
General Knowledge	"Her hayata biraz yağmur yağmalı" dizesini yazan şair Henry Longfellow'dur.	https://live.staticflickr.com/8559/8704668368_0d783c2dab_z.jpg
General Knowledge	"Bing yüzlü adam" olarak bilinen aktör Lon Chaney'dir.	https://live.staticflickr.com/2268/1542876911_cf2c1675b7_b.jpg
General Knowledge	Elwood P. Dowd, "Harvey" oyunundaki bir karakterdir.	https://live.staticflickr.com/1842/30858304658_9522eaa6fe_b.jpg
General Knowledge	Bir mili dört dakikanın altında koşan ilk kişi Roger Bannister'dı.	https://upload.wikimedia.org/wikipedia/commons/d/d5/Bannister_and_Landy.jpg
General Knowledge	"Pinokyo" hikayesindeki Japon balığının adı Cleo'dur.	https://cdn.pixabay.com/photo/2017/05/27/00/52/italy-2347390_1280.jpg

General	"Gulliver'in Seyahatleri"ndeki devlerin	https://cdn.pixabay.com/photo/2016/10/11/15/15/gullivers-travels-1731861_1280.jpg
Knowledge	ülkesi Brobdingnag'dır.	
General	İlk buzlu dondurmayı icat eden kişi Frank	https://cdn.pixabay.com/photo/2020/09/30/11/47/popsicle-5615426_1280.jpg
Knowledge	Epperson'dur.	
General	Navajo dili, Na-Dené dil ailesine aittir.	https://upload.wikimedia.org/wikipedia/commons/f/fd/A_Navajo_man_in_ceremonial_dress_Wellcome_V0038481.jpg
Knowledge		
General	"Acı ve İlham" kitabının yazarı Irving	https://live.staticflickr.com/93/242834045_cd8f0e1589_b.jpg
Knowledge	Stone'dur.	
Plants	İdolomantis diabolica, hayatta kalabilmek için çiçek şekline bürünen bir peygamberdevesi türüdür.	https://live.staticflickr.com/8629/16232830658_33cf80048c_b.jpg
Plants	Ceset çiçeği olarak bilinen Titan Arum, kötü kokusu ile bilinmektedir.	https://upload.wikimedia.org/wikipedia/commons/5/5c/Amorphophallus_titanum_%28corpse_flower%29_-_2.jpg
Plants	Dünya üzerinde on beş bin farklı gül türü vardır.	https://c.pxhere.com/images/5a/92/45f82f6df9a6476a57d9709f9f46-1592920.jpg!d
Plants	Dünyanın en eski çiçeği, yüz yirmi beş milyon yıl öncesine dayanan bir su zambağıdır.	https://c.pxhere.com/photos/6d/57/water_lily_nuphar_blossom_bloom_aquatic_plant_bloom_flower_water-1100353.jpg!d
Plants	Çamurlu ortamda yetişen Lotus çiçeği,	https://c.pxhere.com/images/86/c6/c488fcdd414f544acfe52a329ba3-1419770.jpg!d

kendini temizleme özelliğine sahiptir.

Plants	Selaginella lepidophylla bitkisi hiç suya ihtiyaç duymadan yaşar.	https://live.staticflickr.com/7724/27256969163_98aedd6a6_b.jpg
Plants	Puya Raimondii bitkisi yalnızca yüz elli yılda bir çiçek açmaktadır.	https://upload.wikimedia.org/wikipedia/commons/6/61/La_Puya_Raimondi.jpg
Plants	Clathrus archeri, küresel dağılıma sahip bir mantardır.	https://live.staticflickr.com/4771/27075290618_aacb063dc9_b.jpg
Plants	Rafflesia (tuan-mudae), dünyada bilinen en büyük çiçektir.	https://live.staticflickr.com/3076/3121690357_71973a357c_b.jpg
Plants	Aristolochia Salvadorensis tropikal iklimde yetişen zehirli bir bitkidir.	https://upload.wikimedia.org/wikipedia/commons/thumb/d/da/Jindai_Botanical_Garden_-_Aristolochia_Salvadorensis.jpg/800px-Jindai_Botanical_Garden_-_Aristolochia_Salvadorensis.jpg
Stones	Rodokrozit, doğada bulunan manganerz karbonat mineralidir.	https://www.flickr.com/photos/maiac/3543335057
Stones	Peridot, olivin ailesinden bir mineraldir.	https://commons.wikimedia.org/wiki/File:Peridot_-_Mineral_Cabinet_(Arppeanum)_-_DSC05499.JPG
Stones	Aleksandrit, krizoberil grubu içerisinde yer alır.	https://commons.wikimedia.org/wiki/File:Chrysobéryl_var._alexandrite_sous_UV_(Brésil)_1.jpg
Stones	Aragonit taşı, ismini İspanya'da bulunan Aragon'dan almaktadır.	https://www.flickr.com/photos/jsjgeology/32166079176

Stones	Krizolit adı, "altın taş" anlamına gelmektedir.	https://denizinyildizi.com/degerli-taslar/peridot-tasi-ozellikleri-ve-faydalari.html
Stones	Heliodor, doğada bulunan silikat grubuna ait doğal bir taştır.	https://commons.wikimedia.org/wiki/File:Beryl-27322.jpg
Stones	Morganit taşı, Güney Kaliforniya'da keşfedilmiştir.	https://www.flickr.com/photos/orbitaljoe/273223697
Stones	Tanzanit, doğada bulunan epidot mineral grubuna ait doğal bir taştır.	https://commons.wikimedia.org/wiki/File:Tanzanite_(Tanzanie).JPG
Stones	Krizopras, doğada bulunan yarı saydam bir kalsedon çeşididir.	https://www.piqsels.com/tr/search?q=ca-bochon
Stones	Rodonit taşı, doğada bulunan lal taşlarının bir çeşididir.	https://commons.wikimedia.org/wiki/File:Rodonit2.JPG
Phobia	Ailurofobi, kedilerden korkmaya verilen addır.	https://pixnio.com/tr/media/doga-sirin-goz-kedi-kurk
Phobia	Amaksofobi, araba ya da taşıt korkusuna verilen addır.	https://libreshot.com/wp-content/uploads/2017/12/red-car-side-view-861x574.jpg
Phobia	Astrafobi, şimşekten korkmaya verilen addır.	https://c.pxhere.com/photos/3b/bb/photo-65051.jpg!d

Phobia	Amatofobi, tozdan korkmaya verilen addır.	https://i.sozcu.com.tr/wp-content/uploads/2020/09/12/iecrop/1_16_9_1599931259-880x495.jpg
Phobia	Hipofobi, atlardan korkmaya verilen addır.	https://c.pxhere.com/photos/6b/ff/horse_pure_arab_blood_horse_breeding_equine_horses_horse_head_horsehair_head-791443.jpg!d
Phobia	Lepidopterofobi, kelebeklerden korkmaya verilen addır.	https://c.pxhere.com/photos/f2/c6/photo-71362.jpg!d
Phobia	Ofidiyofobi, yılanlardan korkmaya verilen addır.	https://c.pxhere.com/photos/b9/dd/photo-108764.jpg!d
Phobia	Talassofobi, deniz veya okyanustan korkmaya verilen addır.	https://pixnio.com/free-images/2017/10/09/2017-10-09-11-54-42-1100x733.jpg
Phobia	Siderofobi, yıldızlardan korkmaya verilen addır.	https://upload.wikimedia.org/wikipedia/commons/4/4b/Bob_Star_-_M45_Carranza_Field_%28by%29.jpg
Phobia	Koulrofobi, palyaçolardan korkmaya verilen addır.	https://cdn.pixabay.com/photo/2017/12/16/17/08/clown-3022958_1280.jpg
Space	Plüton'un en büyük uydusu Charon, Plüton'un yarısı kadardır.	https://live.staticflickr.com/8101/8482713991_8573d5e68d.jpg
Space	Jüpiter'in yörüngesinde yetmiş dokuz uydu vardır.	https://cdn.pixabay.com/photo/2020/12/06/12/03/jupiter-5808571_1280.jpg
Space	Mars'ta bulunan Olympus Mons, güneş sisteminde keşfedilen en büyük dağdır.	https://live.staticflickr.com/669/21305028179_9389e1c771_b.jpg

Space	Satürn'ün küçük uydusu Enceladus, güneş ışığının %90'ını geri yansıtır.	https://c.pxhere.com/photos/83/4f/saturn_planet_saturn's_rings_solar_system_aurora_rings_hiimmelskoerper_space-1252969.jpg!d
Space	Uzayda ilk tüketilen meşrubat Coca Cola'dır.	https://c.pxhere.com/photos/bd/04/beverage_blurred_background_can_coca_col_a_drink_macro_refreshment-1560529.jpg!d
Space	Uzaya ilk çıkan canlı memeli, 'Laika ' isimli bir köpektir.	https://live.staticflickr.com/3868/18883006855_f25b0dfbe6_w.jpg
Space	Tardigrad olarak bilinen hayvan, uzayda on gün yaşayabilmektedir.	https://upload.wikimedia.org/wikipedia/commons/thumb/c/cd/SEM_image_of_Milnesium_tardigradum_in_active_state_-_journal.pone.0045682.g001-2.png/782px-SEM_image_of_Milnesium_tardigradum_in_active_state_-_journal.pone.0045682.g001-2.png
Space	Dünyanın yörüngesini ilk tamamlayan kozmonot Gagarin'dir.	https://live.staticflickr.com/8651/16042132243_c13949f25e_b.jpg
Space	Güneş dışında gökyüzündeki en parlak yıldız Sirius'tur.	https://cdn.pixabay.com/photo/2017/02/19/21/30/sirius-2080966_1280.jpg
Space	Sputnik, dünyanın ilk Sovyet yapay uydusudur.	https://upload.wikimedia.org/wikipedia/commons/e/e3/Sputnik_satelitea.jpg
Sports	Buzkashi, Afganistanın geleneksel sporlarından biridir.	https://live.staticflickr.com/4093/4904723487_2c1582bff0_b.jpg
Sports	Zorbing, Yeni Zelanda'ya ait bir spor dalıdır.	https://cdn.pixabay.com/photo/2016/07/21/12/06/new-zealand-1532366_1280.jpg

Sports	Slacklining, denge kurmanın amaçlandığı bir spor dalıdır.	https://upload.wikimedia.org/wikipedia/commons/e/e0/Cambridgeslackerssaf40.jpg
Sports	Shin Kicking, sonradan bir spor dalına dönüşmüştür.	https://s0.geograph.org.uk/geophotos/06/48/34/6483497_eed9d2ef.jpg
Sports	Limbo pateni, Çin'de düzenlenen bir ekstrem spordur.	https://commons.wikimedia.org/wiki/File:G._Devishree_-_Limbo_Skating_under_Bar_World_Record.JPG
Sports	Pesapallo, Finlandiya beyzbolu olarak bilinen bir spor dalıdır.	https://upload.wikimedia.org/wikipedia/commons/3/3c/Pes%C3%A4pallu_equipment.JPG
Sports	Bo-taoshi, Japonlara özgü bir spor dalıdır.	https://upload.wikimedia.org/wikipedia/commons/1/1d/Bo-Taoshi_%285785182439%29.jpg
Sports	Kaninhop, tavşanların oynatıldığı bir spor dalıdır.	https://live.staticflickr.com/5034/6910679430_a01af4f226_b.jpg
Sports	Octopush, sualtı hokeyinin kısa bir aparatla oynanan dalıdır.	https://upload.wikimedia.org/wikipedia/commons/9/9d/OctopushTwoPlayers28092009.JPG
Sports	Bossabal, İspanya'da icat edilen bir spor dalıdır.	https://upload.wikimedia.org/wikipedia/commons/8/8b/Bossaball-wiki-2.jpg
Nature	Asya'nın en uzun nehri Yangtze'dir.	https://p0.pxfuel.com/preview/696/677/177/yangtze-river-mountain-landscape.jpg
Nature	Güney Amerika'nın en yüksek dağı Aconcagua'dır.	https://upload.wikimedia.org/wikipedia/commons/4/4e/Aconcagua2016.jpg
Nature	Roma'nın içinden akan nehir Tiber'dir.	https://upload.wikimedia.org/wikipedia/commons/d/de/Tiber_River_%28Rome%29.JPG

Nature	Doğada yaşayan en büyük canlı Armillaria ostoyae mantaradır.	https://upload.wikimedia.org/wikipedia/commons/b/bd/Armillaria_ostoyae_DS_Cf5986.jpg
Nature	Sargasso Denizi, karaya kıyısı olmayan tek denizdir.	https://media.snl.no/media/170283/standard_compressed_Lines_of_sargassum_Sargasso_Sea.jpg
Nature	Sibirya'da dünya ormanlarının % 25'inden fazlası bulunmaktadır.	https://pixnio.com/free-images/2018/10/05/2018-10-05-21-09-10-1200x800.jpg
Nature	Bir buzdağının ortalama ağırlığı 20 milyon tondur.	https://i0.hippopx.com/photos/836/447/592/ice-lake-boat-iceberg-preview.jpg
Nature	And dağları, dünyanın en uzun sıradağı zinciridir.	https://i0.hippopx.com/photos/354/101/153/plateau-blue-sky-tibet-s-snow-capped-mountains-preview.jpg
Nature	Dünya'nın yüzey alanı en büyük şehri Hulunbuir'dir.	https://upload.wikimedia.org/wikipedia/commons/1/1a/HulunBuir.png
Nature	Aeaea Adası, İtalya'da bulunmaktadır.	https://c.pxhere.com/photos/83/b6/island_tropical_tropical_island_beach_ocean_sea_travel_water-1368631.jpg!d
Music	Glasharmonika, Benjamin Franklin tarafından icat edilmiş bir müzik aletidir.	https://upload.wikimedia.org/wikipedia/commons/4/4c/Unterlinden-Glass_harmonica_%284%29.jpg
Music	Theremin, manyetik dalgalarla ses çıkaran bir müzik aletidir.	https://upload.wikimedia.org/wikipedia/commons/0/00/My_Theremino_Theremin.jpg
Music	Elasticsynth, esneme ile oluşan sinyali sese dönüştüren bir müzik aletidir.	https://turkcebkf.wordpress.com/2013/06/28/yeni-muzik-aleti-elasticsynth/

Music	Alphasphere, İngiltere’de icat edilen bir müzik aletidir.	https://www.musicradar.com/news/tech/introducing-the-alphasphere-401087
Music	Eigenharp, John Lambert’in icat ettiği bir müzik aletidir.	https://upload.wikimedia.org/wikipedia/commons/5/5f/Eigenharp_Alpha_Wenge_0610_1384_%282%29.jpg
Music	Beatbearing, Peter Bennet tarafından icat edilen bir müzik aletidir.	https://upload.wikimedia.org/wikipedia/commons/f/f2/Beat_Bearing_Board.JPG
Music	Hydraulophone, su basıncı ile çalışan bir müzik aletidir.	https://upload.wikimedia.org/wikipedia/commons/6/69/Hydraulophone45jets091.jpg
Music	Tenori-On, Japon sanatçılar tarafından üretilmiş bir müzik aletidir.	https://upload.wikimedia.org/wikipedia/commons/7/70/Tenori-on.jpg
Music	Hang, İsviçre’de üretilen bir müzik aletidir.	https://upload.wikimedia.org/wikipedia/commons/a/ac/Integral_hang.jpg
Music	Array Mbira Bill Wesley tarafından üretilmiş bir müzik aletidir.	https://upload.wikimedia.org/wikipedia/commons/3/3a/Arraymbira.jpg

APPENDICES

C. LIST OF TRUE STATEMENTS IN EXPERIMENT 2 AND 3

(‘Changed ’Pictures Used in Experiment 3)

Category	Statement	Picture
Animal	Su aygırları üzündüklerinde terleri kırmızı renk alır.	https://www.piqsels.com/tr/public-domain-photo-jbhpk
Animal	Hamam böcekleri kafaları kopsa bile birkaç hafta daha yaşayabilirler.	https://www.maxpixel.net/Roach-Cockroach-Insect-Bug-German-Cockroach-1491411
Animal	İnekler, bir günde insanlardan iki yüz kat daha fazla gaz üretirler.	https://www.piqsels.com/tr/public-domain-photo-spanl
Animal	Zürafalar yaklaşık elli üç santimlik dilleri ile kendi kulaklarını temizleyebilirler.	https://www.hippopx.com/tr/query?q=animal%20world
Animal	İguanalar su altında yirmi sekiz dakika kalabilirler.	https://pixnio.com/tr/hayvanlar/surungenler-amfibiler/kertenkele/hayvan-kertenkele-surungen-yaban-hayati-iguana-renkli-cilt
Animal	Devekuşlarının gözleri beyinlerinden büyüktür.	https://pxhere.com/es/photo/495927
Animal	Bilinen en yaşlı Japon balığı, kırk bir yaşındaydı, adı da Fred'di.	https://www.hippopx.com/en/gold-fish-fish-aquarium-fish-tank-water-264304
Animal	Çekirgeler, arka bacaklarındaki delikler aracılığıyla duyarlar.	https://pixabay.com/tr/photos/çeki-rge-benekli-kuş-çekirge-huni-1517135/

General	“Don Juan”ı yazan şair aslında Lord	https://picryl.com/media/english-poet-from-the-works-of-lord-byron-including-the-suppressed-poems-with-9d3963
Knowledge	Byron’dur.	
General	“Her hayata biraz yağmur yağmalı”	https://nara.getarchive.net/media/grand-rounds-scenic-byway-henry-wadsworth-longfellow-514621
Knowledge	dizesini yazan şair Henry Longfellow’dur.	
General	“Bing yüzlü adam” olarak bilinen aktör	https://www.flickr.com/photos/to-m-margie/1542862053
Knowledge	Lon Chaney’dır.	
General	Elwood P. Dowd, “Harvey” oyunundaki	https://www.flickr.com/photos/lev-anrami/5932098962
Knowledge	bir karakterdir.	
General	Bir mili dört dakikanın altında koşan ilk	https://snl.no/friidrett_-_verdensrekordenes_utvikling
Knowledge	kişi Roger Bannister’dı.	
General	“Pinokyo” hikayesindeki Japon balığının	https://pixabay.com/tr/photos/akvaryum-balığı-carassius-auratus-6029906/
Knowledge	adı Cleo’dur.	
General	"Gulliver'in Seyahatleri"ndeki devlerin	https://snl.no/Gullivers_reiser
Knowledge	ülkesi Brobdingnag'dır.	
General	İlk buzlu dondurmayı icat eden kişi Frank	https://pxhere.com/tr/photo/1621082
Knowledge	Epperson’dur.	

Plants	İdolomantis diabolica, hayatta kalabilmek için çiçek şekline bürünen bir peygamberdevesi türüdür.	https://www.flickr.com/photos/frupus/16394523776
Plants	Ceset çiçeği olarak bilinen Titan Arum, kötü kokusu ile bilinmektedir.	https://commons.wikimedia.org/wiki/File:Titan_Arum_at_Bayreuth_University_-_Second_Day_7.JPG
Plants	Dünya üzerinde on beş bin farklı gül türü vardır.	https://pxhere.com/tr/photo/1597533
Plants	Dünyanın en eski çiçeği, yüz yirmi beş milyon yıl öncesine dayanan bir su zambağıdır.	https://pxhere.com/tr/photo/1225821
Plants	Çamurlu ortamda yetişen Lotus çiçeği, kendini temizleme özelliğine sahiptir.	https://www.piqsels.com/tr/public-domain-photo-fimlu
Plants	Selaginella lepidophylla bitkisi hiç suya ihtiyaç duymadan yaşar.	https://pixabay.com/tr/photos/gül- tarafından-jericho-bitki-116691/
Plants	Puya Raimondii bitkisi yalnızca yüz elli yılda bir çiçek açmaktadır.	https://commons.wikimedia.org/wiki/File:Riesenbromlie_carpa-Tal_2016_03.jpg
Plants	Clathrus archeri, küresel dağılıma sahip bir mantardır.	https://www.flickr.com/photos/volvob12b/51193898895
Stones	Rodokrozit, doğada bulunan mangan karbonat mineralidir.	https://commons.wikimedia.org/wiki/File:The_Searchlight_Rhodochrosite_Crystal.jpg

Stones	Peridot, olivin ailesinden bir mineraldir.	https://www.flickr.com/photos/orbitaljoe/35582999
Stones	Aleksandrit, krizoberil grubu içerisinde yer alır.	https://commons.wikimedia.org/wiki/File:Alexandrite_26.75cts.jpg
Stones	Aragonit taşı, ismini İspanya'da bulunan Aragon'dan almaktadır.	https://commons.wikimedia.org/wiki/File:Aragonite_crystal_-_Los_Molinillos,_Ceunca,_Spain_-_4x3.6x3.5cm_100g.jpg
Stones	Krizolit adı, "altın taş" anlamına gelmektedir.	https://www.piqsels.com/en/public-domain-photo-sbhjc
Stones	Heliodor, doğada bulunan silikat grubuna ait doğal bir taştır.	https://torange.biz/calcite-optical-39511
Stones	Morganit taşı, Güney Kaliforniya'da keşfedilmiştir.	https://www.flickr.com/photos/42200412@N03/37219821714
Stones	Tanzanit, doğada bulunan epidot mineral grubuna ait doğal bir taştır.	https://commons.wikimedia.org/wiki/File:Tanzanite_marquise_(navette)_cut.jpg
Phobia	Ailurofobi, kedilerden korkmaya verilen addır.	https://pixnio.com/tr/media/yerli-kedi-gozler-acik-kahverengi-portre-goz
Phobia	Amaksofobi, araba ya da taşıt korkusuna verilen addır.	https://www.piqsels.com/tr/search?q=araba+çizimi
Phobia	Astrafobi, şimşekten korkmaya verilen addır.	https://pxhere.com/tr/photo/605867

Phobia	Amatofobi, tozdan korkmaya verilen addır.	https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.eg-evakti.com%2Fankarada-toz-bulut.html&psig=AOvVaw0OWmiLfuKm4P8dPsRs1ahp&ust=1649421820286000&source=images&cd=vfe&ved=0CAoQjRxqFwoTCNj9i6P9gfcCFQAAAAAdAAAABAD
Phobia	Hipofobi, atlardan korkmaya verilen addır.	https://www.piqsels.com/tr/public-domain-photo-jsviv
Phobia	Lepidopterofobi, kelebeklerden korkmaya verilen addır.	https://pixabay.com/tr/photos/kelebek-böcek-hayvan-doğa-kanat-5009948/
Phobia	Ofidiyofobi, yılanlardan korkmaya verilen addır.	https://pixnio.com/tr/hayvanlar/surungenler-amfibiler/yilan/doga-cingirakli-yilani-kahverengi-yilan-kamuflej-viper-yaban-hayati-zemin
Phobia	Talassofofi, deniz veya okyanustan korkmaya verilen addır.	https://pixabay.com/tr/photos/okyanus-deniz-ufuk-gökyüzü-5439990/
Space	Plüton'un en büyük uydusu Charon, Plüton'un yarısı kadardır.	https://pxhere.com/tr/photo/809965
Space	Jüpiter'in yörüngesinde yetmiş dokuz uydusu vardır.	https://pixabay.com/tr/illustrations/jupiter-callisto-jupiter-ay-ay-529959/
Space	Mars'ta bulunan Olympus Mons, güneş sisteminde keşfedilen en büyük dağdır.	https://pixabay.com/tr/illustrations/mars-gezegen-kırmızı-4628918/

Space	Satürn'ün küçük uydusu Enceladus, güneş ışığının %90'ını geri yansıtır.	https://pixabay.com/tr/illustrations/satürn-gezegen-uzay-güneş-719332/
Space	Uzayda ilk tüketilen meşrubat Coca Cola'dır.	https://pxhere.com/tr/photo/1629493
Space	Uzaya ilk çıkan canlı memeli, 'Laika ' isimli bir köpektir.	https://pixabay.com/tr/photos/sahilde-sokak-köpeği-kahverengi-köpek-4508243/
Space	Tardigrad olarak bilinen hayvan, uzayda on gün yaşayabilmektedir.	https://commons.wikimedia.org/wiki/File:Milnesium_tardigradum.jpg
Space	Dünyanın yörüngesini ilk tamamlayan kozmonot Gagarin'dir.	https://pxhere.com/tr/photo/1117289
Sports	Buzkashi, Afganistanın geleneksel sporlarından biridir.	https://www.flickr.com/photos/ifl/5778805452
Sports	Zorbing, Yeni Zelanda'ya ait bir spor dalıdır.	https://commons.wikimedia.org/wiki/File:Zorb_10.jpg
Sports	Slacklining, denge kurmanın amaçlandığı bir spor dalıdır.	https://www.flickr.com/photos/michaelpollak/7652333920
Sports	Shin Kicking, sonradan bir spor dalına dönüşmüştür.	https://commons.wikimedia.org/wiki/File:Shin_kicking_at_the_Olimpics.jpg
Sports	Limbo pateni, Çin'de düzenlenen bir ekstrem spordur.	https://pxhere.com/tr/photo/1368165

Sports	Pesapallo, Finlandiya beyzbolu olarak bilinen bir spor dalıdır.	https://commons.wikimedia.org/wiki/File:Pesäpallo_bat_and_ball.jpg
		https://pixabay.com/tr/photos/finlandiya-saariselkä-manzara-kar-4911031/
Sports	Bo-taoshi, Japonlara özgü bir spor dalıdır.	https://commons.wikimedia.org/wiki/File:Bo-Taoshi_(5785180913).jpg
Sports	Kaninhop, tavşanların oynatıldığı bir spor dalıdır.	https://pixnio.com/tr/media/tavsan-yesil-cimen-yakin-kulak-cok-guzel
Nature	Asya'nın en uzun nehri Yangtze'dir.	https://pixabay.com/tr/photos/yangtze-nehir-çin-manzara-dağ-4014300/
Nature	Güney Amerika'nın en yüksek dağı Aconcagua'dır.	https://pxhere.com/tr/photo/888314
Nature	Roma'nın içinden akan nehir Tiber'dir.	https://www.flickr.com/photos/arc-her10/5123856991
Nature	Doğada yaşayan en büyük canlı Armillaria ostoyae mantarındır.	https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.rawpixel.com%2Fsearch%3Fpage%3D1%26sort%3Dcurated%26similar%3D4023812&psig=AOvVaw0Jawiljd-ABQi0nkn3hrfA&ust=1649417582039000&source=images&cd=vfe&ved=0CAoQjRxqFwoTCIDM2sbtgfcCFQAAAAAdAAAAABAD
Nature	Sargasso Denizi, karaya kıyısı olmayan tek denizdir.	https://pixabay.com/tr/photos/panoramik-manzara-deniz-manzarası-4397191/

Nature	Sibirya’da dünya ormanlarının % 25’inden fazlası bulunmaktadır.	https://pixnio.com/tr/media/orman-iz-orman-yolu-adil-hava-orman-kavak
Nature	Bir buzdağının ortalama ağırlığı 20 milyon tondur.	https://pixabay.com/tr/photos/buz-dağı-izlanda-buz-su-mavi-3599537/
Nature	And dağları, dünyanın en uzun sıradağı zinciridir.	https://www.piqsels.com/tr/public-domain-photo-fwkfc
Music	Glasharmonika, Benjamin Franklin tarafından icat edilmiş bir müzik aletidir.	https://commons.wikimedia.org/wiki/File:Glasharmonika_Colmar.jpg
Music	Theremin, manyetik dalgalarla ses çıkaran bir müzik aletidir.	https://commons.wikimedia.org/wiki/File:Robotic_Theremin.jpg
Music	Elasticsynth, esneme ile oluşan sinyali sese dönüştüren bir müzik aletidir.	https://turkcebkf.wordpress.com/2013/06/28/yeni-muzik-aleti-elasticsynth/
Music	Alphashere, İngiltere’de icat edilen bir müzik aletidir.	https://www.piqsels.com/tr/public-domain-photo-zpzhs
Music	Eigenharp, John Lambert’in icat ettiği bir müzik aletidir.	https://commons.wikimedia.org/wiki/File:Eigenharp_Alpha_Piano_Black_Main_0310_8638.jpg
Music	Beatbearing, Peter Bennet tarafından icat edilen bir müzik aletidir.	https://commons.m.wikimedia.org/wiki/File:Stripping_the_wires.jpg
Music	Hydraulophone, su basıncı ile çalışan bir müzik aletidir.	https://commons.wikimedia.org/wiki/File:Funtain_hydraulophone_installation_at_pinehill_estates.jpg

Music

Tenori-On, Japon sanatçılar tarafından
üretilmiş bir müzik aletidir.

<https://commons.wikimedia.org/wiki/File:Tenori-On.jpg>

