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The Ups and Downs of Consumer Behavior: The Effect of Emotions on Vertical Attention

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# The Ups and Downs of Consumer Behavior: The Effect of Emotions on Vertical Attention

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## Summary

Emotions are known to influence cognitive processes, such as attention, memory and behavior. However, only few studies examined the verticality pattern of attention. The present study investigated if selective attention is biased towards upper or lower vertical space, depending on positive or negative emotional valence. For this purpose, two online experiments were conducted using different emotion elicitation techniques. To evoke happiness and sadness, we used videos in Study 1 and combination of autobiographical recall and music in Study 2. The dependent variables were measurements of attention towards upper and lower space. We used Unaided Brand Recall and Aided Brand Recognition values for this purpose.

The results of both studies demonstrated that emotional induction was sufficient and evoked target emotions. Study 1 showed that, on average, participants in the “Happy” group recalled and recognized more of the upper located brands than in the “Sad” group. Nevertheless, in Study 2 there were more upper brands recognized among the “Sad” group and vice versa, while the pattern of brand recall was similar to Study 1. However, the results of both studies were not statistically significant, which does not allow us to conclude about the existence of the effect. We conclude with theoretical and managerial implications on this matter.



## Introduction

Emotions are an inherent part of human life and have a significant impact on cognitive processes and actions. The same person may respond differently to the same trigger depending on whether he/she is happy, sad, or drowsy. Therefore, emotions have been in focus of researchers, particularly, psychology scholars, who defined emotions to have an important role in behavior (Carlson et al., 2007). Later on, the concepts of emotions were integrated in other science areas, including marketing, as emotions might be an important factor when analyzing consumer behavior. Indeed, extant studies suggest that happy people tend to buy more (Kaplanski et al., 2015), excited consumers choose exciting products (Noseworthy et al., 2014), and positive mood could contribute to the effectiveness of advertisement even if the latter one has weak argumentation (Bagozzi, 1999).

Nevertheless, emotions can be difficult to explain and measure due to their abstract nature. Therefore, there is a natural tendency for people to use simpler constructs in order to express their thoughts or feelings, such as “down” instead of sad, or “high” when referring to a happy state. In other words, metaphorical associations between emotions and vertical space are frequently expressed by language constructs or body language. People tend to jump, when they are happy and sit down, when they hear bad news; a man would carry his head up and look up-forward if he had a good day, but would be looking down and lowering his shoulders if he experienced a failure. This creates a base for the concept *happy is up* and *sad is down* (Crawford, 2013), which is a topic of interest for the current paper.

Prior research argued the existence of an associative link between emotionally valenced concepts and vertical location, which is referred to as the space-valence metaphor (Sasaki et al., 2016). Recent studies have tested this association by applying several different methodological techniques: evaluating the directionality and automaticity for the processing of the spatial-valence metaphoric association (Huang, 2015; Lynott, 2014), measuring the time required for the valence evaluation (Meier & Robinson, 2004; Huang et al., 2015), involving audio (Montoro et al., 2015), semantic (Dudschig et al., 2015) or visual stimuli (Sasaki et al., 2016). Also, gaze length was measured

as a direct contribution to preference and further decision making (Shimojo et al., 2003). Moreover, recent studies have investigated the link between spatial-valence metaphor and cognitive processes, such as attention, memory and decision making. The main pattern indicates that congruence of vertical spatial location and valence is associated with higher attention and memory (Crawford, 2014, Palma et al., 2011). Additionally, it was shown that metaphorical consistence biases the process of encoding the affective objects (Meier & Robinson, 2006), meaning that people memorize happy objects locating upwards rather than downwards. However, there were also opposite results suggesting that incongruent pairing of the valence and location are memorized better (Crawford & Cohn, 2014). Therefore, the current paper aims to investigate the impact of emotional valence on spatial attention and reconcile the previously mentioned contradictory findings in extant research. To avoid confusion, throughout this paper, *stimuli* refer to any kind of emotional induction, while the *objects* will help measuring the spatial attention.

The majority of studies conducted on this phenomenon applies emotional valence to the objects. However, when it comes to real-life, the advertisements tend to have a positive connotation, because companies aim to create a positive attitude towards their product. Thus, it makes more sense to consider valence of the surrounding environment rather than valence of the ads. The environment, where the advertisement is placed, can be very different and affect the emotional state of a consumer. For example, if the web-page content is entertaining and can induce happiness, will it have an impact on the viewer's spatial attention?

In consequence, in contrast to the existing research, the current paper is focused on the emotional state of a person, while objects remain of a neutral valence. Based on the justification above, the following research question will be in the center of this paper:

*How is the selective attention within physical space influenced by the affective state of a subject?*

The aim of the current study is to contribute to the existing research on the space-valence metaphor concept by describing the effect of people's affective state on their attention within vertical space. Attention is represented

as ability to recall and recognize neutral objects after experiencing happiness or sadness.

We believe that the results of this study will be relevant for managers' decisions regarding advertisement placement strategies. We suggest considering the potential impact of, for instance, web-page content where advertisements are placed, as it might influence the effectiveness of the ads.

In order to study how the emotional state can affect vertical attention, we suggest building the paper on the existing theoretical frameworks regarding emotions and research contributions within the conceptual metaphor theory. More precisely, the focus will be on the space-valence metaphor, as we are aiming to observe the relationship between abstract (happiness and sadness) and rational concepts (top or bottom location), as well as attention and memory as cognitive responses to a metaphorical cue. In the following section, we will present different approaches, used in the recent studies, and highlight their key findings, which are the most relevant for our research.

## **Literature review**

### ***Emotions affect consumer behavior***

As it was previously studied, emotions do influence behavior and explicit actions (Bagozzi, 1999). Moreover, they have taken an important role in marketing communication strategies: Edell & Chapman (1987) showed that “understanding consumers' feelings is as important as understanding their thoughts” (p. 421), when it comes to assessing the effectiveness of advertising.

However, Bagozzi (1999) emphasizes that there is little consistency when it comes to defining emotions. Therefore, it is important to determine a framework, which will be used as a base for our study.

*Affect* will be defined as “Genuine subjective feelings and moods, rather than thoughts about specific objects or events” (Russell & Carroll, 1999, p.3), which can serve as an umbrella for emotions as a short-term response to a specific object or situation (Bagozzi, 1999). In current research, it is suggested to focus on emotions rather than mood, as they are more likely to influence behavior and explicit actions (Bagozzi, 1999).

Previous researches brought into attention the fact that our daily life activities are based on emotions. Emotions are the cause and effect for many, if not all, aspects of human behavior, such as reactions or decisions. One particular case is consumption and purchase behavior. For example, emotions can be the starting point of a specific choice: if we feel sad and we want to cheer ourselves up, we might choose to buy ourselves a small present, or consume goods that would make us feel better. With respect to that, D'Arrigo (2007) talks in his study about emotional eating, as a response to stress or sadness. On the other side, people also tend to treat themselves when they are happy, as a reward (Mick and Demoss, 1990). In other words, as a short-term strategy to manage emotions, people consume goods in order to regulate negative emotions and get positive feelings. Moreover, consumers may choose particular goods in order to maintain their good state of mind (Kemp and Kopp, 2011).

Being emotional is a human characteristic, and today's advertising tries to be shaped accordingly. In the paper of Kemp and Kopp (2011) some relevant examples are mentioned: "You deserve a break today" (McDonald's), "Celebrate the moments of your life" (General Foods International Coffee). Strategic marketing communication based on emotions is also replicated in the study of Winkielman et al. (2005) who demonstrates the influence of emotions on particular actions: people that were exposed to a happy face increased their consumption and willingness to pay. This finding is another indication that emotions can alter consumer behavior.

As it has been already suggested, emotions can be embedded in marketing stimuli or contexts in order to influence one's decision, and they are called integral emotions (Achar et al., 2016). However, integral emotions are not the only ones that can impact the marketplace; perception, brand choice, information processing are just a few examples of consumer responses that can be influenced by incidental emotions. They do not arise from the content created by marketers, but they are induced by past experience. Achar et.al. (2016) exemplify how watching an ad on TV may influence an unrelated decision, such as what or how much you will eat while watching TV. Therefore, the main conclusion of this research is that both types of emotions (integral and incidental) shape decision-making process.

### *Valence of emotions*

A key dimension of emotions is valence, which was studied and found to be an important moderator of the emotional effect. Valence (positive or negative) is predicted to have similar influences on judgement (Johnson & Tversky, 1983; Wright & Bower, 1992). Nevertheless, it is important to consider an appraisal-tendency approach, which assumes that underlying appraisal themes define the influences of different emotions on judgement (Lerner & Keltner, 2000). In other words, valenced object can elicit different emotions, depending on the person's evaluation (Moors et.al., 2013). What is more, according to affective valence-based models (Schwarz and Bless, 1991), positively valenced stimuli should lead to less effortful, top-down processing and increased reliance on heuristic, while negatively valenced stimuli should lead to more careful, bottom-up processing. Applying this to the conceptual metaphor theory, one might suggest that positively valenced concepts are stronger and the associative link “happiness is up” might be stronger than “sadness is down”.

For the purpose of this study, we suggest to represent positive valence with happiness and negative valence with sadness. These are primary human emotions, which are common for everyone and do not depend on individual experience, cultural background or context (Ekman, 1992). Moreover, we selected “happiness” because this is an emotion that encompasses several positive emotions, it is easier to identify for people, it makes the atmosphere feel safe (Schwarz, et al., 1991), it generates and increases confidence as well as allows people to be “more reliant on their thoughts” (Briñol et al., 2007). Sadness, on the other hand, as opposed to happiness, joints negative emotions, makes the atmosphere feel problematic (Schwarz, et al., 1991), and makes people less reliant on their thoughts (Briñol et al., 2007).

### *Emotional valence can be metaphorically represented with spatial concepts*

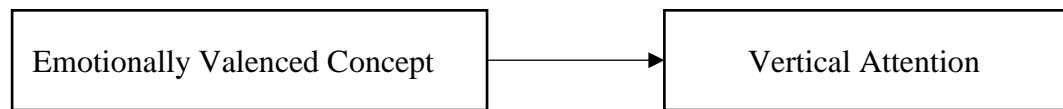
The phenomenon that reflects the relationship between emotion and vertical placement is based on the space-valence metaphor (Sasaki et al., 2016). Benjamin Whorf (1997) noted that, “we can hardly refer to the simplest situation without constant resort to metaphors” (p.205), meaning that it is common to transfer complex abstract concepts into ones that are more fluent for us. One of the most

common frameworks that explains metaphor is Conceptual Metaphor Theory (CMT; Lakoff and Johnson, 1980). Lakoff defines metaphor as “a cross-domain mapping in the conceptual system” (p. 2), meaning that people use metaphors as a tool to explain abstract concepts by applying familiar experience or knowledge. This might imply that a person could communicate an abstract construct, such as happiness, with a more concrete notion, such as top, and sadness with bottom, respectively. Meier (2004) extends prior research on CMT, demonstrating that when making judgments, people automatically perceive objects that are high in their visual space, as positively valenced, and objects that are low in their visual space, as negatively valenced.

Barsalou (1999) suggests that such associations are bidirectional: conceptual processing might influence the sensorimotor experience of a person as well. The symmetrical effect of the Conceptual-Metaphor Theory was also studied by Meier and Robinson (2004), who demonstrated that the processing of positive stimuli is more fluent when the stimuli is placed in a high rather than in a low location, while for negative stimuli it is the opposite. In their study, the participants were faster to evaluate the positive words located at the top of the page and negative words at the bottom rather than vice versa. Another research demonstrated that positively valenced tattoos were preferred to be placed on the upper parts the body, rather than negatively valenced tattoos (Crawford et al., 2009). Meier and Hauser (2007) contributed to the current topic by showing the congruence effects with respect to the bodily response of the subjects: when participants rated linguistic stimuli by pressing either with a finger or with a foot, there was a similar congruence effect: the time spent for the positive evaluations using the upper body was less than using the lower body. Additionally, Crawford, Margolies, Drake, and Murphy (2006) revealed the interaction of CMT with other cognitive processes, such as memory: the valence of nonverbal stimuli had a different impact on memory, depending on their location in the vertical space: positive stimuli were remembered better when they were shown in the upper space, rather than similarly located negative stimuli.

Building on Lakoff and Johnson’s work (1980) on conceptual metaphor, many empirical studies in the area of psychology and consumer behavior demonstrated important associations between affective valence and spatial representations. Furthermore, it was observed that there are different types of

priming of metaphorical frames, which can have impact on people's attitudes or behavior. Such framing effects may themselves interact with whatever bodily experience the decision maker has at the time (Lee and Schwarz, 2014). This could imply that a man jumps when he is happy, because the metaphorical association "happiness is up" is transformed into a bodily response. Therefore, it might be reasonable to assume that since "good" activates "up" and "bad" activates "down", the valence of emotions will have an impact on vertical attention and further on spatial choice as a behavioral response as well. Therefore, we suggest the following model to be tested in the current study:



**Figure 1 Emotions impact vertical attention**

***Spatial verticality – “good is up” and “bad is down”***

Based on the ideas of CMT, many researchers exploited the influence of spatial verticality on consumer behavior. For example, Freddi, Cretenet & Dru (2014) found that up-vertical position is evaluated by respondents more favorably for positive words while down-vertical position – for negative words. So, if vertical position is congruent with emotions behind the words, attitude of respondents will be more favorable.

In experiments performed by Sasaki, Yamada and Miura (2016), participants placed dots higher when they were exposed to positive images than when they were exposed to negative images. They suggest that conscious processing of emotional information is necessary for activating sensorimotor representations of vertical directions, and voluntary action is performed based on these activations (Sasaki, Yamada and Miura 2016).

More recently, another team of researchers found the metaphoric congruence effect only in the spatial-to-valence direction, but not in the valence-to-spatial direction (Huang and Tse, 2015). In other words, the scientist found some more evidence to claim that up-vertical position is associated with “good” words, while they found no evidence for the opposite: “good” words make respondents to prefer more up-vertical position. Hence, current research aims to cover this gap.

Meier and Robinson (2006) took a more respondent-sensitive perspective. Their findings indicate that the more intensive depressive symptoms participants exhibited, the faster they responded to or detected lower (versus higher) spatial attention targets. These results suggest that negative affect in general, and depressive symptoms in particular, appear to bias selective attention in a direction that favors lower regions of physical space (Meier and Robinson 2006).

In addition, Lynott and Coventry (2014) observed an asymmetry in the spatial-to-valence association. During the experiment, happy faces were identified more quickly in an upper rather than in a lower space, but no difference was observed during sad faces identification. This might imply that association “happy is up” is more fluent and, therefore, can be perceived as more positive.

All in all, much has been introduced in research of the metaphorical association “happy is up” and “sad is down”. Nevertheless, we address several gaps in this paper, such as the effect of (a-)symmetry and valence-to-space direction of this metaphor on vertical attention.

### ***Emotions affect vertical attention***

The verticality concept has been noticed within various cognitive processes, particularly, in attention patterns.

The study of Calvo & Nummenmaa (2007) highlights that in order to be able to identify and assess the emotional stimuli as good or bad, the cognitive system needs perceptual mechanisms. One of the main elements involved in this process is *attention*, which can be described as “an information-processing function that selects and keeps accessible stimulus and mental input for analysis by the cognitive system” (p. 347). In other words, the review suggests the existence of attentional biases towards emotions, which activate the perceptual system.

According to the attention theory, *emotions* is a top-down factor, which enhances attention towards an object (Wedel & Pieters, 2008). Regarding attentional processing of emotional information, Yiend (2010) collected evidence in her study, which conclude that emotional information has a stronger effect on attention, compared to non-emotional information. This study also showed that negatively valenced stimuli have a stronger impact, and the intensity of the



induced emotions by the stimuli is a significant parameter when evaluating the attention biases.

In line with spatial verticality, previous researchers found that negative affect appears to bias selective attention in a direction that favors lower regions of physical space (Meier, 2006). However, there is no strong evidence that positive affect has an impact on vertical attention. Based on the aforementioned research, which supports the existence of the metaphorical association “happy is up” and “sad is down”, the aim of the current study is to test if there is any symmetry between emotional state valence and verticality of attention. Hence, we hypothesize the following:

***H1:*** *Happy emotional state will lead the participant’s attention to the upper space.*

***H2:*** *Sad emotional state will lead the participant’s attention to the lower space.*

According to the attention theory, cognitive processes such as memory, preference and choice are consequences of attention towards an object (Wedel & Pieters 2008). Hence, in the current paper we suggest to consider the concept of memory as an indicator of attention.

Besides attention, *memory* was also proved to be influenced by emotional stimuli represented on a spatial scale (Crawford et al., 2006). The tendency to associate positive elements with up, and negative elements with down was studied too, and the outcomes are in line with the current study hypotheses. More precisely, it was shown that the valence of stimuli impacts memory in terms of location: positive stimuli located upwards were better memorized, compared to negative stimuli located upwards.

The common measures for marketing stimuli are recall and recognition (Shapiro & Krishnan, 2001). The observer’s response — recognition of the object — is the first-arriving response from any of the memory sites (Du Pleiss, 1994). Pieters, Warlop, and Wedel (2002) showed in their research that higher attention towards advertisement increased recognition of those ads. Recognition is widely used as an attention or memory measurement in marketing literature (Kumar and Krishnan 2004; Shapiro and Krishnan 2001), as it can show the most immediate attention level (Till & Baak, 2008). Moreover, recognition was described as an “operationalization of attention” (Moore, Stammerjohan, and Coulter, 2005). Therefore, we suggest using recognition of an up- or down- located

advertisements as a measurement of attention towards them. Hence, the hypotheses are extended as follows:

**H1a:** *Happy emotional state will lead the participant's attention to the upper space, which will cause an easier recognition of the objects placed above.*

**H2a:** *Sad emotional state will lead the participant's attention to the lower space, which will cause an easier recognition of the objects placed below.*

There is no evidence of correlation between recall and recognition, because even though they both measure memory, they involve different processes and may have different implications (Du Pleiss, 1994). Therefore, it might be reasonable to study both of those memory measures in order to observe the effect of the emotions on attention.

Even though recall measures can show poorer results (Shapiro & Krishnan 2001), recall often reports deeper involvement and higher attention, while recognition is a more robust and intensive measure (Du Pleiss, 1994). Based on the study results, Till and Baack (2005) claim that recognition might not be “cognitively challenging enough” compared to recall, and the latter one is more sensitive to the level of attention. Hence, in order to test the intensity of cognitive processing evoked by the emotional state, we suggest using the recall measure as an indicator of high-involvement attention. Therefore, the hypotheses are extended to:

**H1b:** *Happy emotional state will lead the participant's attention to the upper space, which will cause an easier recall of the objects placed above.*

**H2b:** *Sad emotional state will lead the participant's attention to the lower space, which will cause an easier recall of the objects placed below.*

To sum up, one can argue that most of researchers found verticality as a significant factor of consumer behavior. On the one hand, congruency between vertical position and valence of stimuli was almost always important for respondents' evaluation. On the other hand, such causation patterns as “good is up” and “bad is down” were mostly found valid only when some conditions were satisfied (e.g., enough attention, emotional context and etc.). In the following part of the paper we describe the method used in the current research in order to test the robustness of the emotion-verticality metaphor and measure the potential impact on participants' attention.

## Study 1

The objective of Study 1 was to examine the interaction between emotional stimuli and attention within vertical spatial axis, testing this way all four hypotheses defined above (H1a, H1b, H2a, H2b). The aim was to assess to what extent brand recognition and brand recall are affected by the emotional stimuli, being later used as a measurement of attention. The emotional state was induced by 2 happy and 2 sad movie scenes.

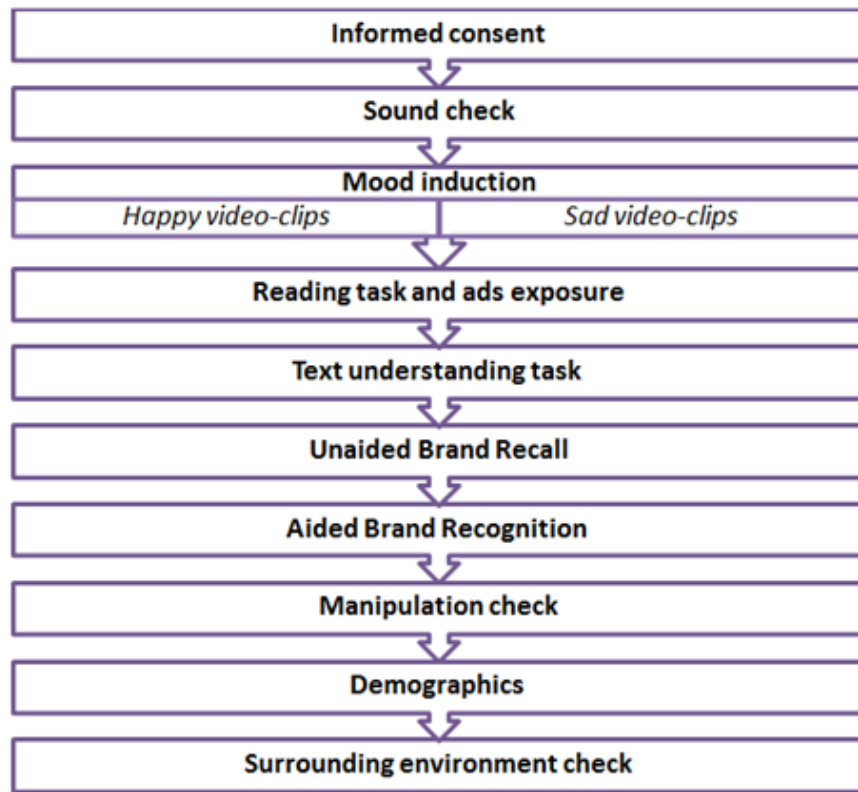
### *Method*

*Study design.* The experiment was built with the aim to study a causal relationship between the emotional valence — an independent variable (IV) — and attention — a dependent variable (DV). It was designed as a 2 (emotions: happy, sad) x 2 (location: UP, DOWN). In order to observe the verticality pattern in neutral condition we used the unpublished data of Knöferle K. M. (2017).

As it is typical for this type of studies, the number of responses is a concern. Using an online computer-based survey experiment allowed us to address the issue and perform a reliable statistical analysis. We employed Qualtrics as the venue for the survey. The responses were collected using Amazon MTurk service. For the purpose of previous behavioral researches, MTurk created a representative sample, which generated reliable results (Goodman, 2012). Burhmester (2011) noted that MTurk provides a diverse and more representative sample of non-college populations than those of typical Internet and traditional samples.

*Participants.* For the purpose of the study, 615 respondents were selected. Incomplete responses and technical issues determined us to remove a total of 218 participants. After adjustments, the final sample consisted of 397 respondents. Each respondent was randomly assigned to one of two groups — either to “Happy” or to “Sad”. Overall, we ended up with 204 participants in “Happy” and 193 in “Sad” group. The sample included 162 male participants (41%), and the average sample age was 36 years.

*Procedure.* Figure 1, presented below, displays the structure of the survey along with the main tasks. Each of the requests was preceded by detailed instructions for the participants, in order to create a clear and user-friendly design of the study. The following paragraphs illustrate in detail every step of the survey.



**Figure 2 Study 1 Structure of experimental process**

*Informed consent and sound check.* First of all, the participants were introduced to the study with general instructions. Each participant was expected to carefully follow the guidelines. Specifically, he or she was asked to watch 2 short movie clips, read a text and respond to several questions. Under the study framework, the anonymity was preserved. The estimated length of the survey (15 minutes) was also mentioned. In addition, participants were kindly asked not to leave the device while completing the study, to avoid distractions from the tasks. The audio aspect of the study played a critical role, as we wanted to be sure that every participant will fully experience the mood induction. Therefore, we conducted a sound check: participants had to type the word they heard.

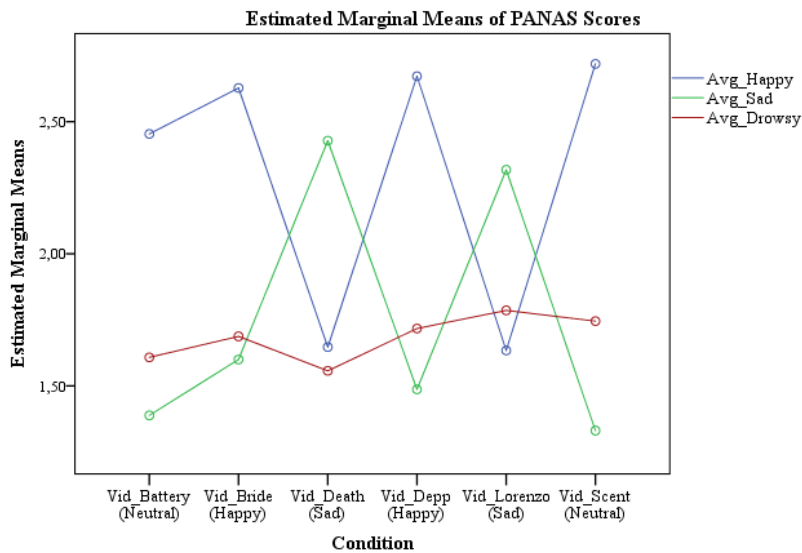
*Mood induction.* Participants were induced with happy and sad emotions through the video clips. Various studies showed emotional response when films were watched, concluding that videos are one of the most effective methods at inducing the target affective state (Fernandez et al., 2012; Ferrer et al., 2015). It was particularly the case for happiness and sadness emotional states (Lench et al., 2011). The affective impact of the emotional movie-clips was found to be robust and relatively long-lasting (Van Berkum et.al., 2013; Gross and Levenson, 1995;

Ray et al., 2007). This aspect was crucial for the current study since the choice task did not follow immediately after the mood induction, but was preceded by a reading task.

To induce happiness, participants were told to watch 2 extracts from the movies: “Benny and Joon” — the dinner scene (Schaefer, 2010) and “Father of the bride” (Fong, 2006). To induce sadness participants in another group were shown scenes from “The Champ” (Lee et al., 2012, Gross and Levenson, 1995, Lerner, Small, and Loewenstein, 2004) and “The Lorenzo’s Oil” (Lee et al., 2012; Andrade and Ariely, 2009). Each movie clip had approximately the same duration (around 2 minutes).

The movie clips have been pretested with 411 respondents from MTurk (Knöferle, 2017). In total 317 participants (58% male; average age 36 years) have completed the survey, and their answers were used for further analysis.

Figure 2 displays the repeated measures ANOVA results, which revealed significant difference in means of the PANAS scores (Happiness, Sadness and Drowsiness) within the same condition ( $F(2, 622) = 38.037, p = 0.000$ ), and significant interaction effect with condition ( $F(10, 622) = 14.841, p = 0.000$ ). This implies that selected video-stimuli indeed effectively evoke the target emotions.



**Figure 3 Study 1: The effect of mood-inducing films on the PANAS scores**

*Reading task and ads exposure.* In the text reading task, all participants were exposed to an article in the format of a webpage. This pursued the aim to enhance ecological validity of the study. For the purpose of current study, we selected the article “Why 1,000-year-old olive oil is Spain's freshest new flavor” by Miquel Ros (CNN, 2017). We considered this article to make minimum possible

emotional impact on the respondents, so that the impact of the MIP was not affected. On the right side of the page there was an advertisement block, which occupied 40% of the screen. On the top and in the bottom of the page there were 2 fictitious brand ads, and filler non-branded ads in the middle, as it is displayed in Figure 3.

<p><b>Why 1,000-year-old olive oil is Spain's freshest new flavor</b></p> <p>It's a sight that's been greeting travelers for thousands of years.</p> <p>On the Montsià plains of southern Catalonia, about a two-hour drive south of Barcelona, lies the Mar de Olivas, or Sea of Olives.</p> <p>Here, shielded between two small mountain ranges, in a broad dry valley near the mouth of the Ebro River, olive groves stretch as far as the eye can see. And not just any olive trees: This area hosts the largest concentration of millenary olive trees anywhere in the world.</p> <p>To qualify as one of these ancient olive trees, the diameter of the trunk has to be more than 3.5 meters, measured at a height of 1.3 meters from the ground.</p> <p>More than 4,400 trees thought to be 1,000 years or older have already been located and cataloged, while many more may be waiting to be discovered.</p> <p>With most of these trees still producing oil, customers worldwide are developing a new taste for this ancient flavor.</p>	<div data-bbox="901 481 1236 593">  <p><b>AquaPure</b> Refresh your day!</p> </div> <table border="0"> <tr> <td><i>Life</i></td> <td><i>Money</i></td> </tr> <tr> <td>People</td> <td>Markets</td> </tr> <tr> <td>Entertainment</td> <td>Business</td> </tr> <tr> <td>Movies</td> <td>Finance</td> </tr> <tr> <td>Music</td> <td>Cars</td> </tr> <tr> <td>TV</td> <td>Retirement</td> </tr> <tr> <td>Books</td> <td>Small businesses</td> </tr> </table> <div data-bbox="901 952 1236 1064">  <p><b>Andy's</b> For all your needs</p> </div>	<i>Life</i>	<i>Money</i>	People	Markets	Entertainment	Business	Movies	Finance	Music	Cars	TV	Retirement	Books	Small businesses
<i>Life</i>	<i>Money</i>														
People	Markets														
Entertainment	Business														
Movies	Finance														
Music	Cars														
TV	Retirement														
Books	Small businesses														

**Figure 4 Study 1: Text reading task, page 1**

There were 6 target advertisements, which consisted of brand names, logos and slogans. Each product category was deliberately chosen to be emotionally neutral: grocery store, drinking water, watches, denim, mobile operator and antivirus brands. All the images have been created by authors using Adobe Photoshop.

The vertical placement of advertisements was randomized. This was done to avoid attention bias, as attention towards vertical space can be moderated by a factor other than emotional state.

*Text understanding.* After the text reading task, respondents were asked to answer five multiple-choice questions concerning the content. Each question had four possible answers which were presented in a random order. The aim of this task was to measure how thoroughly the reading task was completed, and to support the announced purpose of the study.

### *Measurement of Dependent Variables*

The dependent variables were measurements of attention towards upper and lower space. We used Unaided Brand Recall and Aided Brand Recognition values for this purpose.

*Unaided Brand Recall.* First, participants were asked to name the brands, which they remembered having seen near the text. The recalled brand was considered as one that received the most of the respondent's attention. Hence, vertical location of the recalled brand (top or bottom of the page) was used for obtaining Recall\_Up and Recall\_Down variables.

*Aided Brand Recognition.* For the purpose of brand recognition task, 6 more advertisements were created. They communicated fictitious brands of the same product categories as ads used in the text reading task. In total 12 images appeared on the screen in random order. Participants were asked to indicate on a scale from 0 to 100 if they saw a particular ad during the reading task. Depending on the brand location, the recognition score was assigned to Recognition\_Up or Recognition\_Down variable. The recognition scores of the brands which were not used in the reading task were used to measure the Recognition\_False rate.

*Manipulation check.* Taking into account that online respondents tend to be less attentive than subjects supervised in lab (Oppenheimer et al., 2009), we performed a manipulation check. The purpose was to confirm that the affective state was correctly manipulated. The questionnaire included a set of questions about participants' emotional state. The PANAS scale, developed by Watson, Clark and Tellegen (1988), contains positive and negative affect terms. The participants are expected to rate their current state by these terms on a scale from 1 to 5 (1 being not at all, and 5 extremely). Many prior studies demonstrated the reliability and validity of PANAS model in measuring emotions across a large sample of adult population. The results appeared consistent across genders (Crawford and Henry, 2004). Moreover, Hancock et al. (2008) showed that when videos were used as sad mood induction, PANAS scale confirmed the affect. In the current study we employed eight happy terms, five sad terms and four drowsy terms.

Additionally, the manipulation check of Study 1 also contained NAQ (Need of Affect Questionnaire). It is based on the construct developed by Maio

and Esses (NAQ, 2001), which emphasizes the human differences in avoiding or approaching emotional situations and activities. The current study included only 10 items, as the evidence supports efficacy and applicability of the short model in online studies (Appel, Gnambs and Maio, 2012).

*Demographics and Surrounding environment check.* At the end of the survey, participants were asked about their gender, age and what they think the purpose of the study was. Furthermore, in order to be able to detect potential outliers in the collected data, they were also asked to provide information about the surrounding environment as well, as any technical difficulties they experienced while completing experiment. The full set of questions can be found in the Appendix 1.

### **Results**

To conclude about the existence of the vertical choice bias, one needs a reference point that is the results on recall and recognition scores (as in Study 1), and verticality patterns in neutral emotional state. For this we used the results of the external lab study, conducted at University of Michigan, Ann Arbor (Knöferle, 2017). The lab study involved 250 students as respondents. There were 247 participants (54% male, average age 22 years), who have completed the survey. Hence, those responses were used for further analysis. The questionnaire was similar to the Study 1, here with the only difference — no mood induction procedures have been applied. Participants were supposed to read the same text and perform the same memory tasks for the advertisements that they might have noticed while reading.

Paired samples t-test revealed that the likelihood to memorize ads at the top was the same as for ads at the bottom in neutral emotional state.  $M_{\text{recall\_up}} = 0.50$  ( $SD_{\text{recall\_up}} = 0.704$ ),  $M_{\text{recall\_down}} = 0.46$  ( $SD_{\text{recall\_down}} = 0.667$ );  $M_{\text{recognition\_up}} = 0.63$  ( $SD_{\text{recognition\_up}} = 0.320$ ),  $M_{\text{recognition\_down}} = 0.60$  ( $SD_{\text{recognition\_down}} = 0.333$ ). There was also no significant difference in sensitivity  $d'$  measurement as well (See Appendix 2).

This might imply that in the neutral condition participants are equally attentive towards upper and lower vertical space. Hence, for the purpose of the current study we relied on the evidence shown and reasonably assume that there is no vertical choice bias.



Regarding the results of Study 1, in order to test the impact of emotional induction, we checked NAQ and PANAS values. Then descriptive statistics, independent samples t-test and correlation analysis were performed, focusing on variables such as: happiness, sadness and drowsiness scores, text liking, quiz performance, recall and recognition scores. This was done in order to check for the potential confounds and/or moderators. Aiming to assess the hypotheses, recall and recognition of the ads placed in the upper and down side of the page were analyzed for both conditions: “Happy” group and “Sad” group. Independent samples t-test and repeated measures ANOVA were applied. The data was analyzed using IBM SPSS Statistics.

### *General overview*

The first glance at collected data revealed that the people who were induced into a happy mood state (“Happy” group, N = 204) liked the article (Mean~55, on a 1-100 scale) and their quiz performance (the number of correct answers) was also above average. In latter case the mean score was 3.32 out of 5 (66%) correct answers. Regarding the other group, people induced into a sad mood (“Sad” group, N = 193) liked the text as well (Mean ~ 54), and they answered correctly to 3.62 (72%) questions, on average. The quiz performance appeared to have significantly higher score for “Sad” as compared to the “Happy” group ( $t(395) = -2.447, p = 0.015$ ).

These numbers express the fact that participants enjoyed reading the article, even though the text was considered of a neutral valence. Moreover, participants who watched sad video-clips might have paid more attention to the text than those who watched happy video-clips.

Brief analysis of the answers across all five questions revealed that participants more often answered correctly the questions related to the first paragraphs (Q1, Q4) rather than the last ones. Specifically, the proportion of correct answers for Q1 and Q4 was as high as 78%, while for the questions Q3 and Q5, it was as low as 51%. Q2 was answered correctly most often – 88%, which was mainly because of the easiness of the question itself, rather than attention. The pattern persisted irrespectively of group considered — the “Happy” group encountered 76% correct answers for Q1 and Q4 (from upper paragraphs), and 47.1% for Q3 and Q5 (from bottom paragraphs), while “Sad” group

encountered 80% correct answers for upper part of the article, and 55.15% correct answers for the down part of the text. Overall, it suggested that participant's attention was decaying as he or she moved along the text. The summary of these findings is presented in Table 1.

**Table 1 Study 1 Quiz performance results**

Qn	Answers Upper Paragraphs					Answers Down Paragraphs				
	Q1	Q4	Q1+Q4	Total	%	Q3	Q5	Q3+Q5	Total	%
Correct answers	310	312	622	794	<b>78.33</b>	219	186	405	794	<b>51.0</b>
<b>Happy group</b>	154	156	310	408	<b>76.0</b>	107	85	192	408	<b>47.05</b>
<b>Sad group</b>	156	156	312	386	<b>80.82</b>	112	101	213	386	<b>55.18</b>

*Note: Q2 had a score of 88.16% of correct answers for the entire sample, therefore it was not taken into account while analyzing the location of the answers.*

While the quiz performance for the questions from the upper paragraphs (QP\_UP) did not have a significantly different score for the "Happy" vs. "Sad" groups, the quiz performance for the questions from the bottom paragraphs (QP\_DOWN) was shown to be significantly different. Participants induced into a sad mood more often answered correctly to Q3 and Q5 compared to those induced into a happy mood ( $t(395) = -2.152, p = 0.032$ ). This means that people in "Sad group" were more willing to remain attentive as they read through the text, compared to their "happy" counterparts.

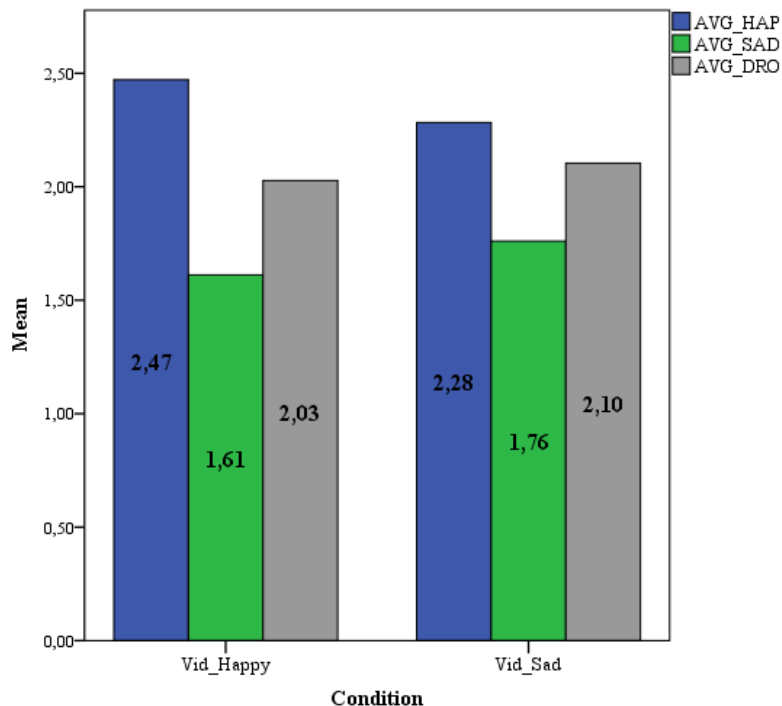
### *Emotionality*

**NAQ.** The Need for Affect scale resulted in a Mean of 0.90 (SD = 0.91) for the total sample, which is close to the median value (Range = -1.50 to 3.00, Median = 0.90). The mean scores for NAQ were the following: M = 0.92 (SD = 0.91) for the "Happy" condition group and M = 0.88 (SD = 0.92) for the "Sad" condition group. Independent t-test showed no significant difference in NAQ scores between both condition groups ( $t(395) = 0.385, p = 0.701$ ).

There was significant correlation of NAQ with text liking ( $r = 0.151, p = 0.003$ ), average happiness score ( $r = 0.236, p = 0.000$ ), average sadness score ( $r =$

-0.274,  $p = 0.000$ ), average drowsiness score ( $r = -0.208$ ,  $p = 0.000$ ). This implies that more emotional people might be more likely to enjoy the text. Additionally, the need of affect of the participants could influence their emotional state, which is measured by the PANAS scores.

**PANAS.** An independent t-test was run on the PANAS scores, to check for the difference in means between “Happy” and “Sad” condition. To figure out which type of t-test is the most appropriate, it was necessary to analyze variances in both groups, For instance, Levene’s test showed that group variances can be treated as equal, i.e. that homogeneity of variance assumption is satisfied. Given that average happiness scores were significantly higher (at the level of 10%) in the “Happy” condition group ( $t(395) = 1.895$ ,  $p = 0.059$ ) with a difference of 0.189; average sadness scores were significantly higher in the “Sad” condition group ( $t(395) = -1.756$ ,  $p = 0.080$ ). The difference in the means of drowsiness scores was not significant. This means the emotional state between the groups was significantly different, and the selected mood induction procedure was effective enough to induce target emotions.



**Figure 5 Study 1: Average PANAS Scores within each condition**

As we found that the normality assumption for the independent t-test was violated, we ran additionally Mann-Whitney test for means comparison. Average happiness scores were significantly (level of 10%) higher in the “Happy” condition group ( $p = 0.059$ ). Sadness scores were higher in “Sad” condition group

( $p = 0.049$ ). No significant difference in drowsiness scores ( $p = 0.493$ ). The results of both tests are presented in Table 2.

**Table 2 Study 1: PANAS Scores Means evaluations and independent samples t-test results**

PANAS Scores	Levene's Test for Equality of Variances		t-test for Equality of Means				Mann-Whitney Test Statistics	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Mann-Whitney U	Asymp. Sig. (2-tailed)
<b>AVG_HAP</b>	0,316	0,574	1,895	395	0,059	0,189	17 530	0,059
<b>AVG_SAD</b>	1,266	0,261	-1,756	395	0,080	-0,149	17 506	0,049
<b>AVG_DRO</b>	1,006	0,317	-0,757	395	0,449	-0,077	18 911	0,494

The result of multiple linear regression analysis demonstrated significant linear relationship between Average PANAS Happiness Score and Text Liking, Video Liking, Average NAQ Score ( $F(3, 393) = 27.211$ ,  $p < 0.000$ ), with an  $R^2$  of 17.2%. The regression equation suggested the following relationship  $Avg\_Happy = 1.315 + 0.010 * \text{Text Liking} + 0.006 * \text{Video1 liking} + 0.197 * \text{Avg\_NAQ}$ . This indicates that if a participant liked the video and the text, it enhanced the effect of the happy video clip.

The linear relationship between Average PANAS Sadness Score and Text Liking, Average NAQ and Quiz Performance was significant ( $F(3, 393) = 16.429$ ,  $p < 0.000$ ), with an  $R^2$  of 11.1%. This suggests that if a participant didn't like the text and couldn't answer the quiz, it complemented the effect of the sad video clip.

#### *Aided Brand Recognition*

Mean Recognition\_Up score was 70.37 in the "Happy" condition group and 67.73 in the "Sad" condition group; mean Recognition\_Down was 66.88 and 67.68 respectively; mean Recognition\_False 30.34 and 30.01. A paired-sample t-test was conducted to compare the difference in means of Recognition\_False scores and recognition of the previously exposed advertisement. The results suggested that the difference between means of Recognition\_Up and Recognition\_False variables ( $M = 39.90$ ,  $SD = 33.50$ ,  $t(396) = 23.146$ ,  $p = 0.000$ ) as well as between means of Recognition\_Down and Recognition\_False variables ( $M = 37.09$ ,  $SD =$

34.19,  $t(396) = 21.62$ ,  $p = 0.000$ ) was significant. This implies that recognition task can be considered as accurately performed.

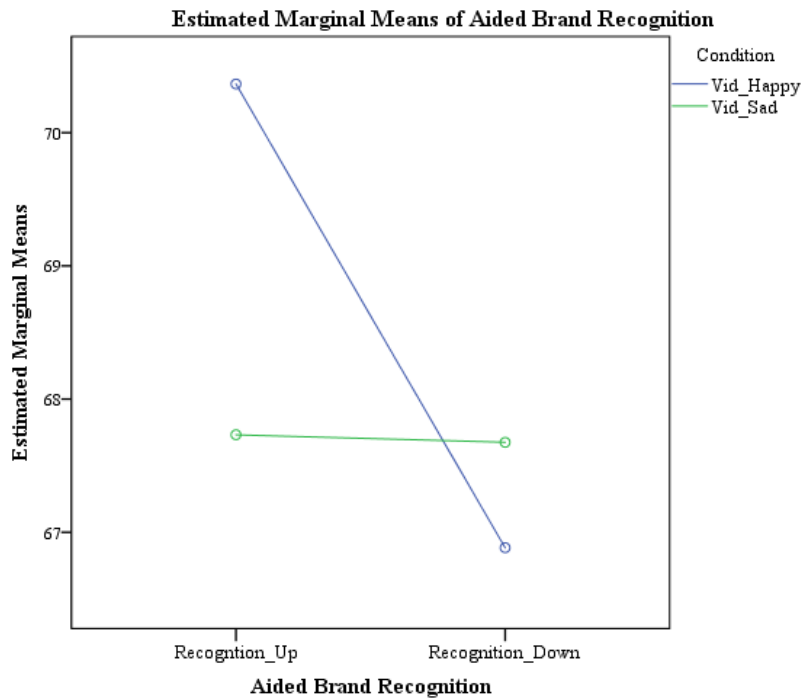
Regarding brand recognition, linear regression analysis evidenced that variation of Recognition\_Up was partially explained by happiness and sadness PANAS scores:  $F(2, 394) = 5.165$ ,  $p = 0.006$  with  $R^2 = 0.026$ . The impact of Avg\_Happy variable ( $\beta = 2.418$ ) was positive while it was negative for Avg\_Sad variable ( $\beta = -2.812$ ). The linear relationship for Recognition\_Down variable, though, was not significant ( $F(2, 394) = 1.853$ ,  $p = 0.158$ ,  $R^2 = 0.009$ ).

Providing that PANAS scores represent emotional state, the results of regression analysis imply that emotional valence had impact on the attention towards the upper space and exhibited no impact on the attention towards lower space.

However, the means for the upper versus lower space were not significantly different, for the two groups. Participants recognized almost equally well the brands placed at the top and bottom of the page, no matter which mood induction was applied. For the “Happy” group, the mean of recognition for the upper brands was 70.36, while for the down brands it was 66.88, on a 1-100 scale. For the “Sad” group the mean for the upper brands was 67.73, and for the down brands the mean was 67.67. No significance was found regarding the recognition of the upper brands within the 2 groups. The recognition of the bottom brands had a  $p$  value of 0.746 for the 2 groups also pointing to insignificant difference between means.

Similar conclusions could be drawn from the repeated measures ANOVA analysis, which is presented in Figure 5.

Recognition\_Up and Recognition\_Down variables were defined as within-subject factors and Condition as a between-factor. The conducted analysis revealed an interaction pattern between condition (emotional valence) and a spatial location. However, this relationship was not statistically significant. There was no significant difference between Recognition\_Up and Recognition\_Down means according to the within-subject test output ( $F(1, 395) = 1.947$ ,  $p = 0.164$ ), and no interaction effect with the Condition ( $F(1, 395) = 1.823$ ,  $p = 0.178$ ). Between-subject test also showed no significant difference between the conditions ( $F(1,395) = 0.203$ ,  $p = 0.652$ ). Therefore, neither hypotheses H1a nor H2a was confirmed.



**Figure 6 Study 1: The effect of emotional valence on Brand Recognition Means (RM ANOVA output)**

#### *Unaided Brand Recall*

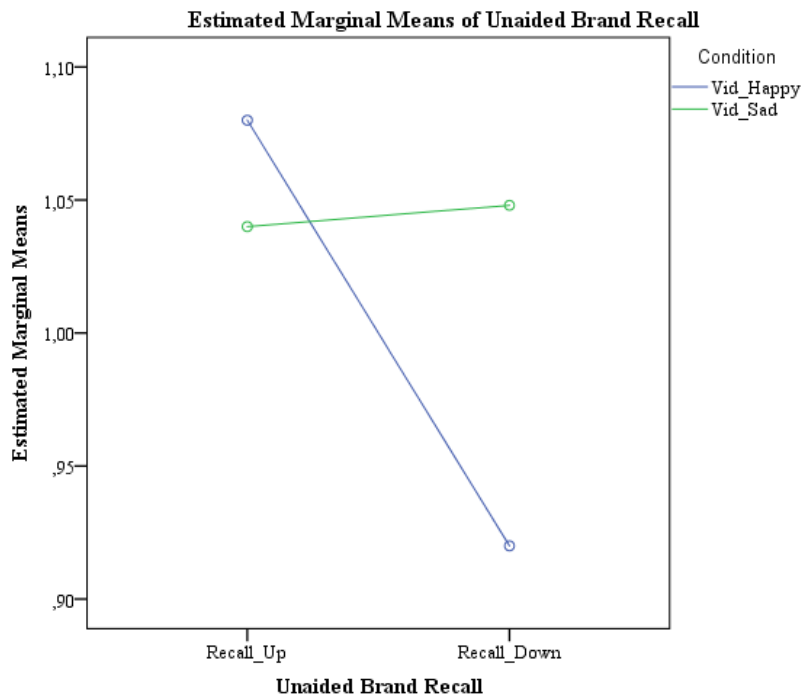
In order to analyze Recall variables, only the responses where participants recalled at least one brand were selected. This was done as we were interested in the verticality of the recall, while no-recall responses could not provide any evidence with respect to this. In total 250 responses were analyzed, 125 under each condition.

There was a significant correlation between Quiz\_Performance and both Recall variables ( $r_{up} = 0.203$ ,  $p = 0.001$ ;  $r_{down} = 0.167$ ,  $p = 0.008$ ). A linear regression analysis further revealed that Quiz\_Performance can explain 4% of the Recall\_Up variance ( $F(1, 248) = 10.686$ ,  $p = 0.001$ ), and 3% of the Recall\_Down variance ( $F(1, 248) = 7.152$ ,  $p = 0.008$ ). This implies that people who remained attentive throughout the entire reading task, turned out to draw more attention to the advertisements as well. They could also recall more brand names than those whose attention decreased by the end of the task.

The next step was to consider the difference in the Recall means for different conditions. For this purpose we conducted Mann-Whitney and independent-samples t-test. The analysis showed no significant difference in Recall Up and Recall Down means for “Happy” and “Sad” condition, implying

that the likelihood of recalling upper or lower brands was similar for happy and sad people.

In order to test if there was a significant difference in recall for higher- and lower-placed objects, repeated measures ANOVA was used. Recall\_Up and Recall\_Down variables were defined as within-subject factors and Condition as a between-factor. The analysis revealed an interaction pattern between condition (emotional valence) and a spatial location, which is displayed in Figure 6.



**Figure 7 Study 1: The effect of emotional valence on Brand Recall Means (RM ANOVA output)**

However, the relationship was not statistically significant. There was no significant difference between Recall\_Up and Recall\_down means according to the within-subject test output ( $F(1, 248) = 1.079, p = 0.300$ ), and no interaction effect with the Condition ( $F(1, 248) = 1.319, p = 0.252$ ). Between-subject test also showed no significant difference between the conditions ( $F(1, 248) = 0.332, p = 0.565$ ). Thus, we found no support for hypotheses H1b and H2b.

### *Discussion of Study 1*

The objective of the first study was to investigate whether emotional state has any impact on the human attention, measured by brand recall and recognition on a vertical scale. The experiment was designed to simulate a web page that contained a neutral article, fictitious branded ads and non-branded fillers. Based on the

results of Ann Arbor study, we assumed that there is no vertical choice bias in a non-emotional condition. We found positive significant correlations between the manipulation check (PANAS) and the two conditions (“Happy” and “Sad”). This implies that the mood induction was effective and evoked target emotions, hence, we were expecting differences in the attention distribution, for each condition. However, none of the four hypotheses was supported by significant measures, regarding recall and recognition of the brands.

Nevertheless, several observations and possible explanations could be raised. The text got high liking and quiz performance scores, which indicates that participants paid close attention to the article and its content. The quiz performance appeared to be significantly higher for the people induced into a sad mood, compared to those induced into happiness. In particular, the “Sad” group answered correctly to more questions related to the bottom paragraphs, than the “Happy” one. These findings illuminate a potential bias in terms of attention distribution over the web page: the text received more attention from the participants in a sad condition, the bottom paragraphs in particular. This is in line with the hypotheses of this paper. But, does this mean that people did not pay attention to the brands too? We found that 63% of the entire sample recalled at least one brand, with no variance between the two groups. The significant correlation between quiz performance and recall variables implies that people who were attentive to the text (having higher quiz performance) were also attentive to the ads. However, no statistically significant differences between upper brands and down brands were found. This means that people were equally attentive towards upper and lower brands, with no impact of their emotional state.

When analyzing the recognition variables, despite low  $R^2$ , the linear regression showed that Recognition\_Up variable was partially explained by the mood condition. This means that the emotional valence impacts the attention towards the upper space. Yet, the mood condition exhibited no impact on Recognition\_Down variable. Similar conclusions were drawn from the further analysis: there was an interaction pattern between condition (emotional valence) and the spatial location, yet the relationship was insignificant.

Even though the mood induction was pre-tested and confirmed using PANAS scale, an alternative explanation for this study results is that the induction was not sufficient to evoke strong emotions. For instance, Westermann et al.,

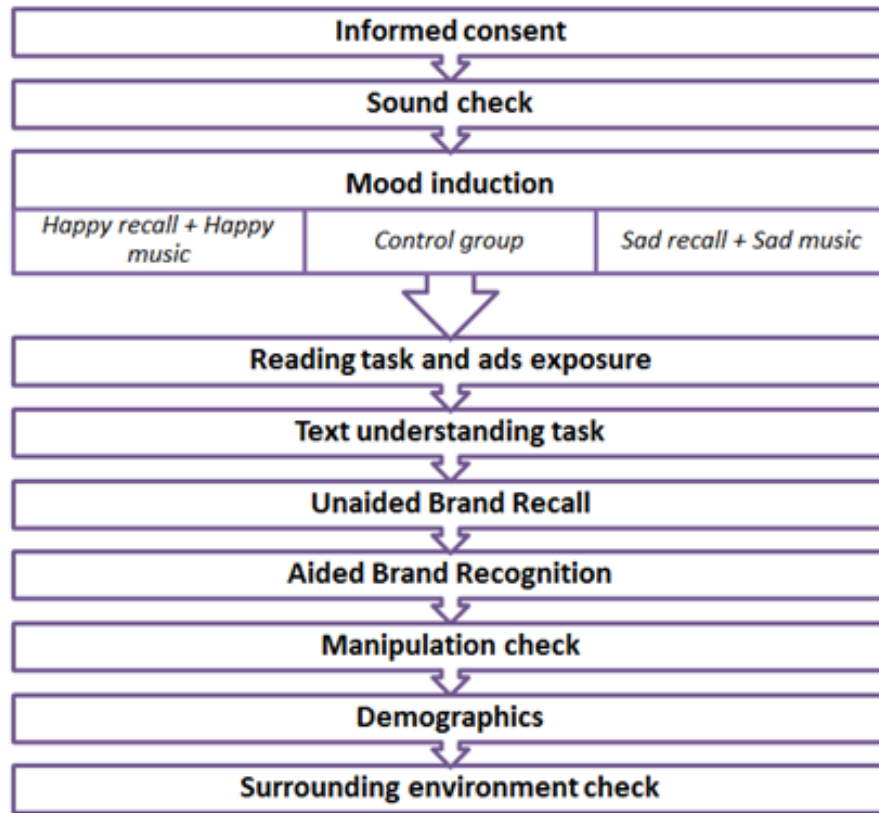


(1996) argued that movies were effective in inducing positive emotional state, but for sad emotions combined mood-induction procedures (MIP) perform better. This can be one limitation of our first study. Pêcher (2009) has found that there is a significant impact of emotions, elicited by positively or negatively valenced music on human behavior, which is also mediated by attention. Based on this, it is suggested that the mood induction can be more effective. Then, the study might have stronger and more significant results. To check if this assumption is true, a second study was conducted, where the mood induction technique was changed and the control group was added.

## **Study 2**

### *Method*

The second study was a conceptual replication of the first study. The objective maintained the same — to examine the interaction between emotional stimuli and attention within a vertical spatial axis, testing this way all four hypotheses of the paper (H1a, H1b, H2a, H2b). However, this time the experiment included 3 emotional conditions (happy, sad, neutral) with 2 locations (UP, DOWN). We introduced control group (“Neutral” group) to create a benchmark for the other two emotional states. Another modification was regarding the mood induction: participants were emotionally induced by autobiographical recall combined with music. The aim was to test if results were stronger or different with another manipulation technique. Recognition and recall were again the measurements of attention. Qualtrics was used for designing the survey, and Amazon MTurk for collecting the responses. The structure of the second experiment is presented in Figure 7. The changes are explained in details in the following paragraphs.



**Figure 8 Study 2: Structure of Experimental Process**

*Participants.* In order to improve the accuracy of the statistical analysis, the sample size was increased. In total 807 respondents from MTurk were selected. They were randomly assigned to one of the groups: 258 to “Happy”, 277 to “Sad” and 272 to “Neutral” condition group. The sample consisted of 323 male participants (40%); average age was 34 years.

*Mood induction.* For study 2, autobiographical recall technique combined with music was used. The combination of two emotion-induction procedures was shown to be more effective than using them separately. It is the case when the first induction (recall task) occupies foreground attention and a second one (music) contributes to a congruent background atmosphere (Jallais & Gillet, 2010). Several recent studies demonstrated that recall-based affect induction has successfully elicited target emotions (Lench et al., 2011; Jefferies et al., 2008). The efficacy of the recall technique is explained by its high relevance to respondent, which helps to control for individual differences within sample (Zhang et al., 2014; Quigley et al., 2014). Moreover, Goritz & Mozer (2006) showed that recall is effective during web-based mood induction which we used in the current study design. Apart from its effectiveness, this technique has some drawbacks. For

instance, the variation in terms of participants' ability to engage in mental imagery can weaken the intensity of the MIP. (Quigley et al., 2014). Nevertheless, this was balanced by incorporating music induction. Music is often used in combination with recall or imagery techniques (Chepenik et al., 2007; Zhang et al., 2014), as it helps to evoke stronger emotional feelings than a single MIP (Baumgartner et al., 2006). Additionally, Pêcher (2009) has found that there is a significant impact of emotions, elicited by positively or negatively valenced music, on individual's behavior. The effect is also mediated by attention. Therefore, we expected that the suggested emotion elicitation technique would be sufficient to evoke target emotions.

To induce happiness, participants were asked to recall one of the happiest event of their life and describe it in 5-7 lines of text while listening to *Tausendundeine Nacht* of Johann Strauss II (Kreutz et al., 2016). At the same time, participants in the "Sad" group were asked to recall one of the saddest event of their life and describe it in 5-7 lines of text while listening to *Elegie Op. 24, C minor* for violoncello and orchestra by Gabriel Fauré (Kreutz et al., 2016). The control group had to describe one of the days at work (Jacques and Levine, 2007), without listening to any music composition. The latter was related to common belief among researches that no music is "neutral" per se. (Baumgartner et al., 2006).

*Measurement of Dependent Variables.* Unaided Brand Recall was measured similarly to the Study 1. To measure Aided Brand Recognition, participants were asked to respond "Yes"/ "No" to the question if they saw a particular ad while reading the text. "Yes" answers were recoded to 1 and "No" answers — to 0. Depending on the brand location, the recognition score was assigned to Recognition\_Up or Recognition\_Down variable. The recognition scores of the ads, not used in the reading task, were counted to measure the Recognition\_False rate.

*Manipulation check.* Since NAQ scale did not make significant contributions in Study 1, we decided not to use it in Study 2. Presumably this would make the questionnaire shorter and less time-consuming to complete. Each participant would then feel less time-constraint and hence willing to spend more time answering the questions. Overall, it might improve the quality of data.

At the end of the questionnaire, the purpose of the study was disclosed to collect self-reported measures of the induction efficacy: the participants were asked how effective the emotion elicitation task was. This was done to support the PANAS results, in case PANAS question was not responded thoroughly. The full set of questions can be found in the Appendix 3.

## **Results**

### *General overview*

As in the first study, participants seemed to have liked the article they read during the survey, as all groups had liking scores higher than 50 on 1-100 scale ( $M_{\text{Happy\_group}} \approx 60$ ,  $M_{\text{Sad\_group}} \approx 60$ ,  $M_{\text{Neutral\_group}} \approx 63$ ). They also scored higher than average in quiz performance task. Both the “Happy” group and “Sad” group showed better results than the “Neutral” group. Specifically, the participants induced into a happy emotional state answered correctly to 3.66 questions (73%) on average, those induced into a sad one answered correctly to 3.69 questions (74%) on average, while participants of the control group had a mean of 3.46 (69%) correct answers. It suggested that “Sad” group had a significantly higher quiz performance than the control group, who was assigned to neutral condition ( $t(547) = 2.24$ ,  $p = 0.025$ ).

The high average score for quiz performance was in line with prior research findings: that emotional condition has a stronger effect on attention (in our case attention to the text) than the non-emotional condition (Yiend, 2010). Furthermore, the difference appeared significant for the “Sad” group. It confirmed the findings of the extant studies as well, being shown that negatively valenced stimuli have a more powerful effect on attention, compared to the positive ones.

After analyzing the answers to the five questions in more depth, it could be noticed that in general participants had provided correct answers more often to the questions regarding the information in the upper paragraphs (Q1 and Q4), with a correct score of 80%. The questions related to the bottom paragraphs (Q3 and Q5) had a lower correct score — 55.20%, which is still more than the half of participants. Q2 seemed to be the easiest question with 90.45% of correct answers. Breaking it down into two groups, there were no consistent differences: the “Happy” group encountered 80.42% correct answers for Q1 and Q4 (upper

paragraphs), and 58.13% for Q3 and Q5 (bottom paragraphs), while “Sad” group encountered 82.31% correct answers for upper part of the article, and 56.67% correct answers for the down part of the text. The respondents from control group answered correctly to 77.20% of Q1 and Q4, and to 51% of Q3 and Q5. The summary of these findings is presented in Table 3. This implies that happy people were somewhat more attentive towards the lower part of the page, than sad people. However, the difference is not significant enough to generalize this statement.

**Table 3 Study 2: Quiz performance results**

Qn	Answers Upper Paragraphs					Answers Down Paragraphs				
	Q1	Q4	Q1+Q4	Total	%	Q3	Q5	Q3+Q5	Total	%
Correct answers	625	666	1,291	1,614	<b>80.0</b>	475	416	891	1,614	<b>55.20</b>
<b>Happy</b> group	200	215	415	516	<b>80.42</b>	152	148	300	516	<b>58.13</b>
<b>Sad</b> group	222	234	456	554	<b>82.31</b>	170	144	314	554	<b>56.67</b>
<b>Neutral</b> group	203	217	420	544	<b>77.20</b>	153	124	277	544	<b>51.0</b>

*Note: Q2 had a score of 90.45% of correct answers for the entire sample, therefore it was not taken into account while analyzing the location of the answers.*

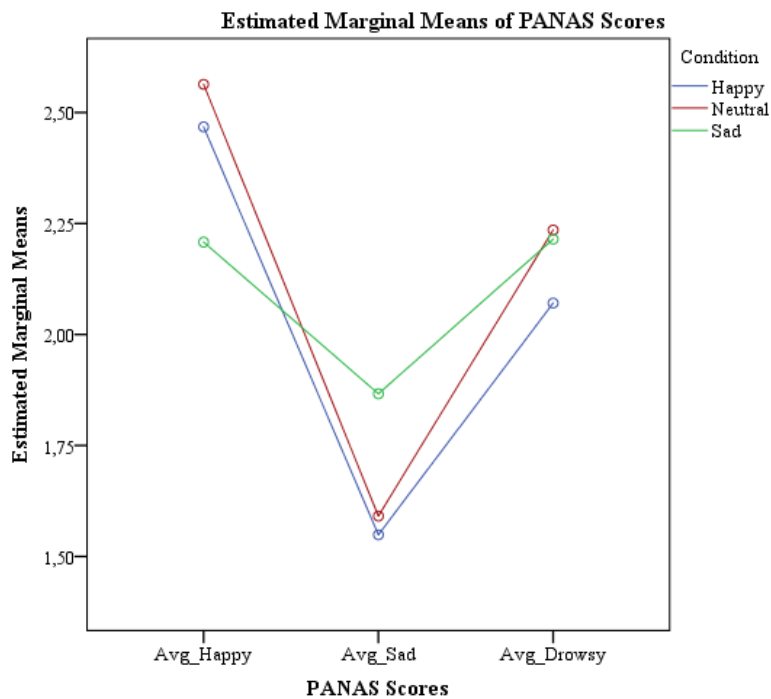
The results of quiz performance agreed with those in Study 1 – the questions from upper paragraphs (QP\_UP) did not have a significantly different score for any of the groups involved. However, regarding the quiz performance for the questions from the bottom paragraphs (QP\_DOWN), it was shown that participants induced into a happy mood answered correctly more often to Q3 and Q5 compared to participants from the neutral group ( $t(528) = 2.168, p = 0.031$ ). This contradicted the theoretical concepts detailed in the literature review part, being different from the metaphorical association “happy is up”. Nevertheless, there is heterogeneity in the difficulty of the questions, which could be behind this result.

### *Emotionality*

Independent samples t-test showed significant difference in the means of PANAS happiness and sadness scores between “Happy” and “Sad” condition, as well as “Sad” and “Neutral” condition. Happiness scores were significantly higher in the

“Happy” than in the “Sad” ( $t(533) = 3.162, p = 0.002$ ) and in “Neutral” versus “Sad” condition group ( $t(547) = -4.341, p = 0.000$ ). Sadness scores were significantly higher in the “Sad” condition group than in “Happy” ( $t(533) = -4.284, p = 0.000$ ) and in “Neutral” condition group ( $t(547) = 3.739, p = 0.000$ ). No significant difference in the means of PANAS scores was found between “Happy” and “Neutral” conditions.

Moreover, the results of repeated measures ANOVA showed that there is an impact of the condition on PANAS scores, which is displayed in Figure 8. There is significant difference in the means of PANAS scores according to the within-subject test output ( $F(2, 1608) = 136.320, p = 0.000$ ). Between-subject test showed significant (at 10% level) interaction effect between the conditions ( $F(2,804) = 2.425, p = 0.089$ ). The statistical output implies that the induction of sadness was successful as PANAS scores of happiness and sadness are significantly different from the “Neutral” condition. In “Happy” condition there is significant difference in drowsiness scores compared to the control group, while there is no difference in the target emotions. What is more, based on the self-reported induction effectiveness scale from 0 to 100, the means ( $M_{\text{Happy}} = 63.12, SD_{\text{Happy}} = 27.068; M_{\text{Sad}} = 66.95, SD_{\text{Sad}} = 28.288$ ) indicated that in both conditions on average, the induction was successful.

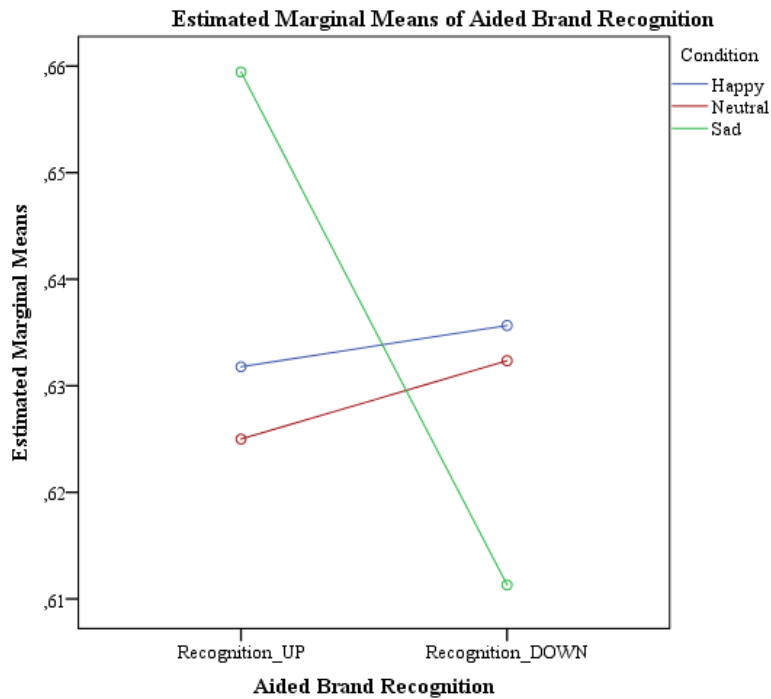


**Figure 9 Study 2: Average PANAS Scores within each condition**

*Aided Brand Recognition*

Surprisingly, the descriptive statistics output suggested that mood induction worked in the opposite direction to what was expected. For the “Happy” group, the mean of recognition for the upper brands was 0.631, while for the down brands the mean was 0.635 (where 0 = not recognised, and 1= recognised). For the “Sad” group the mean for the upper brands was 0.659, and for the down brands the mean was 0.611. The “Neutral” group had closer means,  $M_{\text{up\_brands}} = 0.625$ ,  $M_{\text{down\_brands}} = 0.632$ . The recognition of the filler brands was low ( $M_{\text{Happy\_group}} = 0.150$ ,  $M_{\text{Sad\_group}} = 0.161$ ,  $M_{\text{Neutral\_group}} = 0.141$ ) which means that participants correctly recognised the brands used. Independent samples t-tests showed no significant difference in recognition of the upper and lower brands within any of the three groups. This means that mood induction did not have significant impact on the vertical location of recognized brands.

Similar conclusions could be drawn from the repeated measures ANOVA analysis, which is displayed in Figure 9. Recognition\_Up and Recognition\_Down variables were defined as within-subject factors and Condition as a between-factor. The conducted analysis revealed an interaction pattern between condition (emotional valence) and the spatial location. However, the relationship was not statistically significant. No significance was found for the difference between Recognition\_Up and Recognition\_Down means according to the within-subject test output ( $F(1, 804) = 1.245$ ,  $p = 0.265$ ). There was, though, a significant interaction effect with the Condition, at 10% level ( $F(2, 804) = 2.694$ ,  $p = 0.068$ ), implying that recognition pattern of the participants was different, depending on their emotional state.



**Figure 10 Study 2: The effect of emotional valence on Brand Recognition Means (RM ANOVA output)**

The score of the mood induction efficacy was also taken into account to test whether it had an impact on the verticality of recognition scores. For this purpose, we selected the responses with reported scores greater than 50. However, no relevant changes were found.

To sum up, even though the pattern of recognition means showed that the people induced into a sad mood recognized more upper brands, this effect was not statistically significant. Nevertheless, there was no support for the opposite effect either. Hence, neither hypotheses H1a nor H2a was confirmed.

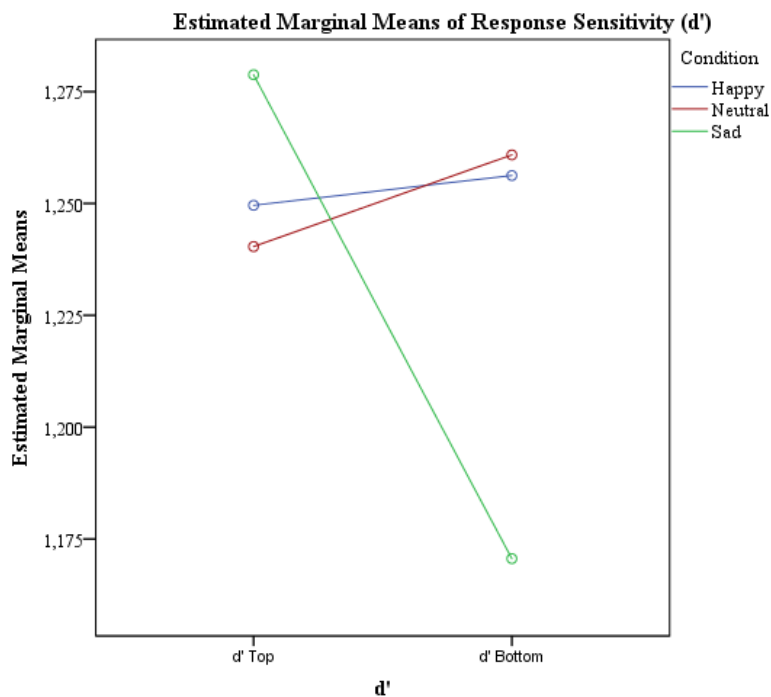
#### *Sensitivity of the responses*

In order to test if there is a response bias, we measured the response sensitivity, which indicates a respondent's ability to separate present and "filler" advertisements in the recognition task. First, correlation analysis was conducted, which showed positive linear relationship between Avg\_Sad PANAS scores and False\_alarm rate ( $r = 0.116$ ,  $p = 0.001$ ), meaning that sad people tended to recognize more of non-present ads.

Second, following the Stanislaw and Todorov (1999) methodology, we calculated Hit\_rates and False\_alarm rates. They were further used to compute  $d'$  for upper and lower placed advertisements. The results showed that overall



sensitivity is higher for upper brands ( $M_{\text{upper}} = 1.2565$ ,  $M_{\text{lower}} = 1.2284$ ). The difference in means was higher for “Sad” condition:  $M_{\text{upper}} = 1.2788$ ,  $M_{\text{lower}} = 1.1706$ . Repeated measures ANOVA revealed significant interaction effect Sensitivity\*Condition ( $F(2, 804) = 2.725$ ,  $p = 0.066$ ), at 10% level (see Figure 10), and no significance for sensitivity difference within the same condition ( $p = 0.279$ ). This implies that on average, participants were equally able to discriminate present advertisements in both areas of the vertical space; however, sensitivity was lower towards down-objects in “Sad” condition. This implies that in “Sad” condition, respondents were less attentive towards the lower space, which is in line with previous findings of Study 2, but objects our hypotheses.



**Figure 11 Study 2: The effect of emotional valence on response sensitivity**

#### *Unaided Brand Recall*

There were 522 (65%) responses in total, who recalled at least one of the brands: 172 in “Happy”, 178 in “Sad” and 172 in “Neutral” condition. Those participants recalled on average 1.12 (SD = 0.860) upper located brands and 1.10 (SD = 0.931) lower located brands in “Happy” condition;  $M_{\text{recall\_up}} = 1.04$  (SD = 0.849) and  $M_{\text{recall\_down}} = 1.06$  (SD = 0.878) in “Sad” condition;  $M_{\text{recall\_up}} = 1.16$  (SD = 0.783) and  $M_{\text{recall\_down}} = 1.07$  (SD = 0.835) in “Neutral” condition.

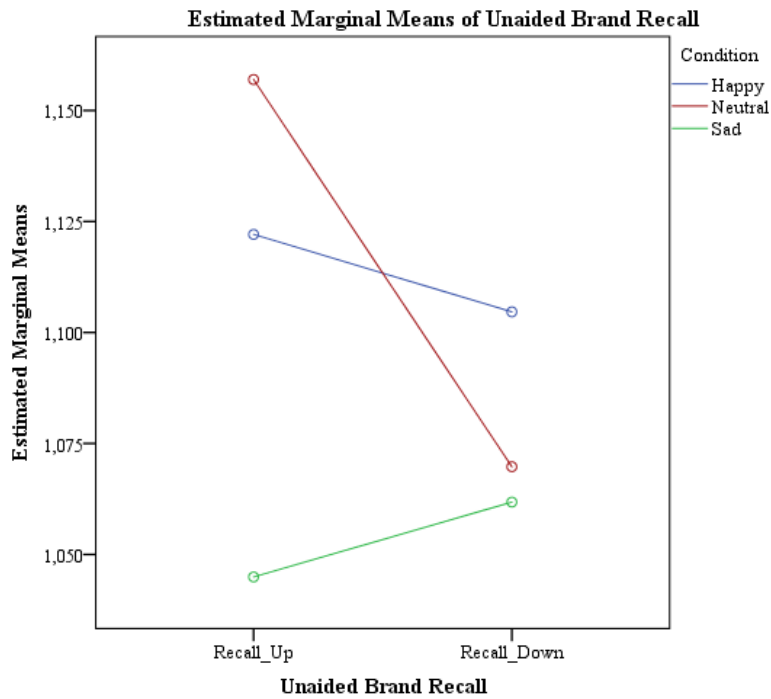
Recall\_Up variable positively and significantly correlated with Recall\_Down ( $r = 0.468$ ,  $p = 0.000$ ). This means that participants who recalled

upper brands, recalled lower brands as well, which implies no attention shift towards any of the spatial locations depending on the emotional state. In other words, if participant recalled the ads at the top, he/she most likely recalled it at the bottom too, and vice versa. However, further analysis was needed to test this inference.

Therefore, an additional variable was created — *If\_recalled*, which indicated if any brand was recalled within a particular response. It has positive correlation with *Recognition\_Up* ( $r = 0.512, p = 0.000$ ), *Recognition\_Down* ( $r = 0.519, p = 0.000$ ) and negative correlation with recognition of the false advertisements ( $r = - 0.269, p = 0.000$ ). This indicates that participants who recalled more brands, were more attentive towards advertisements in general, and they were more accurate in recognition task.

Independent samples t-test showed insignificant difference in *Recall\_Up* and *Recall\_Down* variables within all three conditions (“Happy”, “Sad” and “Neutral”).

Moreover, Repeated measures ANOVA (see Figure 11) determined that both *Recall\_Up* and *Recall\_Down* means were not significantly different from each other ( $F(1, 519) = 0.363, p = 0.547$ ) and no interaction effect with Condition was observed ( $F(2, 519) = 0.398, p = 0.672$ ). This implies that there is no significant difference in attention within vertical space, in the same emotional state, as well as between different emotional conditions, which supports neither H1b nor H2b.



**Figure 12 Study 2: The effect of emotional valence on Brand Recall Means (RM ANOVA output)**

### *Discussion of Study 2*

The analysis of self-reported emotionality measures suggested that selected mood induction procedure was effective and target emotions were evoked sufficiently.

The results of Study 2, however, did not support either of the hypotheses. Interestingly, even though there was no statistical significance, the patterns were opposite to the ones, received in Study 1. More specifically, the attention in “Happy” condition was biased towards lower space, while in “Sad” condition — towards upper space. The quiz performance analysis emphasized this pattern — there were more correct answers for the questions, which involved information from the upper paragraphs of the text, provided by respondents induced into sadness, and vice versa. This indicates that participants were more attentive to the text in the upper part of the simulated webpage when they were sad, and to the lower part when they were happy.

When it comes to recognition of the advertisements, the pattern remained the same — participants were more sensitive towards upper space in “Sad” condition, and less accurate in their responses when it came to brands from lower space. Further, in contradiction with our hypotheses, data patterns showed existence of interaction between emotional valence and vertical location of the recognized brands: in “Sad” condition there were more upper brands recognized,

while in “Happy” condition — more lower brands appeared in the responses. These findings also contrasted with conclusions in the literature within “good is up” and “bad is down” metaphorical associations. One of the reasons might be that prior studies were using emotionally valenced objects, and checked the memory within metaphor-congruent and incongruent vertical space. The current study used neutral objects and manipulated with emotion-eliciting stimuli instead.

The patterns of recall variables, though insignificant, showed the opposite. Happy respondents recalled slightly more of upper brands and sad respondents recalled more of lower brands. This implies that more elements from the upper space were top-of-mind for the happy participants, and vice versa.

The opposite data patterns in recall and recognition scores might be explained by different sample sizes. There were fewer responses with at least one brand recall and which were used for recall analysis, compared to the total sample, which was used for recognition analysis.

## General Discussion

### *Overall findings*

The two experiments were designed to answer the research question, defined in the introduction part:

*How is selective attention within physical space influenced by the affective state of a subject?*

The results have provided insights on how emotions can drive the attention distribution of a person on a vertical scale. Even though none of the two experiments revealed enough evidence to support the research hypotheses, it is worth mentioning that several observations were drawn.

In order to induce the target emotions, two different techniques were used. In line with prior research, emotional movies (in Study 1) and autobiographical recall in combination with music (Study 2) were used as effective techniques in evoking happiness and sadness. The self-reported PANAS scores and evaluation of the MIPs confirmed the efficacy in both studies. We found significant correlation between PANAS scores and other variables, which implies that emotional state was influenced not only by emotional stimuli, but also by text liking, quiz performance, stimuli liking and Need for Affect. This means that it is difficult to control for external factors as there are many other variables that can influence emotional state.

When emotional induction was not applied, the results of Ann Arbor study demonstrated that there is no significant difference in attention towards upper or lower space of the webpage, implying that there is no vertical choice bias. However, since our findings suggested that emotion induction was sufficient, significant difference between attention towards upper and lower space was expected.

The results of both experiments indicate that participants involved in completing tasks of the survey liked reading the article “Why 1,000-year-old olive oil is Spain's freshest new flavor”. They also paid enough attention to the text, which was confirmed by high quiz performance scores. From here we conclude that the webpage created for these studies was engaging and respondents were thorough while completing the survey. We assume that this had a positive impact on data quality. Moreover, when we compared the quiz performance within

groups, several inferences could be made. People induced into a sad mood state, performed better in both experiments. However, in Study 1 “Sad” group had more correct answers than “Happy” group, while in Study 2 – “Sad” performed better than “Neutral” group. Also, no significant difference in the means of PANAS scores was found between “Happy” and “Neutral” conditions. This implies that the “Happy” group from the first study behaved similarly to “Neutral” group of the second study. The possible explanations for this could be either that the intensity of happy emotions induction in Study 1 was not sufficient, or the neutral condition in Study 2 evoked happiness.

Even though the results were not significant, the two studies showed contradictory outcomes. Study 1 demonstrated that “Sad” group answered correctly to more questions regarding the information from lower paragraphs, while Study 2 presented the opposite pattern - the attention of the “Sad” group was directed to upper paragraphs.

The same contradiction was revealed after analyzing recognition measures - in Study 1 participants in “Happy” group recognized more of the up-brands, while in Study 2 more of the down-brands. In other words, the interaction pattern between condition (emotional valence) and spatial location was different in the two experiments. The first study was in line with the metaphorical association “happy is up, and sad is down”, but the second study showed the opposite effect. Moreover, the results of Study 2 demonstrate lower sensitivity towards down-brands in “Sad” condition (respondents were less accurate in recognition), which is in line with recognition pattern, but contradicts Study 1 and hypotheses. However, since the results were not statistically significant, they cannot be generalized.

On the contrary to recognition measures, the patterns of brand recall were similar in both studies and in line with the hypotheses - “Happy” group recalled more upper brands and “Sad” group - more lower brands. Even though the results of both studies were not significant, the interaction effect patterns might imply that there is an impact of emotional state on vertical attention. Providing that recall is considered a measurement of memory, which requires deeper processing and higher cognitive effort (Till & Baack, 2005), it could be considered as a more representative memory measurement. Hence, this implies that there are more upward brands recalled among happy people and more downward brands recalled

among sad, which is the result of their attention bias towards respective vertical space.

### ***Theoretical Implications***

This paper is one of the first to study the metaphorical association “happy is up” and “sad is down” in terms of cognitive processes and using emotional manipulation. Prior research showed an evidence for the existence of metaphorical link between an object and its location. By extending this concept we hypothesized that similar link exists between the emotional state of a subject and the verticality of his focus. For the purpose of current research, neutrally valenced objects were used for measuring attention, which has not been done in previous studies. Moreover, this paper aimed to verify how symmetrical the effect is and whether it is robust to different emotions manipulations. For this, we varied induction techniques in each study. Future experiments and researches can be built on the findings of this study.

### ***Managerial Implications***

Even though the research hypotheses have not been confirmed, there might be several implications for managerial practice.

First, since our findings showed the efficacy of used MIPs, similar methods can be used to evoke target emotions in stores or within Internet environment. For instance, exposing consumers to mood-films or making them recall emotionally valenced events might be effective in inducing happiness during their interaction with a particular brand by creating positive brand cues.

Second, the study demonstrated that not only the manipulation technique had an impact on emotions, but also surrounding factors played their role. Therefore, for example, while placing an advertisement on a website, it is important to consider the potential emotional valence of the content or possible interactions with the consumer. They may impact one’s emotional state and, consequently, his behavior towards the respective brand.

Third, even though there were no significant statistical results, the patterns of memorizing brands suggest that vertical attention might be biased by emotional state. Therefore, it is reasonable for managers to consider the vertical placement of the ads in their marketing strategies, depending on the valence of the webpage

content. For instance, one can place an advertisement in the lower part of the page, when negative breaking news is announced.

### *Limitations and Further research*

This section outlines several possible limitations of the current paper, and proposes directions for future research.

One of the drawbacks of the study is the experiment design. Because it was conducted online, the respondents could have been less attentive than subjects supervised in a laboratory (Oppenheimer et al., 2009). The laboratory experiment minimizes noise, and makes it quite artificial, but conditions are more equal. There were plenty of factors outside our control, such as light, temperature, time, type and size of the device used, or other potential procedural confounds. In other words, the environment could have had an impact on the internal validity of the experiment. Therefore, in order to have a better control on the environment and external factors that could influence the results, a similar experiment in a laboratory would be of a great interest.

Even though the PANAS analysis showed that the mood induction was effectively performed, the emotional state could be evoked even in more depth. The length of the manipulation technique might have not been sufficient to evoke desired level of emotions, and this way, the impacts were limited. Future research could address whether similar results as the ones reported can be found when the mood induction is conducted during a longer period of time and carries a more emotionally intense context. Moreover, it could be reasonable to measure the emotional arousal level, as it has impact on the attention patterns (Lane et. al., 1999).

Furthermore, the brands used as experimental objects for measuring attention did not represent a real case; they were fictitious. Consequently, the recognition and recall processes could have been affected. People were not familiar with the ads, so aspects such as color, brand names or logos might have biased their cognitive action as well. Thus, another venue for future research is the ads: one could examine what would be the outcomes when real brands are exposed.

It has been already concluded that emotions influence consumer behavior not only in theory, but also in real life. A related case would be the Lurpak Spirit



Level campaign (Lurpak Spirit Level, n.g.), which had a significant success in raising the sales by 9% and delivering a cost savings of 50%. The strategy was based on creating and exposing ads that matched the mood of the target audience. More precisely, they created a tool called Spirit Level which was monitoring the happiness/sadness level of the population in specific periods of time, depending on Twitter conversations, news and weather. If the tool indicated that the consumers are happy, the corresponding ads were used, and vice versa. We suggest that the Lurpak case can be extended by adding verticality variable and contributing with an ecologically valid experiment.

There are certain segments of people interesting to analyze. Among all, it would allow to focus on specific targets in terms of consumption habits, level of involvement or in terms of product related ads. For instance, what would be the results if the sample consisted of football supporters, after a winning/failing game? Investigating a much closer to reality situation, the attention could be measured also on a resized scale, and not only from digital perspective. As an example, participants involved in the study (with or without being aware about their participation) can be exposed to products placed on shelves, in a typical souvenir shop.

Last but not least, combining valenced emotional stimuli and experimental objects serves as another interesting topic. Prior studies used either valenced objects or valenced stimuli. In our opinion, it is of a great interest to see how both valenced factors work together. This is because in real life, every object has its own connotation and certain valence for a person, and it makes sense to consider as many as possible sources of emotional impact.

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## Appendix

### *Appendix 1: Questionnaire Study 1*

**Informed consent**

In this study, you will see and rate various video and text stimuli.

You will first see two short movie clips. Afterwards, you will read a text and answer some questions. All answers will be kept anonymous. The whole study will take around 15 minutes.

We would like to kindly ask you not to leave your computer while completing this survey, to be attentive during the entire survey, and to respond honestly. This is very important for the results of the study.

I have read the information above and would like to participate


>>

(page 1)

**This study includes videos with sounds. Please put on your headphones or activate your speakers.**

If possible, please turn off any music or other sound sources in your environment.

You will now listen to a short sound recording that allows you to adjust the volume of your headphones to a pleasant level. Please make sure you can hear the sound clearly and follow the auditory instructions.



>>


(page 2)

You will now see two movie scenes. Please watch both scenes until the end.

>>

(page 3)

Please watch this short video.



>>

(page 4)

How much did you like the video?


Not at all Very much

—————●—————

>>

(page 5)

Please watch another short video.




>>

(page 6)

How much did you like the video?

Not at all Very much



>>

(page 7)

Next, you will read an article in a webpage format and answer some questions about it.

>>

(page 8)

### Why 1,000-year-old olive oil is Spain's freshest new flavor

It's a sight that's been greeting travelers for thousands of years.

On the Montsià plains of southern Catalonia, about a two-hour drive south of Barcelona, lies the Mar de Olivas, or Sea of Olives.


Here, shielded between two small mountain ranges, in a broad dry valley near the mouth of the Ebro River, olive groves stretch as far as the eye can see. And not just any olive trees: This area hosts the largest concentration of millenary olive trees anywhere in the world.

To qualify as one of these ancient olive trees, the diameter of the trunk has to be more than 3.5 meters, measured at a height of 1.3 meters from the ground.

More than 4,400 trees thought to be 1,000 years or older have already been located and cataloged, while many more may be waiting to be discovered.


With most of these trees still producing oil, customers worldwide are developing a new taste for this ancient flavor.

**Andy's**  
For all your needs



<i>Life</i>	<i>Money</i>
People	Markets
Entertainment	Business
Movies	Finance
Music	Cars
TV	Retirement
Books	Small businesses

**AquaPure**  
Refresh your day!



>>

(page 9)

Near the small town of Ulldecona, is a unique piece of natural heritage: a 1,700-year old tree which might be the oldest, scientifically dated, olive tree anywhere in the world. Researchers at the Technical University of Madrid used advanced laser-based techniques to conclusively date the Farga de l'Arión, as this monumental tree is called, to the early fourth century. This was during the reign of Roman emperor Constantine the Great, who ruled over Britain, Gaul and Spain.


Most of the ancient trees here are of the Farga variety, a heirloom olive that is endemic to the area.

"It is difficult to find a Farga olive tree that is younger than 200 years old," explains Jaume Antich, former mayor of Ulldecona and now an adviser at Taula del Senia, which works to preserve the trees' heritage and promote tourism. "They tend to be less productive than other varieties, therefore they went out of favor for a really long time."

Until very recently, Antich explains, Farga olive trees were felled and replaced with higher-yielding varieties, or simply uprooted and re-sold elsewhere as garden decor.


However, most millenary trees are still productive. The growing popularity of the Mediterranean diet and increasing consumer interest in food provenance have opened up new opportunities for olive oil entrepreneurs.

**Chronos**  
Always on time



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News	Flights
Reviewed.com	Destinations
Talking Tech	Cruises
Reviews	Deals
Columnists	More...

**Denim's**  
Makes you feel special



>>

(page 10)

"It is only recently that we realized that we had a valuable asset in these trees, that people are ready to pay for the experience of tasting an olive oil with such a unique origin," says Antich.

Amador Peset used to work as a carpenter, but when Spain's construction boom ended a few years ago, the 37-year-old switched to making olive oil.


Recognizing the potential of ancient olive trees, he launched his own brand of millenary oil: Thiarjulia, named after the Roman name of his hometown of Traiguera.

Having begun with his own small plot of millenary trees, Peset now drives around the region finding other ancient trees that are being neglected by the landowners. He then will usually make an arrangement with the owners so he can harvest specific trees for his Thiarjulia brand.

"It has become like an obsession," he says. "I love to find these trees and bring them back into production."

His annual yield of millenary olive oil is around 800 liters, harvested from more than a hundred scattered trees. That's a tiny drop in the ocean of Spanish olive oil production, which in 2015/16 stood at 1.4 million metric tons, or close to half the total global olive oil production.


**Virusil**  
Kill the virus



*Explore*

Sport	Weather
Shop	Earth
Music	Arts
Culture	Autos
Nature	TV
Radio	Food

**Easy Call**  
Anytime. Anywhere



>>

(page 11)

Next, we will ask you some questions regarding the text and its contents.

>>

(page 12)

How much did you like the text?

Not at all Very much

>>

(page 13)



In which part of Spain is the "Sea of Olives" located?

- Catalonia
- Canary islands
- Basque country
- Navarre

[>>](#)

(page 14)

Which of the following is the main criterion of an ancient olive tree?

- Color of leaves
- Size of root
- Height of the tree
- Diameter of the trunk

[>>](#)

(page 15)

What were ancient olive trees mainly used for until very recently?

- House heating
- Carpentry
- Garden decoration
- Making olive oil

[>>](#)

(page 16)

Amador Pesed named his brand Triarjulia after

- his hometown
- his wife
- his mother
- his daughter

[>>](#)

(page 17)

How much olive oil does Spain produce?

- 1/2 of global production
- 1/3 of global production
- 1/5 of global production
- 1/10 of global production

[>>](#)

(page 18)

Now, we will ask you some additional questions related to the reading task.

[>>](#)

(page 19)

Please name all brand names that you remember having seen in the advertisements next to the text.

Use a semicolon (;) to separate brand names.

>>

(page 20)








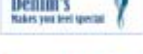




Next, you will see several advertisements.

Some of these ads may have appeared next to the text during the reading task. For each ad, please indicate whether or not you have seen it before (i.e., during the reading task).

>>

(page 21)

Please indicate on the scale below whether you have seen the following advertisements next to the text during the reading task.

	The ad was definitely not there		The ad was definitely there
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(page 22)

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now (that is, at the present moment). Use the following scale to record your answers:

	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
	1	2	3	4	5
enthusiastic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
lonely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
happy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
blue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
delighted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
tired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
excited	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
joyful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
drowsy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
cheerful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
sleepy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
sluggish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
energetic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
lively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
alone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
downhearted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(page 23)

Please indicate on the scale below to which extent these statements describe you.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
	-3	-2	-1	0	1	2	3
I feel that I need to experience strong emotions regularly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Emotions help people to get along in life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think that it is important to explore my feelings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important for me to be in touch with my feelings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important for me to know how others are feeling.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(page 24)

If I reflect on my past, I see that I tend to be afraid of feeling emotions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find strong emotions overwhelming and therefore try to avoid them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would prefer not to experience either the lows or highs of emotion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not know how to handle my emotions, so I avoid them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Emotions are dangerous – they tend to get me into situations that I would rather avoid.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(page 24)

What is your gender?
<input type="radio"/> Male
<input type="radio"/> Female
<input type="radio"/> Other
-----
How old are you?
<input type="text"/>
-----
What do you think was the purpose of this study?
<input type="text"/>

(page 25)

By any chance, did you temporarily leave your device while completing this survey?

Yes  No

---

Were you alone while completing this survey?

Yes  No

---

Based on your honest judgment, how quiet was your surrounding environment when you were completing this survey?

Not quiet at all Extremely quiet

---

Did you experience any technical problems during the study?

No

Yes:

(page 26)

***Appendix 2. Study 1. Vertical Attention in Neutral Emotional State: Paired Samples Test Results***

Compared Variables		Paired Differences		t	df	Sig. (2-tailed)
		Mean	Std. Deviation			
Pair 1	<b>Recall_Up - Recall_Down</b>	0,045	0,756	0,926	246,000	0,355
Pair 2	<b>Recogn_UP_AVG - Recogn_DOWN_AVG</b>	0,031	0,331	1,473	246,000	0,142
Pair 3	<b>dprime_top - dprime_bottom</b>	0,072	0,744	1,520	246,000	0,130

### Appendix 3: Questionnaire Study 2

**Informed consent**

In this study, we will ask you to complete various reading and writing tasks.

First, you will be asked to write a text about an event from your life. Afterwards, you will read a text and answer some questions. All answers will be kept strictly anonymous. The whole study will take around 15 minutes.

We would like to kindly ask you not to leave your computer while completing this survey, to be attentive during the entire survey, and to respond honestly. This is very important for the results of the study.

I have read the information above and would like to participate


>>

(page 1)

**This study includes videos with sounds. Please put on your headphones or activate your speakers.**

If possible, please turn off any music or other sound sources in your environment.

You will now listen to a short sound recording that allows you to adjust the volume of your headphones to a pleasant level. Please make sure you can hear the sound clearly and follow the auditory instructions.



>>

(page2)



The first task is a writing task. On the next page, we will ask you to write about an event from your life. Please try to recall that event as vividly as possible and provide a detailed answer. All responses will be kept confidential.



(page 3)

Please **recall one of your days at work/school** and describe it in 5-7 lines of text. Describe it such that a person reading the description would get a good impression of your experience.

A large, empty rectangular box with a thin grey border, intended for the user to write their response. A small cursor icon is visible in the bottom right corner of the box.

(page 4)

Thank you very much for completing the writing task.

Next, you will read an article in a webpage format and answer some questions about it.



(page 5)

### Why 1,000-year-old olive oil is Spain's freshest new flavor

It's a sight that's been greeting travelers for thousands of years.


On the Montsià plains of southern Catalonia, about a two-hour drive south of Barcelona, lies the Mar de Olivas, or Sea of Olives.

Here, shielded between two small mountain ranges, in a broad dry valley near the mouth of the Ebro River, olive groves stretch as far as the eye can see. And not just any olive trees: This area hosts the largest concentration of millenary olive trees anywhere in the world.

To qualify as one of these ancient olive trees, the diameter of the trunk has to be more than 3.5 meters, measured at a height of 1.3 meters from the ground.


More than 4,400 trees thought to be 1,000 years or older have already been located and cataloged, while many more may be waiting to be discovered.

With most of these trees still producing oil, customers worldwide are developing a new taste for this ancient flavor.



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TV	Retirement
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>>

(page 6)


Near the small town of Ulldecona, is a unique piece of natural heritage: a 1,700-year old tree which might be the oldest, scientifically dated, olive tree anywhere in the world. Researchers at the Technical University of Madrid used advanced laser-based techniques to conclusively date the Farga de l'Arión, as this monumental tree is called, to the early fourth century. This was during the reign of Roman emperor Constantine the Great, who ruled over Britain, Gaul and Spain.

Most of the ancient trees here are of the Farga variety, a heirloom olive that is endemic to the area.

"It is difficult to find a Farga olive tree that is younger than 200 years old," explains Jaume Antich, former mayor of Ulldecona and now an adviser at Taula del Senia, which works to preserve the trees' heritage and promote tourism. "They tend to be less productive than other varieties, therefore they went out of favor for a really long time."


Until very recently, Antich explains, Farga olive trees were felled and replaced with higher-yielding varieties, or simply uprooted and re-sold elsewhere as garden decor.

However, most millenary trees are still productive. The growing popularity of the Mediterranean diet and increasing consumer interest in food provenance have opened up new opportunities for olive oil entrepreneurs.



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>>

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"It is only recently that we realized that we had a valuable asset in these trees, that people are ready to pay for the experience of tasting an olive oil with such a unique origin," says Antich.

Amador Peset used to work as a carpenter, but when Spain's construction boom ended a few years ago, the 37-year-old switched to making olive oil.

Recognizing the potential of ancient olive trees, he launched his own brand of millenary oil: Thiarjulia, named after the Roman name of his hometown of Traiguera.

Having begun with his own small plot of millenary trees, Peset now drives around the region finding other ancient trees that are being neglected by the landowners. He then will usually make an arrangement with the owners so he can harvest specific trees for his Thiarjulia brand.

"It has become like an obsession," he says. "I love to find these trees and bring them back into production."

His annual yield of millenary olive oil is around 800 liters, harvested from more than a hundred scattered trees. That's a tiny drop in the ocean of Spanish olive oil production, which in 2015/16 stood at 1.4 million metric tons, or close to half the total global olive oil production.

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>>

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Next, we will ask you some questions regarding the text and its contents.

>>

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How much did you like the text?

Not at all Very much



>>

(page 10)

In which part of Spain is the "Sea of Olives" located?

- Catalonia
- Canary islands
- Basque country
- Navarre

[>>](#)

(page 11)

Which of the following is the main criterion of an ancient olive tree?

- Color of leaves
- Size of root
- Height of the tree
- Diameter of the trunk

[>>](#)

(page 12)

What were ancient olive trees mainly used for until very recently?

- House heating
- Carpentry
- Garden decoration
- Making olive oil

[>>](#)

(page 13)

Amador Pesed named his brand Triarjulia after

- his hometown
- his wife
- his mother
- his daughter

[>>](#)

(page 14)

How much olive oil does Spain produce?

- 1/2 of global production
- 1/3 of global production
- 1/5 of global production
- 1/10 of global production

[>>](#)

(page 15)

Now, we will ask you some additional questions related to the reading task.

[>>](#)

(page 16)

Please name all brand names that you remember having seen in the advertisements next to the text.

Use a semicolon (;) to separate brand names.

>>

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Next, you will see several advertisements.


Some of these ads may have appeared next to the text during the reading task. For each ad, please indicate whether or not you have seen it before (i.e., during the reading task).

>>

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Please respond below whether you have seen the following advertisements next to the text during the reading task.

	No, the ad was not there	Yes, the ad was there
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>



(page 19)

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now (that is, at the present moment). Use the following scale to record your answers:

	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
	1	2	3	4	5
tired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
sleepy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
lonely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
delighted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
cheerful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
drowsy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
downhearted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
blue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
sluggish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
excited	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
joyful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
enthusiastic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
alone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
energetic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
happy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
lively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[>>](#)

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What is your gender?

Male  
 Female  
 Other

---

How old are you?

---

What do you think was the purpose of this study?

[>>](#)

(page 21)



By any chance, did you temporarily leave your device while completing this survey?

Yes  No

---


Were you alone while completing this survey?

Yes  No

---

Based on your honest judgment, how quiet was your surrounding environment when you were completing this survey?

Not quiet at all Extremely quiet



---

Did you experience any technical problems during the study?

No

Yes:

(page 22)

You have reached the end of this study. Do you have any feedback for us (optional)?

(page 23)