



## The Effect of Subliminal Stimuli Used in Promotion Videos on the Level of Liking and Remembering

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### Abstract

In recent years, there has been a growing interest in investigating the effects of subliminal stimuli on human decisions and behavior. Do subliminal stimuli that people are not consciously aware of have any effect on their liking and recall levels? If so, can these effects be used in the consumer decision-making process? In this study, a 45-second promotional video prepared by the Ministry of Culture and Tourism of the Republic of Turkey was used. Three copies of the promotional video were created for positive, negative and control groups. 17 ms subliminal stimuli, of which the participants were not consciously aware, were placed 9 each in predetermined scenes for the positive group (as like emoji) and the negative group (as dislike emoji). A total of 90 students from the Department of Tourism and Hotel Management, who had not watched the video before, were divided into three groups (negative, positive and control) of 30 students each. After the video presentation, the participants were asked to immediately indicate their preference as "like or dislike" and to write down the video content (objects) they could remember. The findings reveal that the placement of negative and positive subliminal stimuli in the videos did not have a significant effect on participants' 'like or dislike' preferences. However, it was observed that the group given positive stimuli remembered the images with subliminal stimuli more than the other groups. The group given negative stimuli remembered the images with subliminal stimuli more than the control group and more than the other images in the video without subliminal stimuli. The results suggest that subliminal stimuli may be effective on recall but not on liking rate.

## Keywords

Stimuli, Consumer Decision-Making, Remembering, Advertising, Promotion

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## Tanıtım Videolarında Kullanılan Bilinçaltı Uyarıların Beğeni ve Hatırlama Düzeyi Üzerindeki Etkisi

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### Öz

Son yıllarda, bilinçaltı uyarıların insan kararları ve davranışları üzerindeki etkilerini araştırmaya yönelik ilgi giderek artmaktadır. İnsanların bilinçli olarak farkında olmadıkları bilinçaltı uyarıların beğenme ve hatırlama düzeyleri üzerinde herhangi bir etkisi var mıdır? Eğer varsa, bu etkiler tüketici karar verme sürecinde kullanılabilir mi? Bu çalışmada, Türkiye Cumhuriyeti Kültür ve Turizm Bakanlığı tarafından hazırlanan 45 saniyelik bir tanıtım videosu kullanılmıştır. Tanıtım videosunun pozitif, negatif ve kontrol grupları için üç kopyası oluşturulmuştur. Katılımcıların bilinçli olarak farkında olmadıkları 17 ms'lik subliminal uyarılar, olumlu grup için (like emoji olarak) ve olumsuz grup için (dislike emoji olarak) önceden belirlenmiş sahnelerle 9'ar adet yerleştirilmiştir. Daha önce videoyu izlememiş olan Turizm ve Otelcilik Bölümü'nden toplam 90 öğrenci, her biri 30 kişilik üç gruba (negatif, pozitif ve kontrol) ayrılmıştır. Video sunumunun ardından, katılımcılardan tercihlerini "beğendim ya da beğenmedim" şeklinde hemen belirtmeleri ve hatırlayabildikleri video içeriğini (nesnelere) yazmaları istenmiştir. Bulgular videolara negatif ve pozitif bilinçaltı uyarıcıların yerleştirilmesinin katılımcıların 'beğenme veya beğenmeme' tercihleri üzerinde önemli bir etki göstermediğini ortaya koymaktadır. Ancak pozitif uyarı verilen grubun diğer gruplara kıyasla bilinçaltı uyarılar yerleştirilmiş görüntüleri daha fazla hatırladığı görülmüştür. Negatif uyarı verilen grubun ise kontrol grubuna nazaran bilinçaltı uyarılar yerleştirilmiş görselleri ve uyarı yerleştirilmemiş olan video içindeki diğer görüntülerden daha fazla hatırladığı görülmüştür. Sonuçlar subliminal uyarıların beğenme oranı üzerinde değil ancak hatırlama üzerinde etkili olabileceğini göstermektedir.

## Anahtar Kelimeler

Bilinçaltı Uyarılar, Tüketici Karar Verme, Hatırlama, Reklam, Promosyon

## Atıf Bilgisi

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## Introduction

Although the idea that human decisions and behaviors result from conscious processes has traditionally prevailed, recent theoretical and experimental research suggests that the opposite may be true. Many studies have shown that most complex human behaviors and mental processes occur in the absence of conscious attention when conscious awareness is limited (Dehaene et al; Bargh & Ferguson, 2000; Dehaene & Naccache, 2001; Mattler, 2003; Ferguson & Bargh, 2004; Hassin, Uleman, & Bargh, 2004; Dijksterhuis, Bos, Nordgren, & Van Baaren, 2006; Kouider & Dehaene, 2007; Custers & Aarts, 2010; Sklar et al., 2012). Human beings tend to think that the decision-making process is the product of their conscious control. Despite the importance that humans attribute to conscious decision-making, some researchers have stated that up to 95% of our decision-making process occurs without conscious attention (Zaltman, 2003).

It is known that it is not possible for human beings to pay the same conscious attention to millions of stimuli coming from their environment in terms of our cognitive abilities. However, it can be said that even when we are not consciously paying attention, subconscious processes are active and process data that escape conscious attention and can reveal these data as decision-making, attitude or behavior in the future (Bargh, 2006; Hassin, Uleman & Bargh, 2004; Hassin, 2013). Stimuli that are given below the threshold of consciousness (Smith & McCulloch, 2012) and at the same time cannot be consciously realized (Theus, 1994; Bargh, 2002; for review see Warren, 2009) are defined as 'subconscious stimuli'. Data from different disciplines and different empirical studies on subliminal stimuli show that subliminal stimuli can affect people's emotions, attitudes, decisions and behaviors (Hawkins, 1970; Cooper & Cooper, 2002; Dijksterhuis & Smith, 2002; Naccache et al., 2005; Dijksterhuis, Aarts & Smith, 2005; Karremans, Strobe & Claus, 2006; Stern, 2015).

The increase in technological developments has a great impact on the study of the effects of subliminal stimuli on humans (Stern, 2015). Researchers also state that it is important to examine subliminal stimuli in different disciplines (Elci & Sert, 2015). Many studies have been conducted to determine the cognitive and emotional responses of consumers to marketing stimuli (Kawasaki & Yamaguchi, 2012; Khushaba et al., 2013; Koenigs & Tranel, 2007). However, there is not enough research in the literature on the effect of negative and positive subconscious stimuli in promotional videos on liking or disliking and their effect on recall level. Addressing this gap, this study focuses on examining the liking and recall of promotional videos. Considering the research on the effects of subliminal stimuli on cognitive processes, it is thought that this study will make significant contributions to the research on promotional videos.

## 1. Literature

Research in various disciplines has investigated the effect of stimuli perceived without conscious awareness on individuals and the strength of this effect. For example, the effects on consumer behavior (Theus, 1994; Dijksterhuis et al., 2005; Weber, 2010; Ceylan & Ceylan, 2015; Strahan, Spencer & Zanna; 2002; Bermeitinger, 2009; Smarandescu & Shimp, 2015), cognitive processes and their effects on different brain regions (Morris, Ohman & Dolan, 1998; Morris et al, 2001; Sabatini et al, 2009; Bernat, Bunce & Shevrin, 2001; Luo et al, 2004; Nomura et al, 2004; Kongthong), effects on performance (Blanchfield, Hardy, & Marcora, 2014), the effect of subliminal stimuli on the sense of touch and subsequent preference for related objects (Hilsenrat & Reiner, 2011), effects on sexuality (Gilliath et al, 2007; Birnbaum et al, 2006; Janssen et al, 2000; Ponseti and Bosinski, 2010), its effect on feelings of jealousy (Massar and Buunk, 2009), its effect on the perception of the target as aesthetic or beautiful (Era, Candidi and Aglioti, 2015).

Some studies have measured the responses of individuals by giving them subconscious stimuli related to the traumas they had previously experienced (Du et al., 2015). Similarly, the brain responses of military paramedics were measured with masked stimuli about the trauma they experienced in conflict zones (Admon et al., 2009). In a different study, it was tried to reveal which parts of the brain were affected by subconscious stimuli related to gender (Oei et al., 2012).

Researchers have investigated how individuals with various phobic fears (such as spider phobia and agoraphobia) will be affected when they are exposed to subconscious stimuli related to these fears (Siegel & Gallagher, 2015; Lee et al., 1983; Lipka et al., 2011, 2014). In addition, the effect of conditions such as anxiety is also one of the topics investigated (Öhman and Soares, 1994; Gibbons, 2009). The effect of food images given as subliminal stimuli on women with restrictive anorexia nervosa is also one of the interesting studies (Brooks et al., 2012).

The effect of threat-related subliminal stimuli on the brains of individuals diagnosed with post-traumatic stress disorder (Rabellino et al. 2015), the effect of subliminal stimuli on Parkinson's patients (Seiss and Praamstra, 2004), its effect on sleep (Shimizu et al., 2013) and Huntington's disease Its effect on motor responses in patients (Aron et al., 2003) is also a subject that researchers are studying. There are also studies investigating the use of subliminal voice stimuli to prevent infections and improve hand-washing behavior in hospitals (Edmond and Wenzel, 1993) and the use of them for encouragement or treatment in the health sector (Havare and Antalyalı, 2015).

The effects of subliminal clues on intuitive problem solving, learning performance and logical inferences (Chalfun and Frasson, 2011), their effects in terms of computer-human interaction (Ritter, 2011) and directing visual attention (Huang et al., 2015) are among the topics studied. It has also been researched in the literature that subliminal stimuli used in digital games erode the reality threshold, which represents the perceptual boundary between children's virtual world and the real world (Darıcı, 2015).

Huang et al. (2015) demonstrate that a brief subliminal cue presented before the color image of a complex real-world scene can attract human visual attention. It can be contemplated that these effects on human beings are caused by the selection of facial expressions and different facial images, which can raise anxiety and fear in using stimuli given to the subconscious. A visual stimulus leads to increased activation in the amygdala not only when presented at the level of conscious awareness but also when given subliminally. These findings indicate that one of the most important brain structures that enable human survival can be activated by subliminal stimuli (Whalen et al., 1998).

In the context of our study, it is already established that marketing strategies such as advertising and promotion play a significant role in influencing consumers' purchasing decisions (Alalwan, 2018; Dehghani & Tumer, 2015). Simultaneously, many variables including motivation (Nwankwo, Hamelin, & Khaled, 2014), remembering (Thamizhvanan & Xavier, 2013), liking (Beukeboom, Kerkhof, & De Vries, 2015), service delivery (Gottlieb, Brown, & Drennan, 2011), culture (Moon, Chadee, & Tikoo, 2008), and political attitudes (Hoffmann, Mai, & Smirnova, 2011) have been identified as influencing purchase intention. Annually, both public and private institutions in countries allocate substantial budgets to create and publish promotional films, advertisements, catalogs, and brochures with the aim of impacting the purchasing decisions of tourists. In this regard, the effect of subliminal stimuli on liking and recognition of the advertisement is paramount.

In this study, we investigated the effect of subliminal visual stimuli (like and dislike emojis) embedded in promotional videos created by the Ministry of Culture and Tourism of the Republic of Turkey on the levels of liking and remembering. It is thought that the study will fill a gap in the literature in this regard and will also contribute to research on liking and remembering.

## **2. Method**

### **2.1. Participants**

To participate in this study, 102 Tourism and Hotel Management Department students (a group of 48 women and 54 men between the ages of 18-26, with an average age of 20.5) were selected voluntarily and through convenience sampling. All participants were healthy, right-handed, and reported normal or correct-to-normal vision. No history of neuralgic or psychiatric disorders was reported. The ethics committee at Istanbul Gelişim University has approved this study.

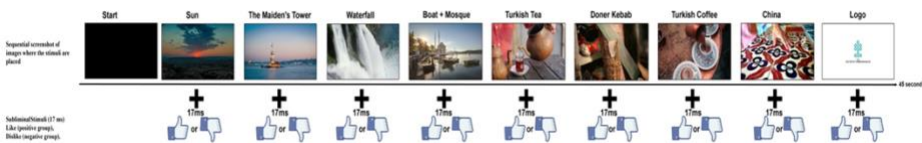
### **2.2. Materials and Stimuli**

In this study, a promotional video about Turkey (public service announcement), prepared by the Ministry of Culture and Tourism of the Republic of Turkey in 2016, was utilized. The video was selected by the researchers using criterion sampling, one of the purposeful sampling methods. The criterion was taken to include different objects and

scenes consecutively in the video. Three copies were generated from the 45-second video. The researchers randomly chose nine segments, each lasting approximately 2 seconds, from various scenes in the video. These segments featured the sunrise, the Maiden's Tower, Düden Waterfall, Great Mecidiye Mosque + Boat + Bosphorus Bridge, Turkish tea, doner kebab, Turkish coffee, Turkish ceramics, and the logo (Ministry of Culture and Tourism of the Republic of Turkey).

The "Like" emoji, obtained freely through Google image search, was chosen as the stimulus (Hsu, L., and Chen, Y. J., 2020). The "dislike" emoji was created by inverting the "Like" emoji using Adobe Photoshop CS3 (Adobe Systems Software Ireland Ltd). The background emojis were designed with a transparent background and positioned at the center of the screen. This approach aimed to avoid any potential issues on the screen during video streaming, preventing participants from noticing changes caused by the frame's background color.

A notebook with a resolution of 1024x768 (60Hz) was utilized for the presentation. The pre-experiment presentation was synchronized with the monitor's refresh rate. In the introductory video, which lasted 45 seconds, subliminal stimuli of 17 ms duration (refer to Fig.02 or Fig.03) were inserted at equal intervals (refer to Fig.01), occurring once every 5 seconds and totaling 9 times. The 17 ms duration for the subliminal stimulus aligns with the refresh rate of our 60 Hz monitor. Given that one second is equivalent to 1000 ms and a 60 Hz monitor can display 60 frames per second, the subliminal stimulus time is set to 17 ms, which represents the shortest time the monitor can effectively display (Mladenovic and Ljajic, 2016).

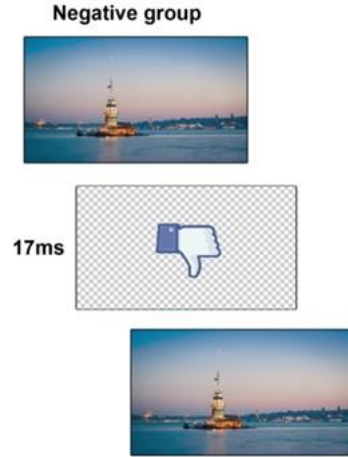


**Figure 01.** The predetermined locations of images where subliminal stimuli were inserted within the 45-second timeline of the promotion video





**Figure 02:** Positive Group



**Figure 03:** Negative Group

### 2.3. Procedure

All participants were instructed to attend the experimental sessions without experiencing thirst or hunger. The experimental sessions took place in three separate rooms with identical equipment, dim lighting, and occurred on weekdays from 10:00 a.m. to 5:00 p.m.

On the first day, participants gave informed consent and demographic data was collected. They were then randomly assigned to one of three groups (Positive, negative and control). Each group consisted of 34 participants. When they arrived at the experimental session, the participants were informed as follows: 'You will soon watch the promotional video prepared by the Ministry of Culture and Tourism of the Republic of Turkey. Then, we will ask you what you remember from the objects in the video. Therefore, it is important that you watch the video carefully until the end'. Participants were instructed not to communicate with each other until the end of the experiment to avoid mutual influence. Participants in each group were accompanied by an assistant throughout the entire experiment.

Participants viewed the video while seated in a chair positioned approximately 100 cm away from the screen. Subsequently, participants were prompted to indicate whether they "liked" or "disliked" the video and were asked to promptly jot down scenes from the video that they remembered. Participants were not subjected to any time pressure when recording their recollections. Following this, they were queried about whether they observed anything distinctive while viewing the video. Three participants in the positive group and 2 in the negative group stated, "I saw something passing quickly, but I did not understand what happened." These participants were excluded from the analysis. Other participants reported that they did not observe anything different.

The experiment concluded in approximately 150 minutes, averaging 5 minutes per participant across the three test rooms. To ensure an equal number of participants in each group, random participants were excluded, and the group size was standardized to 30 participants.

### 3. Analysis

The forms of the participants (n = 90) were examined individually. The image content recalled by each participant was compared with the content of the promotional video, ensuring that none of the participants recorded image content not present in the video. The objects remembered by participants were coded separately in Excel®, and a list was generated. Statistical analysis was conducted using IBM® SPSS® Statistics Version 22 (IBM Corp., Los Angeles, CA, USA). Tables were created with Microsoft® Excel® 2010 for Windows (Microsoft Corp., Santa Rosa, CA, USA).

**Table 01.** Descriptive statistics and difference analysis results of recall variables

Variable	Group	Statistics								p
		Parametric				Nonparametric				
		Min.	Max.	Average	Std.	25%	75%	Med.	Mod	
<b>Total recalled objects in the video (Subliminal + others)</b>	Positive	6	15	9,77	2,43	8	11	9	3	<0,001a
	Negative	5	20	13,10	3,87	10	17	13	7	<0,001b
	Control	3	19	7,40	3,10	5	9	7	4	<0,001c
<b>Recalled objects that exposed to subliminal stimuli</b>	Positive	4	9	4,83	1,09	4	5	5	1	<0,001a
	Negative	3	4	3,30	0,47	3	4	3	1	<0,001b
	Control	2	3	2,47	0,51	2	3	2	1	<0,001c

**a: Comparison of positive and negative groups.**

**b: Comparison of negative and control groups.**

**c: Comparison of positive and control groups.**

Table 01 demonstrates the descriptive statistics and difference analysis results of recall variables. The positive group, exposed to the subliminal (like) emoji with nine images, recalled more objects than the other groups. Similarly, the negative group, exposed to the subliminal (dislike) emoji with nine images, recalled more objects than the control group. Statistics for the total recalled objects in the video (including subliminal emoji with nine images and other images in the video) indicate that the negative group recalled more objects than the other groups.

**Table 02.** Cross-table between "groups" and "choice of like or dislike of promotion video."

Groups	Statistics	Choice		Total	p
		Dislike	Like		
Positive	n	22	8	30	0,696
	%	%73,3	%26,7	%100,0	
Negative	n	21	9	30	
	%	%70,0	%30,0	%100,0	
Control	n	19	11	30	
	%	%63,3	%36,7	%100,0	
Total	n	24	66	90	
	%	%68,9	%31,1	%100,0	

Table 02 demonstrates the cross-table between "groups" and "choice of like or dislike of the promotion video." Thus, it shows that there was no significant effect of the subliminally embedded "like or dislike" emoji on group preferences.

**Table 03.** Recall rates and various statistics for intergroup objects

Objects	Recall Status	Groups						p
		Positive		Negative		Control		
		n	%	n	%	N	%	
Sunrise	No	26	86,7	28	93,3	29	96,7	0,338
	Yes	4	13,3	2	6,7	1	3,3	
The Maiden's Tower	No	4	13,3	8	26,7	14	46,7	0,016
	Yes	26	86,7	22	73,3	16	53,3	
Doner Kebab	No	18	60,0	24	80,0	28	93,3	0,071
	Yes	12	40,0	6	20,0	2	6,7	
Turkish Tea	No	13	43,3	20	66,7	18	60,0	0,171

	Yes	17	56,7	10	33,3	12	40,0	
<b>Waterfall of Düden</b>	No	9	30,0	10	33,3	17	56,7	<b>0,008</b>
	Yes	21	70,0	20	66,7	13	43,3	
<b>Great Mecidiye Mosque + Boat + Bosphorus Bridge</b>	No	2	6,7	14	46,7	20	66,7	<b>&lt;0,001</b>
	Yes	28	93,3	16	53,3	10	33,3	
<b>Turkish Ceramics</b>	No	17	56,7	24	80,0	20	66,7	0,152
	Yes	13	43,3	6	20,0	10	33,3	
<b>Turkish Coffee</b>	No	15	50,0	17	56,7	22	73,3	0,164
	Yes	15	50,0	13	43,3	8	26,7	
<b>Logo</b>	No	21	70,0	26	86,7	28	93,3	0,144
	Yes	9	30,0	4	13,3	2	6,7	

Table 03 demonstrates the recall rates and various statistics for intergroup objects. As shown in Table 03, a significant difference was observed in participants' recall of specific objects. These objects correspond to recognized and well-known tourist locations in Turkey and the world, including The Maiden Tower, Great Mecidiye Mosque + Boat + Bosphorus Bridge, and Waterfall of Düden.

### Conclusion and Discussion

This study aims to investigate the impact of subliminal visual stimuli, such as like and dislike emojis, embedded in promotional videos prepared by the Ministry of Culture and Tourism of the Republic of Turkey, on the levels of liking and remembering.

The research yielded three significant findings. Firstly, the inclusion of negative and positive subliminal stimuli in the videos did not show a significant effect on the 'like or dislike' preferences. Secondly, there was a notable impact on the recall level of certain subliminally embedded images, all of which were popular and well-known tourist locations. Lastly, the positive group demonstrated higher recall for subliminally embedded images compared to other groups, while the negative group recalled more objects from images within the video.

While the stimuli did not significantly influence the 'like or dislike' preference, their impact on memory was evident. Positive subliminal stimuli showed an effect on recalling well-known and recognized locations. In contrast, negative subliminal stimuli had a broader influence, affecting the recall of the entire video more than the nine images in which subliminal stimuli were embedded. Positive subliminal stimuli are perceived as a form of reinforcement in remembering already-known locations, while negative subliminal stimuli are thought to induce a mismatch between conscious awareness and the subliminal content.

The increased recall of popular and well-known tourist destinations can be attributed to consumers' aversion to risk. As unfavorable decisions may result in a loss for consumers (Mitchell, 1999, p. 167), the rational choice theory dictates the need for the most rational decision (Scott, 2000). Consumers face financial risk (Forsythe et al., 2006; Crespo et al., 2009) if the purchased product fails to meet expectations, potentially leading to a loss of trust in the firm (Kim et al., 2011; Liu & Chang, 2016). Building a relationship with the target audience based on trust can diminish risk perception or eliminate it altogether. The results underscore the importance for companies aiming at effective marketing strategies to intensify advertising efforts, thereby increasing awareness of products in marketing processes and securing a lasting place in consumers' minds.

In the negative group, participants consciously observed scenes with positive content in the promotional video, similar to the positive and control groups. However, the subliminal stimuli, which they were not consciously aware of, were negative. It can be hypothesized that this conflict situation introduces a decision-making complexity between conscious and subconscious levels, thereby contributing to participants' increased retention.

This study is expected to provide insights for future research across various disciplines. Specifically, further investigation is needed to explore in greater detail the impact of diametrically opposed stimuli presented at conscious and subliminal levels on participants' decision-making and memory.

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