ATTENTION AND EMOTION IN SPOTS. AN ANALYSIS FROM A NEUROSCIENCE PERSPECTIVE

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ABSTRACT

Introduction: Due to the current advertising saturation, organizations must seek new methods of researching effectiveness. These methods include those related to the biological processes of attention and emotion, which are the subject of this study. The initial hypotheses of this research are as follows: H1: The type of advertisement is a relevant factor in changes in attention and emotion in the selected sample. H2: Sudden changes in sound or visual content cause significant variations in attention and emotion in the studied sample. H3: Higher levels of attention are associated with greater emotional intensity. H4: A higher percentage of spontaneous recall is associated with a higher subjective rating of the advertisement. H5: A higher percentage of suggested recall is associated with a better subjective rating of the advertisement. **Methodology** The results revealed patterns of attentional and emotional activation in response to advertisements with sudden audio or video changes. However, no specific types of advertisements were identified as more

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effective in this regard. Emotional activation occurred to a greater extent in situations of heightened attention. Furthermore, advertisements received better evaluations when they were more easily recalled, whether spontaneously or prompted. **Results**: The results suggest patterns of attentional and emotional activation in response to sudden changes in audio or video advertisements. However, no specific types of advertisements were identified as being more effective in this regard. Emotional activation occurs to a greater extent in situations of heightened attention. Furthermore, advertisements were evaluated more positively when they were recalled more strongly, whether spontaneously or through prompting. **Discussion**: The results regarding patterns of attentional and emotional activation are consistent with previous studies using electrodermal activity (EDA) and functional magnetic resonance imaging (fMRI), as is the relationship between emotional activation and periods of heightened attention. However, these patterns could not be linked to specific types of advertisements, as have been highlighted in other studies. The relationship between evaluation and spontaneous and prompted recall is similar to Gruber's studies at the University of California, which emphasize that the mind tends to remember events and situations that generate greater reward. In other words, people tend to remember what they enjoy. **Conclusions**: The most noteworthy findings validate the presented hypotheses, except for the one related to the greater efficiency of the comedic typology, which could not be demonstrated. This work could improve advertising communication by providing information relevant to spots' production.

Keywords: neuroscience; EDA; electrodermal activity; advertising; spot.

1. INTRODUCTION

In an era of audiovisual advertising saturation, providers of products and services have been forced to evolve. They have created new processes and forms of communication to stand out from the competition. It is also important to highlight the intense growth of the media ecosystem, which has contributed to the emergence of new languages and modes of communication.

Furthermore, the increasing structural similarity of competitors' products necessitates product differentiation through other means, particularly emotional ones. López-Lita and Farrán-Teixido (2010) analyzed this phenomenon in a study on the shift from rational to emotional advertising narratives. Ferrés i Prats (2014) also extensively addressed this phenomenon in a work on emotion and audiovisual advertising from the perspective of neuromarketing.

Similarly, providers have been forced to analyze what adds value to their communication in an attempt to differentiate themselves in this saturated context. Thus, in the audiovisual field in particular, studying factors that heighten attention and emotional engagement with what is viewed is of great interest (Marques et al., 2025).

However, commercial storytelling is complex. In fact, studying audience comprehension through surveys is often insufficient because the psychological

processes involved are internal and unobservable. Furthermore, the subjects being studied are sometimes not truly aware of these processes or unable to adequately verbalize them.

Therefore, audience studies that use biometric research methods can be very informative (Read et al., 2024; Alvino et al., 2024). Similarly, over a decade ago, Torreblanca-Díaz et al. (2012) discussed the potential for analyzing attention and emotion while viewing a spot.

In line with the above, it is worth noting that studying the individual psyche for market research is not new; the term "neuromarketing" emerged in 2002. However, it should be noted that neuromarketing has experienced significant growth in the last decade (Cisneros Enríquez, 2023).

A review of studies on the use of EEG (electroencephalography) in advertising revealed EEG's innovative potential to predict advertisement success, optimize product features, and refine pricing strategies with unprecedented accuracy. Specifically, the review highlights that emotion-based advertisements profoundly influence decision-making and offers new insights into consumers' emotional engagement (Alsharif & Isa, 2025). Another review found that 49% of the articles analyzed in a systematic review of EEG studies on marketing and advertising focused on advertising (Wang et al., 2024).

Similarly, another systematic review emphasized the significant impact of functional magnetic resonance imaging (fMRI) in academic and commercial settings, providing new insights for targeted marketing and consumer behavior research (Alsharif & Isa, 2024).

Another study examining audiovisual advertising using electrodermal activity (EDA) and facial expression analysis (FEA) revealed that attention, engagement, and emotions associated with joy and displeasure are the four primary characteristics that influence consumers' advertising preferences (Marques et al., 2025).

Additionally, a study that combined EDA and eye tracking with advertising in music videos demonstrated that advertising with higher visual content captures more attention. In contrast, brand jingles only increase attention to advertising when combined with visual advertising (Mandolfo et al., 2024). In contrast, an earlier study by Sánchez-Porras (2014) on advertising jingles highlighted the importance of using this format whenever possible.

Another study using eye tracking revealed that the novelty of an advertisement influences the attention it receives (Mashrur et al., 2024).

Additionally, given its close relationship to this work, other studies conducted in line with it should be noted. Using EDA, these studies were able to link high levels of attention and emotion with subjective recall reported through surveys, as well as with

certain types of spots, primarily comedic ones (Tapia Frade & Martín Guerra, 2017; Tapia Frade et al., 2016; Tapia Frade & Martín Guerra, 2016).

In short, in line with the aforementioned studies, this research aims to analyze the context in which cognitive processes related to attention and emotion are triggered during audiovisual advertising broadcasts.

2. OBJECTIVES

The objectives of this study are to identify patterns of attentional and emotional activation related to specific events and to determine whether certain types of advertisements are more likely to generate attention and evoke emotion in viewers. Similarly, the relationship between recall and evaluation is of interest in this context and was chosen as a central element of this research.

More specifically, the initial hypotheses that motivated this study are as follows:

H1. The type of advertisement is a relevant factor in changes in attention and emotion in the selected sample.

H2: Sudden changes in sound or visual content significantly affect attention and emotion in the studied sample.

H3: Higher levels of attention are associated with a stronger emotional response.

H4: Higher percentages of spontaneous recall are associated with a more positive subjective evaluation of the advertisement.

H5: The higher the percentage of suggested recall, the better the advertisement is rated.

3. METHODOLOGY

The sample consisted of 30 people, equally divided by sex and age (18-45). A convenience sample was used, so the results are exploratory.

Due to the limited sample size and the use of a non-probability sampling method, the results should be interpreted with caution. It should be emphasized that this is an initial exploratory study.

On February 10, 2025, a projection was shown to the aforementioned 30 people in the lecture hall of the Faculty of Commerce at the University of Valladolid. At the entrance to the lecture hall, each participant was given a wristband containing the measuring instrument. The group was then shown a 5-minute, 53-second placebo video to help them become accustomed to the measuring instrument. This was followed by a continuous sequence of 17 spots with a total duration of 8 minutes, 57 seconds. After the video, participants completed a questionnaire.

For the fieldwork, a mixed methodology was used, incorporating two measurement instruments.

Sociograph technology was used to gather objective data via EDA, measuring data with the index and middle fingers of the left hand. A time series model with high autocorrelation was used for the statistical analysis of the signal.

To obtain subjective information about the degree to which the brands and spots were recalled, an ad hoc questionnaire was administered. The questionnaire contained questions about gender and age, as well as questions about spontaneous and prompted brand and spot recall.

Specifically, the Sociograph's EDA measurement instrument sends three types of signals from each subject to the central processing unit:

1) Tonic activity (EDL, or electrodermal level) indicates baseline activation levels and is strongly associated with attentional processes. Higher EDL values indicate greater attention and a greater ability to receive, analyze, and respond to information. In this case, the instrument uses the sum of the electrodermal resistance in kilohms (kΩ) of all subjects studied as the unit of measurement. It is important to note that lower resistance indicates a higher level of attention.

2) Phasic activity (EDR, or electrodermal response) is a psychophysiological response referring to a sudden change in conductivity triggered by specific stimuli controlled by the researcher. EDR is one of the most widely used indices because it is a strong predictor of change following a given stimulus. In this case, the unit of measurement is the arithmetic mean in kΩ of the subjects' electrodermal resistance. Consequently, a higher measurement implies greater emotional intensity. It should be noted that the measurement instrument detects the presence of emotion but does not distinguish between positive and negative emotions, which must be inferred from the context.

3) A spontaneous signal independent of each subject (NSA, or non-specific activity). The appropriate unit of measurement in this case is electrodermal resistance in kΩ. Since it is a non-specific and subjective signal unique to each person, the arithmetic mean of all participants was used to compensate for it and disregard it.

The Sociograph measurement instrument takes these readings 36 inputs per second. However, it was deemed appropriate to analyze one data point per second, the mean of the aforementioned 36 inputs.

The viewed advertisements are indicated in the following table.

Table 1.

Spots being broadcast

Advertiser	Situation	Description / Typology
Placebo	0:00 - 5:53	Habituation. Not measured
El Corte Inglés	5:54 - 7:13	Fantastic/Musical
Carrefour	7:14 - 7:33	Promotional
Campofrio	7:34 - 8:03	Spices of Life: Street and Supermarket
Plus Ultra	8:04-8:33	Spices of Life: Soccer
Mahou	8:34-9:31	Spices of Life: Soccer and Motivation
Aldi	9:32-9:51	Promotional
Danone	9:52-10:12	Spices of Life: Home
Estrella Galicia	10:13-10:41	Famous - Talking Head - Fixed American Shot
Lidl	10:42-11:25	Fantastic
Gallo	11:26-11:45	Spices of Life: Home
Paschal	11:46-12:05	Spices of Life: Street and Home
Alcampo	12:06-12:35	Promotional/Musical
El Pozo	12:36-13:15	Spices of Life: Tennis/Motivational
Fontvella	13:16-13:36	Famous
Consum	13:37-14:10	Spices of Life: Soccer and Supermarkets
Helios	14:11:14:30	Spices of Life: Home and Countryside
La Sirena	14:31-14:50	Comedian: Home

Source: Own elaboration.

The selection of spots is justified in two ways. First, they are from major Spanish food retailers (with the exception of Mercadona, which rarely uses television for advertising). Second, they feature leading brands from various product categories. The goal was to be representative of food retailers and to include a variety of product categories while considering the time constraints of the presentation.

However, due to the exploratory nature of this study, variables such as sector, duration, and prior brand awareness were not considered.

Thus, the spots presented essentially refer to retailers and consumer brands. Furthermore, an ad hoc descriptive taxonomy was developed to validate or refute the initial hypothesis.

4. RESULTS

4.1. Objective Measurement

First, it should be noted that the experiment was conducted using a time series model with a high correlation. This implies that previous levels of attention significantly influence subsequent levels. Conversely, due to its sudden nature, emotion does not adhere to this characteristic.
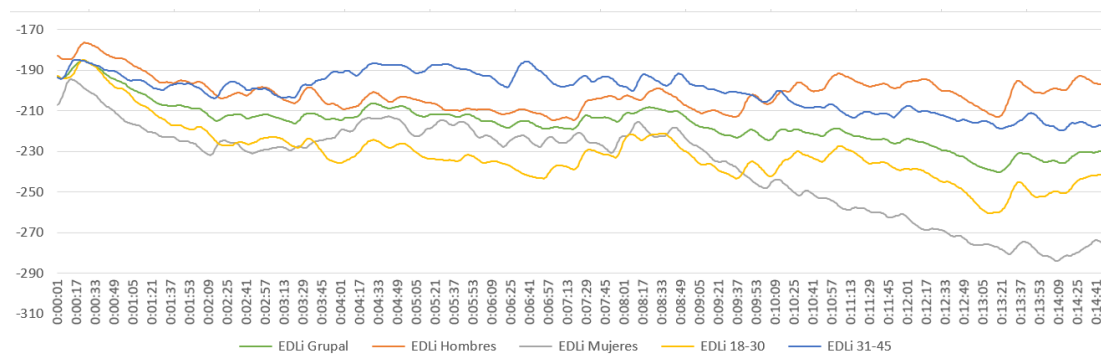
4.1.1. Attention

The average level of attention for the entire sample is 216.35 kΩ, with a standard deviation of 11.01. Similar values are shown in the partial studies. Thus, the average attention level is slightly higher for men and subjects aged 31-45 ($\bar{x}$=201.39 and σ=7.92, respectively), and slightly lower for women and subjects aged 18-30 ($\bar{x}$=236.60 and σ=22.99, respectively). Based on the trend of the curves, a sustained attention pattern can be observed throughout the session for the entire sample, as well as for men and subjects aged 31-45. This pattern shows a slight decrease in the sample aged 18-30, which is more pronounced in women, as seen in Figure 1.

Note that the measurement is based on endurance; lower endurance indicates a higher degree of attention.

Figure 1.

*Level of EDL (Attention) Throughout the Session*

Source: Own elaboration.

As previously mentioned, the attention signal uses a time series model that exhibits high autocorrelation. Therefore, its analysis must include an estimation of change rates per second to highlight significant changes and their relation to the audiovisual presentation at that moment.

Figure 2 shows particularly attention-grabbing moments in the first few seconds for all groups, at 2:09 for women and those aged 31-45, at 3:15 for all groups, from 6:10 to 6:25 for the 31-45 age group, from 7:15 to 7:25 for those aged 18-30, from 7:45 to 8:10 for women, those aged 18-30, and those aged 31-45, from 8:32 to 8:37 for those aged 31-45, from 9:35 to 9:45 for men and those aged 18-30, from 10:42 to 10:50 for men, and from 13:25 to 13:35 formen and those aged 18–30.

Figure 2.

Absolute Rate of Change in EDL Throughout the Session
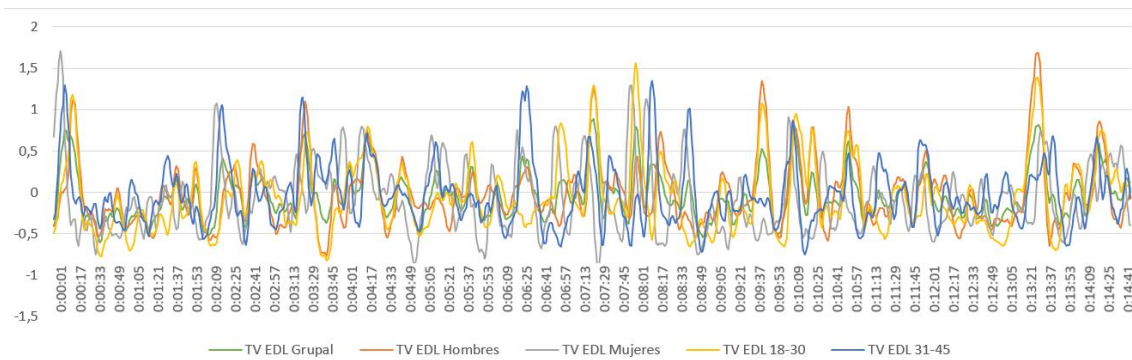
Source: Own elaboration.

The table below analyzes what happened at those times, and whether any common pattern of EDL activation can be observed.

Table 2.

EDL Activation Intervals

Brand	Minute / second	Situation
Sociograph	0:00 to 0:03	Sociograph reel. The visualization begins. A white background with the brand logo appears, and there is an abrupt change in the audio.
Placebo	2:09 to 2:15 and 3:15 to 3:25	Placebo to acclimate to the measuring instrument. The analysis is discarded due to the potential contamination of the instrument. The visualization recounts a social experiment in which subjects climb stairs based on their emotional responses.
El Corte Inglés	6:10 to 6:25	Visually, it is a colorful, fantastical sequence; audibly, it is the development of a song. In both cases, there is a sudden change from the preceding recording.
Carrefour	7:15 to 7:25	The spot begins with a sudden visual change to a red fade with the Carrefour logo and an audible change to the Carrefour jingle.
Mahou	8:34 to 8:40	Start of the spot. Audibly, there is a sudden change: a bell rings over a silent background. Visually, a shot of a football stadium begins.
Aldi	9:35 to 9:45	Sequence in a store. Audibly, a blue plush toy shouts, "It's the cheapest! It's the cheapest!". Visually, there are medium shots of blue plush toys.
Lidl	10:42 to 10:50	The spot begins. A fantastical, colorful sequence of a building appears, accompanied by silence. This is followed by the sound of a judge's gavel.
Fontvella	13:25 to 13:35	The second half of the spot begins. First, a close-up sequence of water; then, a famous actress in a film-like sequence. Audio: A voiceover narration.

Source: Own elaboration.

Firstly, regarding the table, it should be noted that attentional activation intervals generally occur with sudden changes in visual or auditory patterns. These changes can be due to alterations in the spot itself (3 times) or in the narrative of an ongoing spot. In all cases, there is an abrupt change in sound or visuals (five times each).

Thus, the abrupt changes in sound are due to beginnings against a background of flat sound. For instance, in the Mahou spot, a bell rings after a period of silence. In the Aldi spot, the abrupt change occurs with an unexpected shout of "It's the cheapest, it's the cheapest!". In the Lidl spot, the sound of a hammer hitting the ground occurs when there was no voice-over immediately beforehand. In the Carrefour and El Corte Inglés spots, the abrupt change in sound is related to the start of a song within the spot.

Regarding visuals, it could be suggested that sudden changes produce attentional activation. Specifically, this occurs on several occasions due to a fade-to-black transition between spots and, on others, due to a sudden change within the same spot. This occurs in the Lidl spot when it shifts from an exterior shot of the building to a close-up of the judge's gavel and in the El Corte Inglés spot, which deals with travel sales and features continuous camera changes between the inside and outside of a car with different jungle and desert scenes.

Continuing with this topic, it's worth noting that some spots capture attention, while others divert it. The overall attentional balance (EDL) of the spots (the attention level at the beginning compared to the exit level) is shown in the following table.

Table 3.

Attention balance (EDL) of the spots being broadcast

Spot	EDL Group Balance	EDL Balance Men	EDL Balance Women	EDL Balance 18-30	EDL Balance 31-45
El Corte Inglés	-6.505625	-4.127375	-6.9755	-5.350625	-7.889
Carrefour	6.21425	8.3055	0.12075	8.075375	4.30675
Campofrio	0.14	1.880375	3.25325	3.961125	-4.092375
Plus Ultra	3.089625	4.07925	-0.301875	3.877125	2.191875
Mahou	-12.821375	-13.215125	-12.544	-19.495875	-5.327875
Aldi	2.60925	9.6705	-8.537375	5.760125	-1.00625
Danone	-2.650375	-1.470875	-0.258125	-5.49325	0.594125
Estrella Galicia	1.015875	4.55	-5.67175	8.248625	-7.044625
Lidl	-1.673	3.070375	-8.287125	-0.424375	-2.954
Gallo	-1.2145	-0.328125	-3.10975	-2.636375	0.331625
Paschal	0.06125	0.842625	-1.665125	-3.147375	3.9235
Alcampo	-5.658625	-4.445875	-6.30525	-6.475	-4.8195
The Well	-9.70375	-11.489625	-6.8145	-15.21975	-3.614625
Fontvella	6.344625	14.623875	-2.345875	12.936875	-0.9205
Consum	-1.756125	-2.004625	-5.291125	-2.265375	-1.1795
Helios	3.8675	5.82925	3.80275	5.397	2.113125
La Sirena	0.826875	-3.730125	4.87375	2.989	-1.420125

Source: Own elaboration.

Thus, it can be noted that the spots that had a positive overall impact on the sample —that is, those that generated attention— were Fontvella, Helios, Carrefour, Plus Ultra, Aldi, and Estrella Galicia.

Aldi and Fontvella spots stood out among men, while Helios and La Sirena stood out among women. Among 18-30 year olds, Fontvella, Estrella Galicia, and Carrefour stood out positively, and among 31-45 year olds, Carrefour and Pascual stood out positively.

Conversely, the spots with the most negative impact —those that distracted attention— were Mahou, El Pozo, El Corte Inglés, Alcampo, and Danone.

Mahou and El Pozo stood out among 18-30 year olds and men. Among women, Aldi and Lidl stood out, as did Estrella Galicia among 31-45 year olds.

Regarding whether any spot had a significantly better or worse attention balance compared to the rest of the sample, the Carrefour and Fontvella spots had significantly higher results, and the Mahou and El Pozo spots had significantly lower results (One-Way ANOVA test, Bonferroni postHoc).

Considering partial studies in relation to gender, we can highlight significantly higher values in the case of the Carrefour, Fontvella, and Aldi spots and significantly lower values than the rest in the case of the Mahou and El Pozo spots. Among women, Aldi, Lidl, and Mahou stood out negatively; no spots showed a positive effect.

Finally, two very different situations can be distinguished among the two age groups considered (18-30 and 31-45 age groups). Among the youngest demographic, Carrefour and Fontvella spots stood out, followed by Estrella Galicia. Mahou and El Pozo, on the other hand, performed poorly. In stark contrast, the older group did not see any spots that were significantly better or worse, and a high degree of homogeneity was observed throughout the session.

In summary, there is a great deal of variability in spots according to age and gender, which suggests that advertisements may be targeted at specific demographics.

4.1.2. Emotion

The average emotional intensity level for the entire sample is 0.1156 kΩ, with a standard deviation of 0.0948. Among the partial studies of the sample, higher mean emotional intensity is observed in women than in men ($\bar{x} = 0.1560$, $\sigma = 0.1798$ and $\bar{x} = 0.1278$, $\sigma = 0.1301$, respectively). Regarding age, the data shows uniformity.

The electrodermal response (EDR) study shown in the figure below indicates sudden changes in skin resistivity, which may be related to reactions to the projection at that moment.

Therefore, these significant changes are linked to intense emotional activity.

Figure 3.

Level of EDR (Attention) Throughout the Session
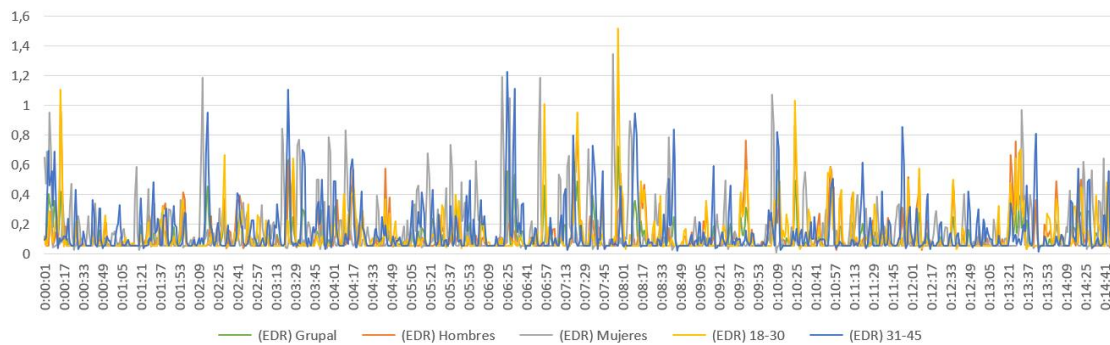
Source: Own elaboration.

The challenge then becomes analyzing what happened during those moments of intense emotion, greater than 1 kΩ. Intense peaks were noted at the following times: 0:14–0:15 (18–30 age group), 2:11–2:12 (women), 3:22–3:23 (31–45 age group), 6:21–6:25 (women and 31–45 age group), 6:51–6:52 (women), 8:06–8:08 (women and 18–30 age group), 10:05–10:06 (women), and 10:24–10:25 (18–30 age group).

The following table presents this information in a structured way.

Table 4.

EDR Activation Intervals

Brand	Minute / second	Situation
Placebo	0:14-0:15	A placebo is used to acclimate the subject to the measuring instrument. Analysis is ruled out due to the potential for instrument contamination.
	2:11-2:12	
	3:22 - 3:23	
El Corte Inglés	6:21 – 6:25	This coincides with the EDL activation interval. The visuals are very colorful and fantastical, and there is a song in the audio.
El Corte Inglés	6:51 – 6:52	There is a car in the studio, and two characters—one female and one male—are dancing in the visuals. There is a song in the audio.
Plus Ultra	8:06-8:08	Opening of the spot. In the visuals, two players enter a soccer field and then an airplane appears. The female voiceover in the audio is unremarkable.
Danone	10:05-10:06	In the visuals, a woman eats yogurt and then chases a toddler. The male voiceover is also unremarkable.
Estrella Galicia	10:24-10:25	There is a medium shot of a character against a black background. The character says, "Even the best plans have loose ends".

Source: Own elaboration.

In the case of the El Corte Inglés spot, the emotional moments seem to be related to the unusual visual elements, such as a car in a recording studio with two dancing characters, and the Spanish song.

In the Plus Ultra spot, emotional activation occurs at the beginning, possibly due to abrupt changes in visuals (the spot begins after a fade-to-black ending) and sound (the voice-over begins after silence at the end of the previous spot), or atypical situations (an airplane appears on a soccer field).

In the Danone spot, emotional activation may be related to the appearance of a young child, around two years old, and their charm and tenderness. Regarding the sound, a male voice-over is used at the moment of activation, which is consistent with the preceding moments and does not have an emotionally noteworthy narrative. Therefore, it does not appear to be responsible for the emotional activation.

Finally, in the Estrella Galicia spot, a man is shown in a medium shot against a black background. The color scheme used in the spot is disruptive compared to the other spots, and the man's narration is original with a distinctly different tone. Therefore, it could be suggested that the originality and difference of this spot from previous ones could have been responsible for the emotional activation.

Finally, in the case of Estrella Galicia, a man is shown in a medium shot speaking against a black background. The color palette used in the spot is very disruptive compared to the other ads, and the man's narration is truly original and in a distinctly different tone from the rest of the spots. Therefore, it could be suggested that the originality, the difference of this spot from the previous ones, may have been responsible for the emotional response.

It is also worth noting which spots evoked stronger emotions and which evoked weaker ones. In this regard, the Campofrío spot was the only one that showed a higher average emotional response compared to the Alcampo, El Pozo, and Mahou spots for the entire sample (One-Way ANOVA, Bonferroni post-hoc test). Continuing with this topic, among men, the Aldi spot had significantly higher average emotional values compared to the El Corte Inglés, El Pozo, and Mahou spots. Among women, only the opening reel stood out; the remaining spots showed great homogeneity (One-Way ANOVA, Bonferroni postHoc test).

Finally, among the youngest demographic (ages 18-30), the Fontvella spot had a significantly higher average emotional value than the spots from El Corte Inglés, El Pozo, Gallo, Mahou, and Pascual. Among the oldest demographic (ages 31-45), no significant differences were found in the spots (One-Way ANOVA, Bonferroni postHoc test).

Another important aspect to consider is whether positive balances in EDL (i.e., spots that capture attention) are related to increased EDR segments. In other words, does a spot that captures attention also generate a greater amount of emotion? Does each moment that captures attention lead to an increase in emotion? In this case, the answer

is clear. There is a positive relationship between EDL and EDR segments in the sample as a whole (Pearson = .706, Sig. = .002) and in the strata related to men and women (Pearson = .885, Sig. = .000 and Pearson = .719, Sig. = .001). However, in the age strata, this relationship was only found in the 18–30 age group (Pearson = .855, Sig. = .000) and not in the 31–45 age group (Pearson = .386, Sig. = .126).

4.2. Subjective Measurement

It is important to note that the survey completed at the end of the screening focused primarily on two aspects: the memories evoked by each spot and its audience rating.

Regarding the first aspect, the survey addressed both spontaneous and suggested recall. The results for spontaneous and suggested recall, as well as audience ratings, are shown in the table below.

Table 5.

Percentage of Mentions in Spontaneous and Suggested Recall and Average Rating of Spots

Brand	% Spontaneous Rec.	% Recommended Rec.	Spot Rating (1-5)
Alcampo	76.6	93.3	3.68
Aldi	66.6	93.3	3.57
Campofrio	40	80	3.24
Carrefour	66.6	86.7	3.35
Consum	20	34.5	3.30
Danone	10	66.7	2.56
El Pozo	40	76.7	3.11
Estrella Galicia	66.6	100	4.20
FontVella	30	73.3	3.00
Rooster	23.3	80	3.33
Helios	26.6	83.3	3.50
La Sirena	43.3	86.7	2.68
Lidl	73.3	100	3.00
Mahou	76.6	90	3.72
El Corte Inglés	60	86.7	3.69
Paschal	16.6	60	3.33
Plus Ultra	10	50	2.71

Source: Own elaboration.

First, it is important to note the significant and direct relationship between spontaneous and prompted recall (Pearson = .677, Sig. = .003). In other words, higher spontaneous recall is associated with higher prompted recall.

Similarly, a direct and significant relationship was found between spontaneous brand recall and spot rating (Pearson = .589, Sig. = .013). That is, higher spontaneous brand recall is associated with a better spot rating. Finally, the relationship between spot rating and prompted brand recall was statistically significant as well (Pearson = .595, Sig. = .012).

Regarding rating alone, particularly high values were observed for Estrella Galicia and, to a lesser extent, Mahou, El Corte Inglés, Alcampo, and Aldi. Conversely, particularly low ratings were observed for Danone, La Sirena, and Plus Ultra.

Gender significantly affected the ratings of the Danone and Mahou spots (T-test, Sig. = .027 and .029, respectively), with women giving higher ratings in both cases. No significant differences were found between the two age groups, suggesting homogeneity in the ratings.

5. DISCUSSION

The results presented emphasize several aspects that should be linked to other studies in relation to the hypotheses posed. Regarding the first hypothesis (H1), The type of advertisement is a relevant factor in changes in attention and emotion in the selected sample), it could not be concluded that the type was a significant differentiating factor since the highest levels of attention and emotion were not associated with specific types of spots. In this regard, Tapia Frade and Martín Guerra's (2016) study should be mentioned. They concluded that there were significant relationships between comedic typologies and higher levels of attention and emotion. This opens up interesting avenues of research into the relationship between comedic typology and the generation of attention and emotion.

On the other hand, regarding the second hypothesis (H2. Sudden changes in sound or visual content significantly affect attention and emotion in the studied sample), the validity was confirmed in accordance with previous studies, such as those by Sánchez-Porras (2014) on musical jingles and Tapia Frade et al. (2016). This could help develop advertising structures that incorporate these types of changes to maintain attention and emotion.

The third hypothesis (H3: Higher levels of attention lead to greater emotional intensity) was confirmed in both the overall sample and the subgroups studied, especially those related to gender. This result raises an interesting question about the interdependence of attention and emotion and the need to create spots that address both. This finding is consistent with previous similar studies (Tapia Frade & Martín Guerra, 2017).

Finally, regarding the last two hypotheses (H4 and H5), The higher the percentage of spontaneous recall, the better the spot is rated in subjective measurement and H5: The higher the percentage of suggested recall, the better the spot is rated in subjective measurement), as demonstrated by the above results, a clear and significant relationship was established between spontaneous recall, suggested recall, and the spot's rating. According to clinical studies on the subject, such as one conducted by Gruber et al. (2016) at the University of California, the mind tends to remember events and situations that are more rewarding. In other words, we remember more of what we like.

It is important to note that this work does not seek to address profound questions about viewer behavior; rather, it aims to suggest common patterns of behavior in response to the presented stimuli.

Therefore, while the method may be interesting, it is incapable of developing a model of the subject's behavior.

However, given that it provides information that could be relevant in the making of advertising spots, this work could be useful in improving advertising communication, in line with similar studies carried out previously with EDA (Tapia Frade et al., 2017; Tapia Frade & Martín Guerra, 2017; Tapia Frade et al., 2016; Tapia Frade & Martín Guerra, 2016) or other widely accepted techniques, such as functional magnetic resonance imaging (fMRI) (Ruanguttamanun, 2014).

Regarding future lines of research, it would be interesting to delve deeper into the emotional response and its content using different technology, such as electroencephalography (EEG). This is one of the main limitations of the measurement instrument. Other important limitations of this exploratory study are related to the necessarily small sample size due to the cost per sample unit.

Additionally, this type of study has limited ecological validity. However, this study has a fairly high level of ecological validity since the screening took place in a lecture hall and the measurement instrument is noninvasive (a wristband with two diodes that attach to the fingers with Velcro). A preliminary screening was also conducted beforehand to allow the subjects to become accustomed to the instrument. Nevertheless, it should be emphasized that uncontrolled contextual factors could influence the results.

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