
RESEARCH

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INFLUENCE OF MESSAGE APPEAL ON ATTENTION. AN EYE-TRACKING STUDY

Influencia de la apelación del mensaje en la atención. Un estudio de eye-tracking

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ABSTRACT

This study analyses advertising effectiveness using an eye-tracking methodology. The research analyses differences in attention according to the type of message appeal (pleasant, neutral and unpleasant), assesses the moderating role of environmental concern and regulatory focus. The results show that negative textual stimuli receive the most attention, and that in participants with low environmental concern, low-elaboration stimuli are more attention-grabbing. In general, participants who are more concerned about the environment focus more quickly in terms of time and frequency on stimuli that require a higher degree of elaboration. The paper also presents recommendations for the development of renewable energy (RE) media campaigns using digital advertising.

KEYWORDS: Environmental message - Renewable energy - Eye-tracking - Visual

attention - Advertising effectiveness.

RESUMEN

El presente estudio analiza la efectividad publicitaria utilizando una metodología de seguimiento ocular. La investigación analiza las diferencias en la atención según el tipo de apelación del mensaje (agradable, neutral y desagradable), evalúa el papel moderador de la preocupación por el problema medioambiental y el enfoque regulatorio. Los resultados muestran que, los estímulos textuales negativos son los que mayor atención reciben, además en participantes con baja preocupación medioambiental, los estímulos de baja elaboración captan antes la atención. En general, los participantes más preocupados por el medioambiente, se fijan más rápidamente en términos de tiempo y frecuencia en estímulos que requieren mayor grado de elaboración. El trabajo también presenta recomendaciones en materia de elaboración de campañas de difusión de energías renovables (EERR) a través de medios que utilicen publicidad digital.

PALABRAS CLAVE: Mensaje medioambiental - Energía renovable - Seguimiento ocular - Atención visual - Efectividad publicitaria.

INFLUÊNCIA DO RECURSO DA MENSAGEM NA ATENÇÃO. UM ESTUDO DE EYE-TRACKING

RESUMO

O presente estudo analisa a eficácia da publicidade usando uma metodologia de rastreamento ocular. A pesquisa analisa as diferenças de atenção de acordo com o tipo de apelo da mensagem (agradável, neutro e desagradável), avalia o papel moderador da preocupação com o problema ambiental e a abordagem regulatória. Os resultados mostram que estímulos textuais negativos recebem mais atenção, além de participantes com baixa preocupação ambiental, estímulos de baixa elaboração chamam a atenção mais cedo. Em geral, os participantes mais preocupados com o meio ambiente fixam mais rapidamente em termos de tempo e frequência os estímulos que requerem um maior grau de elaboração. O trabalho também apresenta recomendações sobre o desenvolvimento de campanhas de difusão de energias renováveis (FER) por meio de mídias que utilizem publicidade digital.

PALAVRAS-CHAVE: Mensagem ambiental - Energia renovável - Rastreamento ocular - Atenção visual - Eficácia publicitária.

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1. INTRODUCTION

Decisions on the purchase of renewable energy (RE) can be influenced by communication campaigns. Advertising messages can encourage the adoption of innovative heating systems, the installation of solar panels for domestic hot water, or the replacement of old electrical appliances with high levels of energy consumption by others that are more efficient and lower consumption (Michelsen and Madlener, 2016).

The organizations dedicated to the commercialization of RE, with their advertisements, aim to attract attention and raise awareness of the environmental problem, using different sources of information such as television, newspapers, the Internet, and brochures sent home (Gómez-Carmona et al., 2018; García-Maroto et al., 2015). These brochures play a fundamental role in promoting products that respect the environment (Leonidou et al., 2011), improve communication, the intensity of information in advertising campaigns, and, furthermore, promote sustainable behaviors (VanDyke and Tedesco, 2016). Although it must be recognized that climate change is not considered an urgent risk, nor is it psychologically close, because it is not creating direct personal problems, which generates a lesser commitment to the environmental problem (Van der Linden et al., 2015), in turn, this lower concern causes communication about environmentally friendly products to fail to capture immediate attention and different evaluations of the message are carried out (Weber, 2013).

Much of the academic literature on environmental advertising has analyzed elements of the message such as the time horizon (present/future) or the space horizon (near/far) (Jones, et al., 2017). An important element when designing the ad is determining its valence, a concept that refers to the level of like or dislike generated by the display of an ad (Vieillard et al., 2008). The level of agreeableness influences attitude formation, with positive valence messages being more persuasive or effective (Krishnamurthy et al., 2001) than negative messages.

In the environmental context, we usually find persuasive communication messages about environmentally friendly products that show an image and a pleasant text, where a final gain-frame is presented— consequence of carrying out the actions proposed in the announcement (Newman et al., 2012). Previous literature recommends that the actions shown in these advertisements favor the protection of the environment and show the final benefits of acting responsibly (Casado-Aranda et al., 2018; Gómez-Carmona et al., 2018). While the ads with textual appeals or unpleasant images that show the final state of loss, present the negative consequences caused by not taking care of the environment (Martínez-Fiestas et al., 2015).

By designing environmentally responsible messages, communication experts must ensure their effectiveness by evaluating the attention generated. The relationship between the attention paid to an advertisement and the elements that attract has been the subject of various research works. Different authors affirm that this relationship may be moderated by additional factors, such as concern for the environment or the regulatory approach (Chang, Zhang, & Xie, 2015).

Typically, designers manipulate one or more ad variables and test the validity of the ad. Previous literature has shown that attention measures can determine advertising effectiveness (Hernández-Méndez and Muñoz-Leiva, 2015; Muñoz-Leiva et al., 2019). This effectiveness can be measured thanks to eye-tracking, the eye tracker provides marketers with a reliable tool to successfully measure the relationship between the relevant stimuli present in the advertisement and the recorded eye movements (Boerman et al., 2015; Venkatraman et al., 2015). Specifically, works often use fixations to measure ad effectiveness (Avery & Park, 2018; Ferguson & Mohan, 2019). This fixation refers to the time during which the eye is relatively still, and lasts between approximately 200 to 500 milliseconds (Rayner, 1998). In this work, precise information on the duration and number of fixations is provided, allowing researchers to recognize visualization patterns.

Although the literature has explored the relationship between the focus of the message, its persuasion, and the perceived distance (Chang and Lee, 2010), there are still some doubts in this regard, which raise examining the impact caused by positive and negative approaches, on the behavior of environmentally responsible energy consumption (Green and Peloza, 2014). At the same time, it must be taken into account the existence of different moderating factors such as the environmental concern of the viewers that help to explain the differences in the persuasiveness of ads with negative valence and loss approaches compared to messages with positive valence and gain approaches (Jones et al., 2017; Schmuck et al., 2018).

2. OBJECTIVES

The main objective of this research is to understand the effect of two types of message appeal (valence and final state) considering the potential moderating effect of the level of environmental concern and two levels of the regulatory approach (prevention/promotion strategy of pro-environmental behavior) adapted to the case of the adoption of energy consumption. In particular, the effect of these factors on different measures of advertising effectiveness in terms of visual attention is analyzed.

To achieve the proposed objectives, this study uses the eye-tracking methodology, a technique related to psychophysiology that offers measures based on the registration of eye movements as indicators of information acquisition behaviors (Muñoz-Leiva et al., 2019; Gómez-Carmona, 2020); allowing to identify the points of fixation of attention relevant to marketing (Boerman et al., 2015). In a complementary

way to these psychophysiological measures, the self-report measures will allow us to know the moderating influence of the aforementioned variables and to contrast the raised hypotheses.

3. THEORETICAL REVIEW

Gain-framing and loss-framing are determining factors in relative persuasion. Their research follows two main tendencies, the first focused on cognitive elaboration, and another tendency that studies the processes related to self-regulation (Bhatnagar and McKay-Nesbitt, 2016).

3.1. Elaboration level

The elaboration likelihood model (ELM) demonstrates how attitudes are generated and modified based on consumer concerns and their ability to process information (Cacioppo et al., 2018). This model is based on two ways of persuasion, the central and the peripheral. The central path appears when consumers are motivated and cognitively process the arguments of the message. In this way, the quality of the content determines beliefs and attitudes. On the other hand, the peripheral track occurs when consumers care relatively little about your arguments and only assimilate easy-to-understand statements. That is why we can affirm that there is a higher level of cognitive processing in the central route and a lower level in the peripheral route (Cacioppo et al., 2018).

In the case of high implication products such as REs, message designers can use arguments (textually described) that highlight the savings and efficiency attributes. In this way, consumers will use the central route (Kim et al., 2016). Similarly, consumers who lack motivation or sufficient capacity, process communications through the peripheral route. These consumers do not process information cognitively, but through the senses through music or images (Kim et al., 2016; Cacioppo, Cacioppo, and Petty, 2018), or through the presentation of visual and symbolic advertisements (Schiffman and Kanuk, 2005).

3.2. Self-regulatory approach

According to the regulatory approach theory, we tend to use one of two self-regulatory strategies to achieve our goals: promotion or prevention (Giraldo-Romero et al., 2021). People who primarily use the self-regulation strategy of promotion are more sensitive to gains and experience stronger positive affect in response to gains than losses (Idson et al., 2004). They also use a high level of elaboration to process the information. This allows them to properly execute tasks and clearly know why something is being done. On the other hand, those who use a self-regulation strategy focused on prevention are more sensitive to losses and experience a more intense negative effect when faced with negative results (Sar and Anghelcev, 2015). These individuals are satisfied with the minimum information necessary to avoid errors

when they describe how to carry out an activity and specify exactly how it is done, acquiring that information with a low level of elaboration (Lee et al., 2009).

Literature has explored the effects of individual differences in the self-regulation approach and, furthermore, various studies have focused their interest on the benefits of promotion and prevention messages. The work of Wu et al. (2018) found that words with a gain frame are more effective for promotion-oriented subjects, while words with a loss frame are more effective for encouraging prevention-oriented subjects. This effect is known as regulatory focus message matching. Matching occurs when either the gain frame or the loss frame is in line with a promotion or prevention orientation. This factor also influences the effectiveness of advertisements for environmentally friendly products (Kareklas et al., 2012).

3.3. Environmental concern

Concern for the environment is defined as an attitude focused on a cognitive and affective assessment of environmental protection, according to recent studies (Higueras-Castillo et al., 2019; Schmuck et al., 2018). A fundamental obstacle to environmentally responsible behaviors is a lack of concern for the environment (Cheah and Phau, 2011). People with a positive attitude towards the preservation of the environment (high environmental concern) are more likely to participate than those with a negative attitude towards the preservation of the environment (low environmental concern) (Paul et al., 2016). This concern plays an important role in the intention to adopt these messages. Wang et al. (2016) argue that the relationship between political messages and consumer intention is moderated by environmental concern. This moderating effect is explained by the level of involvement with the content of the message that individuals feel.

According to the ELM, concern for the environment will make it easier for more concerned viewers to pay more attention to the argument behind the message and have a greater interest in understanding it in-depth. On the other hand, consumers less concerned about the environment will pay less attention to the argument and, therefore, will not have as much interest in understanding it.

The present work considers concern for the environment an important distinguishing trait among individuals that drives consumer motivation and draws attention to the main ecological issues (Mohr et al., 1998). Concern also acts as a cognitive filter that influences the selection of information (Bernauer and McGrath, 2016) and can moderate the persuasion generated by the frame of the message to consumers (Newman et al., 2012).

Based on the arguments presented above, we propose the following research hypotheses:

- H1: Messages with a pleasant appeal (positive valence and final gain-frame) provoke a higher level of elaboration, that is, there will be greater visual

attention in textual messages (compared to more peripheral elements such as images) than messages with an unpleasant appeal.

H2: Promotion-oriented people will experience a higher level of elaboration (text reading) when the ultimate benefits of the behavior are displayed.

H3: Subjects with greater environmental concern will pay more attention to textual messages versus images, compared to those with less concern.

4. METHODOLOGY

The fieldwork was carried out from October 1st to 30th, 2019 at the *Centro de Investigación Mente, Cerebro y Comportamiento* (CIMCYC) of the *Universidad de Granada*, following the guidelines of the Helsinki Medical Declaration. All study participants signed informed consent before performing the test.

The participants were recruited following a quota sampling, by prior contact by email and telephone. Their participation was compensated with €15. The final sample consisted of 30 male and 30 female participants and was also divided according to the average age of the consumer profile of organic products in Spain, dividing into 30 participants aged between 18-41 and 30 of 41 years or older.

The experiment used the eye-tracking methodology that allows determining eye movements and fixation patterns in the different areas of interest in the advertisement. Eye movements were recorded using an infrared camera eye-tracking device (Tobii TX300 that samples corneal reflection and pupil diameter under a frequency of 300 Hz; Tobii Technology AB, Stockholm, Sweden). The system has a spatial tracking precision of approximately 0.4° visual angle. Calibration was performed using the nine-point modality to optimize the precision of the spatial tracking, and the data was pre-processed with Tobii Studio software.

4.1. Stimulus and scales of measurements used

The ads were made from 18 images, extracted from an initial set of 54 images previously graded by a group of 257 students from the Universidad de Granada following the IAPS¹ methodology. The selected images formed three groups based on their level of valence (positive, neutral, and negative). Each image corresponds to a description that expresses the final gain, neutral, and loss state. These textual messages have a number of words between 17 and 21 and a number of characters around 100.

Both the images and the texts will be the areas of interest (AOI) under study, differentiating, on the one hand, the valence of the message derived from the images and, on the other, the final state expressed in the messages. The result of the

¹ *International Affective Picture System* (IAPS), is a database of designed weighted images useful for studies of emotion and attention that has been widely used in psychological research.

combination of elements results in three ads: one "favorable", which includes images of positive valence and text with final profit status, highlighting the positive consequences of adopting REs; a "neutral" ad, with more aseptic images and messages about the operation of this type of REs; and an "unfavorable" ad that includes images with negative valence and messages with a final state of loss that emphasizes the consequences of not being environmentally responsible (see images used and descriptions in appendix A).

The subject's level of environmental concern was adapted to the New Environmental Paradigm (NEP) scale of measurement previously used in the work by Dunlap et al. (2000). Responses were measured on a five-point scale establishing two levels of concern (low and high). Preliminary analyzes showed that 65% of the respondents are above the midpoint of the scale (value 3). Although a priori consumers are concerned about environmental issues, clearly the level of concern varies among the population, suggesting that the general distribution of this construct is appropriate for its use as a potential moderator. The reliability analysis based on Cronbach's alpha internal consistency indicators showed a value of ($\alpha = 0.95$).

The measure of the regulatory approach consisted of a five-point scale adapted from the work of Lockwood et al. (2002) to the case of the environment and designed to measure the capacity or objectives of promotion and prevention. The internal consistency indicators also showed high reliability ($\alpha = 0.92$). High levels of reliability ($\alpha \geq 0.90$) allow summary variables to be obtained in the data analysis, averaging the items on the scales so that the resulting indicator captures the variability of the original variables. In particular, this recoding resulted in the levels of high and low concern (30 cases in each group), and promotion (24 cases) and prevention (36 cases) approach, respectively.

4.2. Experimental design

The main objective of the experimental design with repeated measures or intra-subjects (comparison between the analyzed advertisements) was to test positive valence advertisements with final gain-frame messages (A_p), neutral advertisements (A_\emptyset), and negative valence advertisements with final loss-frame (A_n). Each of the three complete digital advertisements consisted of a total of 18 images and 18 textual messages divided into two slides or experimental scenarios when presented to the subject. In any type of appeal, the order of presentation is as follows (Figure 1 and Annex A).

Cover	Img.1	Txt.2	Img.3	Img.4	Txt.5	Img.6
	Txt.1	Img.2	Txt.3	Txt.4	Img.5	Txt.6

Figure 1. *Structure or presentation matrix of each ad.*

Source: Own source

Each test began with a cover that indicated "Citizen awareness campaign in favor of renewable energies" for 5 seconds; then the ad unit was presented with a duration of 42 seconds for each ad, therefore, with a total duration of the experiment equal to 126 sec.

Participants were randomly assigned to counterbalanced groups according to gender and age, and each viewed the displayed advertisements alternating the order of presentation in three different ways (Ap/AØ/An; An/Ap/AØ; AØ/An/Ap) trying to mitigate the effect of the order of presentation of the stimuli, thus giving rise to three experimental groups (Figure 2).

EG ₁ :	A+ / AØ / A-; n=20
EG ₂ :	A- / A+ / AØ; n=20
EG ₃ :	AØ / A- / A+; n=20

Figure 2. *Experimental design.*

Source: Own source.

This design guarantees adequate internal validity as a result of the possibility of controlling the impact of the independent variables, as well as greater control of the research setting (Zikmund, 2003). However, errors can occur due to the artificial nature of the environment, which could lead to lower external validity than in field experiments.

To test how attention was distributed across the stimuli, we divided the three ads into several areas of interest (AOI): images and text boxes (see Annex A). These AOIs were manually delimited so that all fixation measurements would correctly refer to them

4.3. Eye movement analysis and statistical analysis

Fixation analyzes were performed using IBM SPSS Statistics v22, after extracting raw fixation coordinates and metrics with Tobii Studio v.1.2.3 software.

Specifically, the fixations count in each AOI (FC) within an AOI, the total fixation duration (TFD, in seconds) was measured. Besides these measurements, the following fixation metrics and durations were included: time to the first fixation in the AOI (TFF, in seconds), number of fixations before reaching the AOI (FB), and duration or average length of fixations (FD, in milliseconds).

To achieve our research objectives, the different ocular measurements (dependent

variables) on each stimulus were extracted and analysis of variance (ANOVA) with repeated measures was performed, using environmental concern (low or high level) as a factor between subjects, type of stimulus or format (image or text), and appeal (pleasant, neutral, and unpleasant) as an intra-subject factor. The effect of the regulatory approach was controlled from its consideration as a metric covariate, created from the average values of items 1, 2, and 3 for promotion, and 4, 5, and 6 for prevention, as well as the differences to their respective averages. If the result of this indicator is negative, the subject is more oriented towards prevention, if it is positive, the subject is more oriented towards promotion. Some graphic representations will be analyzed from the recoding of this variable. The theoretical model is as follows:

$$y_{ijkl} = \mu + \alpha_i + \alpha_j + \alpha_k + \beta \cdot X_l + \alpha_i \cdot \alpha_k + \alpha_i \cdot \beta \cdot X_l + \alpha_j \cdot \alpha_k + \alpha_j \cdot \beta \cdot X_l + \varepsilon_{ijkl}$$

Figure 3. *Theoretical model indicator equation.*

Source: Own source.

Where y_{ijkl} is the value of the fixation metric(s) for modality i of type or format of stimulus (X_i), modality j of valence (X_j), modality k of environmental concern (X_k), and the l value of the regulatory approach covariate (X_l).

5. ANALYSIS OF RESULTS

Using a MANOVA of repeated measures, the proposed hypotheses have been contrasted and it has been verified whether the concern and the regulatory approach (prevention/promotion) have a significantly different impact on the visual attention of the participants according to the stimulus format and the valence of the message.

In the first place, from a test of intersubject effects we verify that the direct effect of the variables environmental concern (Wilks $\Lambda = 0.906$; $F = 1.101$; $g1 = 5$; $g2 = 53$; $p = 0.371$) and regulatory approach (Wilks $\Lambda = 0.984$; $F = 0.177$; $g1 = 5$; $g2 = 53$; $p = 0.970$) on attention was not significant in any case (see table 1). This could be indicating to us the existence of the moderating role that these variables play instead of a direct effect on attention.

Table 1. *Multivariate tests: Inter-subjects*

Efecto	Λ of Wilks	F	g.l. hypothesis	g.l. of the error	Sign.	Eta partial square
Intersection	0,065	151,74	5	53	0,000	0,935
Environmental concern	0,906	1,10	5	53	0,371	0,094
Regulatory approach	0,984	0,18	5	53	0,970	0,016

Source: Own source.

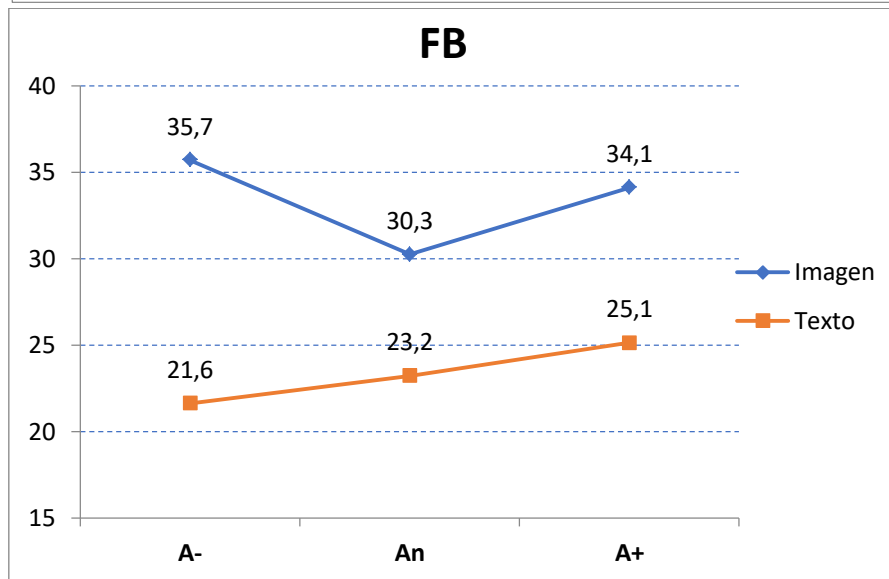
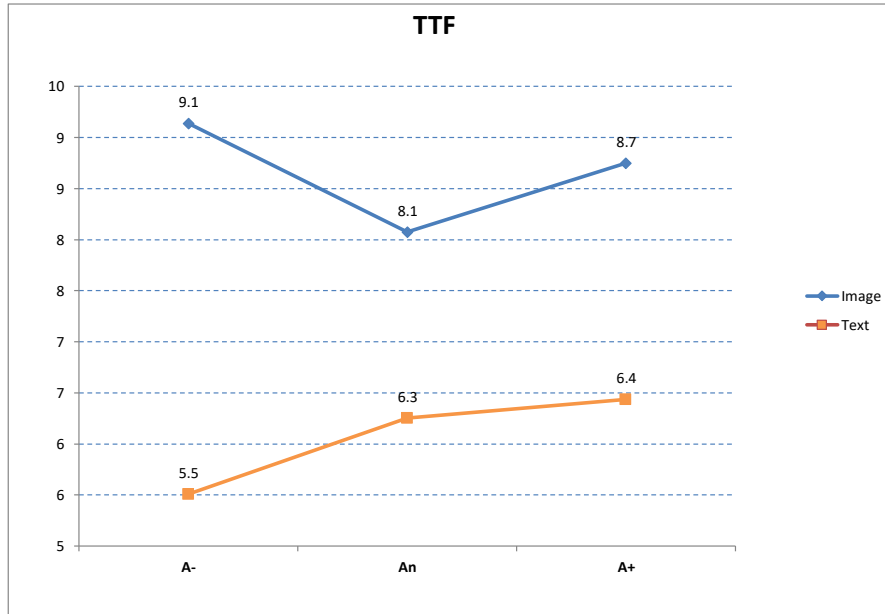
a. Design: Intersection + Concern + Regulatory Approach.

The results of the multivariate analysis show that the level of processing or elaboration: text vs. image (Wilks $\Lambda = 0.587$; $F = 7.595$; $df1 = 5$; $df2 = 53$; $p = 0.000$) and valence level (Wilks $\Lambda = 0.628$; $F = 2.84$; $df1 = 10$; $df2 = 48$; $p = 0.007$) generate a significant influence on the participant's visual attention.

In general, the text shows better visual attention values (TFD and FC) than the images, as expected. In particular, a shorter time is spent to be reached (TFF = 6.14 sec.) and the number of fixations until reaching the text (FB = 23.80 times), shorter fixations (FD = 202.1 milliseconds), and a longer total fixation duration (TFD = 7.23 sec.) and fixation count (FC = 35.84), typical of a reading task.

Looking at the charts (Figure 9) that combine both factors (format and appeal), it is verified that unpleasant textual messages are more efficient before being displayed (that is, the lowest values of: TTF = 5.5 sec. and FB = 21.6 times), also registering a longer total duration with a value (TFD = 7.5 sec.) very close to that of pleasant advertisements (TFD = 7.1 sec.), although at the same time, a slightly higher fixation

count (FC = 36.8 times) than the other two formats. Therefore, there is empirical evidence that hypothesis H1 should not be confirmed. Far from what is expected, textual ads with unpleasant valence are those that attract the most visual attention.



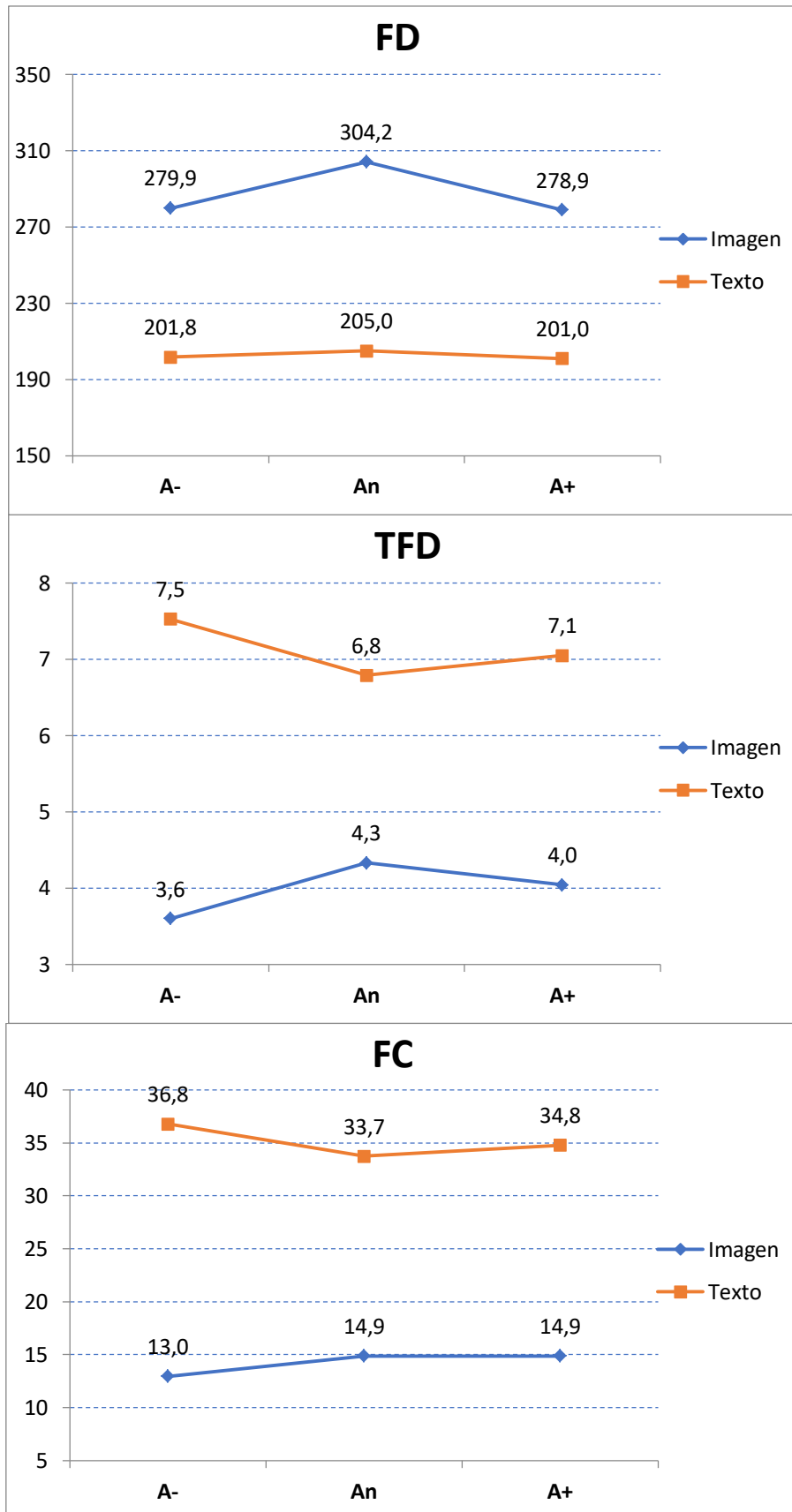


Figure 9. Profile charts for format vs. valence averages; (a) TFF, (b) FB, (c) FD, (d) TFD, and

(e) FC.

Source: Own source.

In the following analysis, we discovered that the environmental concern factor has a significant impact on visual attention when considering the stimulus format (Wilks $\Lambda = 0.789$; $F = 2.832$; $g1 = 5$; $g2 = 53$; $p = 0.024$), but not according to the valence of the ad. Furthermore, we found that the regulatory approach has a significant impact on attention measures according to valence (Wilks $\Lambda = 0.620$; $F = 2.94$; $g.1.1 = 10$; $g.1.2 = 48$; $p = 0.0006$).

Table 2. *Multivariate tests: intra-subjects*

Effect	Λ of Wilks	F	g.l. hypothesis	g.l. error	Sign.	Eta partial square
Format	0,583	7,595	5	53	0,000	0,417
Format * Concern	0,789	2,832	5	53	0,024	0,211
Format * Regulatory approach	0,959	0,455	5	53	0,808	0,041
Valence	0,628	2,840	10	48	0,007	0,372
Valence * Concern	0,869	0,724	10	48	0,698	0,131
Valence * Regulatory approach	0,620	2,941	10	48	0,006	0,380

Source: Own source

a. Inter-subject design: Concern + Regulatory approach; Intra-subjects design: format + valence

We then take a univariate approach for each visual measure. This cross-checking required confirming the assumption of sphericity for the error covariance matrix of the resulting variables transformed through the Mauchly test (see appendix C). The test results showed that there is sphericity in this matrix for valence, in general (for TFF, FB, FD, and FC); but a transformation must be used for the TFD measure. Therefore, we will apply the Greenhouse-Geisser transformation to the TFD results with a deviation ($SD = 0.855$).

The estimated parameter shows the existence of a significant relationship between regulatory approach and valence. Specifically, a negative relationship is observed between this approach and some of the TFF ($B = -0.94$, $T = -2.73$, $p = 0.010$) and FB measures ($B = -3.42$, $T = -2.44$, $p = 0.018$) in the face of positive stimuli of high elaboration (text). Lastly, in the case of low-elaboration positive stimuli (image), the relationship between focus and the TFD measurement becomes positive ($B = 0.526$, $T = 1.840$, $p = 0.071$).

Therefore, we confirm hypothesis H2 that maintains that people who develop strategies to promote responsible behaviors with the environmental problem will experience a higher level of visual attention (less time and number of previous fixations) on ads of positive valence; Specifically, they will focus their attention to a greater extent on stimuli that require a higher level of elaboration. Actually, this hypothesis is partially confirmed in the case of the TFF, FB measurements.

The following profile charts (Figure 10) show the impact on the attention measures of each format and the level of concern and by type of regulatory approach.

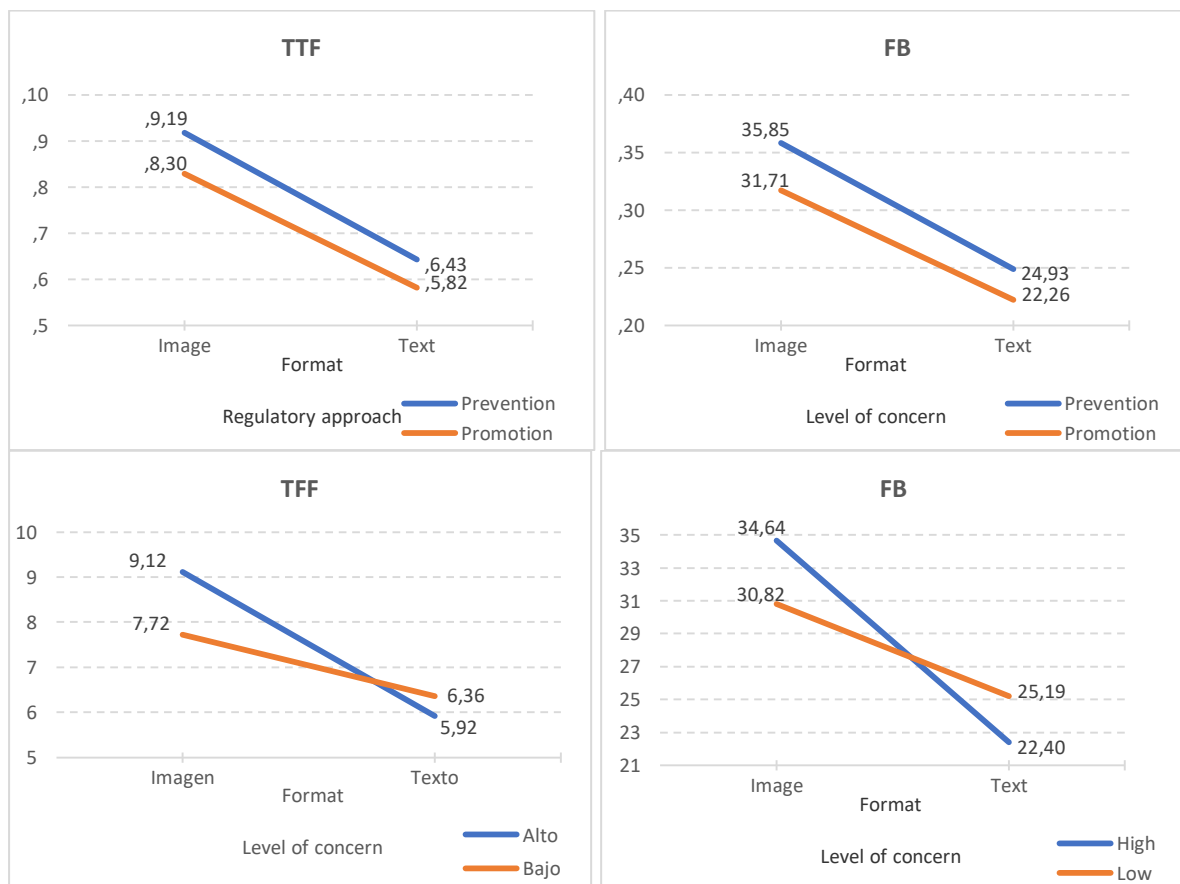


Figure 10. Profile charts for the interaction between format vs. concern and regulatory approach for TTF and FB.

Source: Own elaboration.

Continuing with the regulatory approach of the participants (Figure 10), those who are aimed at promoting a behavior will focus more efficiently on the textual message (TFF = 5.82 seconds and FB = 22.26), as anticipated in the previous paragraph.

In the same way, considering the format of the stimulus, the participants with a higher level of concern fixate more quickly on stimuli that involve a higher level of

elaboration, that is, in the text (TFF = 5.92 seconds and FB = 22.40; see Figure 10) compared to participants with a low level of environmental concern who more quickly fixate on stimuli that involve a lower level of elaboration (images) (TFF = 6.36 seconds and FB = 25.19).

In this way, hypothesis H3 is accepted, which maintains that subjects with greater environmental concern pay more attention to textual messages regardless of the focus of the message.

6. DISCUSSION AND CONCLUSIONS

The results of this work expand the knowledge about the effectiveness of messages with environmental content, considering the moderating effect of environmental concern and the regulatory approach of the individual based on self-report measures.

It is important to note that the first hypothesis confirmed a greater capture of attention by the ad with greater processing of elaboration (text) and with an unpleasant appeal, measured in terms of time and previous fixations (TTF and FB), as well as total time of fixation (TTF) and fixation count (FC). Our results show a greater cognitive effort to process negative text. According to Freling et al. (2014), these findings indicate that there is a congruence between the appeal of the message and the recipient of the message and it is not simply a question of the valence of the stimulus/message used. According to the results, the display of ads with negative text activates the emotional system more quickly, causing greater physiological arousal (De Martino et al., 2008) and behavioral response, in line with Vining and Ebreo (2002). This activation could explain the quick attention paid to the threat indicated by the text. Concerning the results obtained by González et al. (2005), a greater cognitive effort is shown to process negative text, which generates a higher level of information processing and was read with greater intensity (higher TFD and FC) than neutral or positive advertising text. Reading the text prepares the body to adopt an avoidance behavior. This body preparation could justify that negative valence images capture consumers' attention last (higher FB and CF), although the post-processing of these negative images are more careful and detailed (higher FB and CF). This coincides with the results obtained by Hughes and Rutherford (2013). Regarding attention, negative ads are more effective than neutral and positive ones. Other works, however, do not share these results, such as the findings of White et al. (2011) in their study on recycling, or the meta-analysis carried out by O'Keefe and Jensen (2008). In the works carried out by Orquin and Holmqvist (2018), it should be taken into account that, regarding attraction, these are very different messages, as would be the case with any campaign designed to attract attention by generating pleasure or fear. In these types of campaigns, you cannot make direct comparisons between the ads. The possible confounding effect that would affect this was controlled in the design by comparing the attention provided by two groups, exposed to the three advertisements. In this way, it was possible to verify the effect

exerted by the environmental concern and the regulatory approach of the individuals, which moderates the effect of the format of the advertisements (degree of elaboration) and the attraction of attention to the message.

The contrast of the second hypothesis suggests that the visual attention of individuals who focus on promotion and understand environmental issues is captured more quickly by the textual messages contained in the advertisements framed in gain, than in neutral ones or those framed in loss, that is, it takes less time to make the first fixation in the AOI and there are fewer fixations until reaching the AOI. From the perspective of attention, this finding extends the results of Wu et al. (2018), showing that a greater focus on promotion also generates greater attention to images of positive valence, measured in terms of global duration. In general, our results show greater efficacy of positive appeals in promotion-oriented subjects, in line with Aaker and Lee (2001). This promotional approach also generates greater attention to the positive valence of the image, measured in total duration. These results reinforce the theory of the regulatory approach, showing that people with a promotional approach tend to look for more information in advertisements that show the benefits derived from taking care of the environment, that is, in advertisements with a positive approach and a final gain state (Idson et al., 2004; Lee and Aaker 2004; Kim, 2006; Kees et al., 2010; Joireman et al., 2012; Newman et al. 2012; Bhatnagar and McKay-Nesbitt, 2016). These are more effective advertisements for these individuals versus those that show the harms of not engaging in environmentally responsible behavior.

Participants with greater environmental concern paid more attention to textual messages than to images than those with less concern. This result confirmed the third research hypothesis. Specifically, it is shown that the participants who are more concerned about the environment, fixate more quickly in terms of time and frequency on stimuli that imply a greater degree of elaboration. Specifically, we have found that the text (with positive and negative appeal) causes greater processing of the information, being read to a greater extent (greater TFD) than in the case of the neutral ad. Mainly the effect has been detected by the ads with an unpleasant appeal. In other words, when analyzing the effectiveness of messages to influence renewable energy consumption, our findings coincide with those studies that indicate greater effectiveness from negative valence messages (e.g., Shiv et al., 2004; Olsen et al., 2014; Tsai 2007), in contrast to the works of White et al. (2011) in their studies on recycling or the meta-analysis carried out by O'Keefe and Jensen, (2008).

Therefore, an effect of environmental concern is demonstrated that moderates the relationship between the format or type of stimulus used and visual attention. In particular, we have identified a central route in message processing in the case of more concerned subjects (as the theory anticipates). These results are in line with previous works that have used the eye-tracking methodology to analyze environmental problems such as climate change or the consumption of electric cars (Beattie and McGuire, 2012; Chang et al., 2015; Sollberger et al., 2017). In contrast,

subjects with a lower level of concern perform a more peripheral or superficial visualization when viewing an advertisement. These results coincide with those achieved in the work of Heidig et al. (2017) where it is indicated that the final gain and loss statements can be equally effective when clients have invested little effort in their processing.

The lack of interaction between the valence of the message and the environmental concern has not allowed us to discover what type of images are more effective when analyzing the attention of the participants according to this characteristic. Although through the complementary study of memory, it has been found that the best-remembered ads over time are the positive ones, followed by the negative and neutral ads. The academic literature consulted shows that emotionally affective information generates more stimulation than neutral events, causing greater memory (Kensinger, 2009). In line with these results, are those of Botzung et al. (2010), in which it is shown that positive stimuli are better remembered than negative and neutral ones.

7. LIMITATIONS AND FUTURE LINES OF RESEARCH

In the present study, the only method used to obtain physiological data is eye-tracking. Therefore, it would be of interest to go further in this direction by including similar biometric measures such as, for example, neuroimaging through magnetic resonance imaging, which would provide information on the brain regions that are activated during information processing. In particular, the regions linked to the emotions responsible for capturing the individual's attention could be examined, which would make it possible to evaluate the differences according to the type of valence.

In the used stimuli, several important factors of the image evaluation, such as authenticity, compression, brightness, or quality of the images, were not taken into account. Future research should analyze these factors in relation to valence or arousal. On the other hand, the level of elaboration of each stimulus is not measured individually in the present study. Controlling this factor could improve knowledge about the information processing of stimuli with different appeals.

The present work uses static ads and shows different images of REs, all in color, differentiating the valence of each appeal, so it is considered important for future research to analyze the influence of dynamic ads using natural images and black and white images. The design of the reviewed ads differentiates the text from the image and does not allow multimodal interaction. Therefore, it is recommended to study the overlap of the text and image stimuli combining different sizes to know the effect on attention. Another factor to consider is the distance of the saccadic movement (that is, the distance that the eyes travel each time they change focus) and the duration of the saccade (that is, the time it takes for the eyes to change focus) as

indicators of gaze patterns and examine whether there is convergence with fixation results.

The obtained results should be viewed with caution due to the small size of the experimental sample. It is expected that the design used can be replicated in the future using a larger sample to analyze the interactions between all factors, reduce the margin of error, and obtain even more consistent and reliable results. In this sense, future studies in this field should analyze the moderating effect of other variables that reduce the consumption of REs, such as the price and cost of the change or the possible inconvenience that the installation in a private home may cause.

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Influence of message appeal on attention. An eye-tracking study

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9. ANNEX

9.1. POSITIVE ADVERTISEMENT AND DELIMITED AREAS OF INTEREST (AOI)

AOI_IMG1	AOI_TXT2	AOI_IMG3
	La biomasa procedente de residuos forestales puede ser transformada en energía térmica y carburantes de origen vegetal.	
Resulta necesario apostar por un modelo energético basado en consumir de forma más racional y eficiente utilizando energías renovables.		Algunas invenciones menos contaminantes, se recargan con electricidad que es generada parcialmente por energías renovables.
AOI_TXT1	AOI_IMG2	AOI_TXT3
AOI_IMG4	AOI_TXT5	AOI_IMG6
	Las fuentes energéticas se encuentran cada vez más avanzadas e integradas en los hogares, convirtiéndolos en autosuficientes.	
El sol es el origen de todas las energías renovables, y es fuente directa de energía fotovoltaica y térmica.		Todos podemos hacer mucho para vivir en un planeta más sostenible sin combustibles fósiles: Utiliza energías renovables.
AOI_TXT4	AOI_IMG5	AOI_TXT6