



The future of Cosmetics Advertisement Strategy:

A Neuromarketing Study using Electrodermal Activity (EDA) as a measure of Emotional Arousal

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ABSTRACT

Neuromarketing lies at the intersection of three main disciplines: psychology, neuroscience, and marketing, and it has been a successful neuroscientific approach for the study of real-life choices such as consumer behavior [1]. A current gap in the cosmetics field is the lack of published research studies, considering the marketing investment done yearly in this category. With the rapid economic expansion and the rise of social media in China, consumers' interest in beauty is growing. Even though the Chinese cosmetics sector is rapidly expanding, no studies have been done with Chinese consumers. This study aims to employ the same approach as previously done in consumer neuroscience studies to evaluate cosmetic brands' marketing strategy to understand better if immediate emotional responses can be measured using Electrodermal Activity (EDA). Here, we focus on cosmetics products advertisement as a model to understand consumer preference formation and choice. Eighteen Chinese female consumers were recruited between 19 and 37 years old. From the results obtained, it was understood that none of the participants have voted for the product advertisement for which they showed higher emotional arousal. However, it appears that the participants' preference is for the products for which the brand awareness is stronger since the product advertisements with more votes are the ones for the Korean brand used. The product advertisements with Asian faces were the ones with more votes, suggesting that Asian faces have engaged consumer preference. However, the product advertisements for the Brazilian brands, unknown to the Chinese public, were the ones with fewer votes, although, those product advertisements were the ones with more emotional arousal per minute. Those advertisements were also those with non-Asian faces, suggesting that this feature influenced voting decisions. From this study, it has been observed that Electrodermal Activity is a measure of emotional arousal that by itself cannot be translated into consumer engagement. Therefore, it is also proposed to evaluate brand awareness in future studies related to product advertisements. The physical features of the people included in the advertisements is also suggested to be further evaluated in future studies since a

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different cultural background seems to influence the consumers' engagement. Furthermore, using EDA to complement other neurophysiological tools like facial expression analysis is also suggested for future studies to have evidence about the nature of the emotions raised.

CCS CONCEPTS

• Marketing; • Neuromarketing;

KEYWORDS

marketing, consumer behavior, neuromarketing, consumer neurosciences, advertisement, cosmetics

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1 INTRODUCTION

The primary goal of marketing is to match people with products. Therefore, marketers are always trying to develop new ways to sell their products and services to a specific audience. With organizations increasingly focusing on customer-centric strategies, especially as the number of brands and competition grows, it becomes harder to stand out. Therefore, understanding consumer behavior and providing a meaningful experience is more crucial than ever [2]. Traditional marketing research methods mainly rely on self-assessment tools such as surveys and questionnaires [3]. This type of research relies on consumers' disposition and abilities to describe their feelings [4]. This limitation is exacerbated by the fact that many processes occur subconsciously [5]. In search of more objective and reliable insights into consumer thought processes, physiological measures such as electrodermal activity (EDA) were first used to study consumer behavior in the 1920s. Technological advancements have lately led to the usage of other neuroscientific tools and, therefore, the discipline of neuromarketing was born out of such uses of neuroscientific tools to examine customers' emotions and cognitive reactions [3]. Neuromarketing research has generally focused on consumer behaviors in several areas of marketing, such as advertising [3], and these studies have successfully offered insights into the underlying mechanisms of these types of consumer behavior [6]. Although these studies provide valuable information, almost all the studies performed, have been focused on food preferences, environmental-friendly products evaluation, and willing-to-pay behavior [1]. With beauty companies increasingly

focusing on customer-centric strategies, especially with growing competition and the saturation of the cosmetics market, it makes it harder for a company to stand out. Therefore, understanding consumer behavior and providing a meaningful experience to consumers is crucial.

Current literature indicates that it is still a challenge for most companies to predetermine the success of a marketing campaign [7]. Since emotions have been considered an adequate predictor of marketing effectiveness [8], we focused on this study to individually evaluate emotional arousal using Electrodermal Activity (EDA) in different cosmetics advertisements, to understand whether the role of emotions is connected with the effectiveness of advertisement strategies.

The main objective of this study is to monitor consumers' emotional arousal during cosmetics ads to determine consumers' preference towards certain advertisements. All the previous studies using cosmetics were designed using neuroimaging tools and focused on product evaluation. Here, we focus on cosmetics product advertisement emotional arousal as a model to understand consumer preference formation and choice.

2 LITERATURE REVIEW

Advertisement is a method of communication used by marketers to persuade consumers to make a purchase decision [9]. Therefore, creating effective advertising (ads) that will persuade customers to buy a product or service is critical. Thus, the ad evaluation process is crucial in the ad development pipeline, as it may give information about the predicted performance and impact. The effectiveness of advertising is determined by several elements, including the target audience, their decision-making power, and the type of product or service advertised. However, if the factors above are predetermined, the effectiveness of the campaign can be measured using a variety of metrics from the field of neuromarketing, including emotional processing, attention and memory, decision making, approach and withdrawal motivation, mental workload, and reward processing [10]. Consumer neuroscience studies how consumers experience, analyze, and evaluate advertisements [11] [12]. Emotions have been considered a good predictor of advertising effectiveness since they significantly impact an individual's reaction to receiving a message.

Moreover, emotions have been understood as necessary for human function because they are strongly correlated with attention, memory, and decision-making [7]. Since emotions have a considerable impact on decision-making; hence, various advertisements are created to trigger certain emotions in consumers. As a result, neuromarketing advertisement evaluation aims to establish if the targeted emotion is evoked, and second, to find alternative elicited emotions [10].

EDA measurements can aid in overcoming the main limitations related to self-assessment tools: (1) the challenge of collecting unconscious emotions, (2) participants' difficulty or unwillingness to accurately report their feelings, and (3) the difficulty of establishing a continuous measurement [13]. Electrodermal activity (EDA) measures the conductance or electric resistance of the skin, which changes as a response to sweat gland activity. Changes in sweat secretion are a standard physical marker for sympathetic activation and have been linked to attention, arousal, cognition, and emotional

responses secretion [9]. The high sensitivity of the electrodermal system to indicate slight variations in the external world explain why EDA is a valuable tool to evaluate the consumer's emotional arousal [10]. The main reason for its importance is because EDA is only affected by the sympathetic branch of the autonomous nervous system, therefore, not being influenced by the peripheral parasympathetic system as most of the other physiological tools [14]. On the other hand, EDA, as other neurophysiological also presents limitations, namely both positive and negative emotions can increase the arousal levels and therefore increased skin conductance levels only reflects the intensity of the stimuli and not its type [13].

3 RESEARCH METHODOLOGY

This study's design aims to measure the emotional arousal from different advertisement marketing strategies of cosmetic brands. The population had demographic requirements because socioeconomic position, age, and culture should be controlled in marketing research since they are considered individual factors of interest [1]. The inclusion criteria for this study were: (1) Chinese female participants, (2) 18-40 years old; (3) willingness and ability to provide written consent; and (4) normal hearing and vision conditions (sensory skills required for the experiment). Eighteen Chinese female consumers were selected between 19 and 37 years old. All participants signed an informed consent form.

First, the study aims to measure and evaluate the emotional arousal of a series of advertising stimuli. The designed methodology will subject the participants to observe six cosmetics advertisements. During this process, electrodermal activity (EDA) responses were measured in real-time as the participants watched the advertisements. The engagement and emotions experiments were designed according to the listed requirements on the iMotions software version 8.2 [15] on a 12-inch display on a laptop computer with an i7 processor, 16GB RAM, GPU, and Microsoft Windows 10 operating system. iMotions is an integrated analytic platform that uses several sensors to assess customer behavior and track many elements of human reactions to marketing stimuli [6]. EDA sensors with a 1 cm² measurement site made of Ag/AgCl (silver/silver chloride) were placed in reusable Velcro straps [15]. Fingers on the non-dominant hand were the location selected to place the EDA sensors due to their abundance of eccrine sweat glands [13].

This study used six cosmetics product advertisements as presented in Figure 1. Two cosmetics ads are from Brazilian cosmetics, which the Chinese public should not be familiar with since they are currently not sold in China. Two cosmetics ads are from a well-known French brand, with which the Chinese public is expected to be familiar since they are sold in China. Finally, two cosmetic ads are from a well-known South-Korean cosmetic brand that the Chinese public is also expected to be familiar with since they are sold in China. The advertisements were displayed to the participants in sequence order. The participants were asked to observe each ad, and during this process, the EDA biometric measurements were taken. After visualizing the ads for the product category, a survey was included asking the participant what their favorite ad was. Only one choice was possible. Since iMotions also features an integrated survey tool that triangulates respondents' behavioral

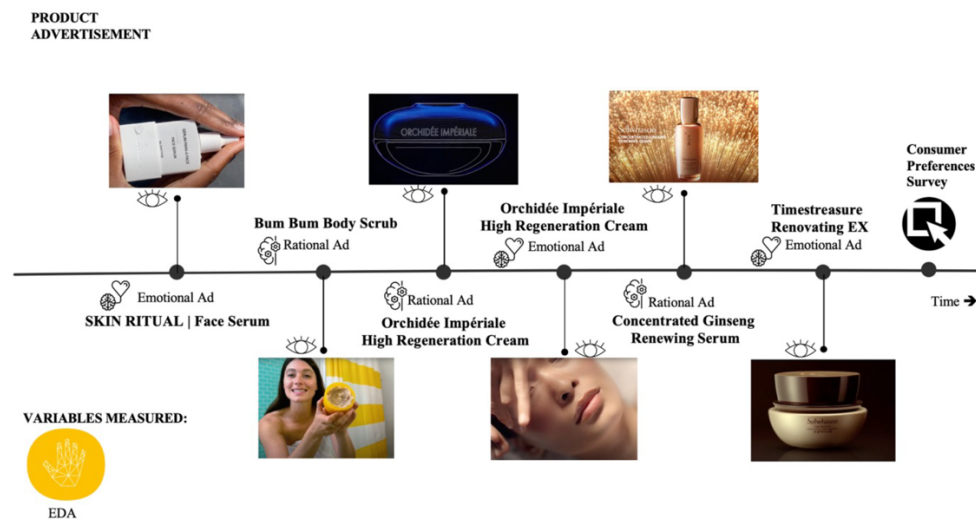


Figure 1: Experimental paradigm of the study

data, such as survey replies with the neurophysiological responses, it gives consumer neuroscience research greater validity.

The content of the six advertisements for the cosmetic products is quite heterogeneous, with noticeably different usage of narrative and informative techniques and image and sound to express messages and emotions.

1. "Skin Ritual | Face Serum" (Costa Brazil) is a "montage sequence" in an emotional atmosphere, with the image of the product being applied by a black person combined with pictures of the ocean using a piece of tribal music.

2. "Bum Bum Body Scrub" (Sol de Janeiro) is an advertisement with a western young white woman with a lively personality that introduces the ingredients of the product, how to apply it, and the sensation of the skin after applying it. The concept that using the product transports her to Brazil is also reinforced.

3. "GUERLAIN | Orchidée Impériale: The New High Regeneration Cream" (Guerlain) is an advertisement focused on the research done by the brand that is infused in the product. The patents and the years of studies are highlighted. The dramatic music emphasizes the relevance of the research.

4. "GUERLAIN | Orchidée Impériale: The Imperial Sense of the Orchid" (Guerlain) is an advertisement focused on the skin ritual of applying the product to an Asian woman combined with clips of an orchid.

5. "Concentrated Ginseng Renewing Serum" (Sulwhasoo) is an advertisement focused on the benefits of the product and the results of the clinical studies that appear as text during the video. An Asian woman with flawless skin appears at the end of the ad.

6. "Sulwhasoo Timestreasure Renovating EX" (Sulwhasoo) is an advertisement focused on the red pine ingredient that is celebrated as an elixir of life and exceptional skin properties. An Asian woman with flawless skin is shown in a forest experiencing the magical properties of the ingredient.

The total duration of the advertisements was 5 minutes. The timeframe was considered adequate not to cause fatigue in the participants and provide reliable results and conclusions. The study designs characteristics is detailed in Table 2.

4 RESULTS AND DISCUSSION

EDA data metrics for this study consists of two components: Peak count and Peaks per minute. The first one is the total peak count, reflected by the number of peaks present per advertisement for each participant. The second one is the peaks per minute of advertisement.

A two-way ANOVA analysis has been performed for the peaks per minute data considering that all advertisements have different lengths. Therefore, peaks per minute data were considered a better metric than peak count to evaluate emotional arousal during the advertisements displayed.

A statistically significant difference in the average percentage of emotional arousal has been observed by both participant ($f(2)=6.733$, $p<0.0001$) and by advertisement ($f(1)=5.902$, $p<0.0001$). However, the interaction between these terms was not significant. A Tukey posthoc test revealed significant pairwise differences between the following product advertisements: 1. Skin Ritual vs. 4. Orchidée Impériale (mean difference=2.121, 1. Skin Ritual vs. 5. Ginseng Serum

Table 1: Cosmetic products advertisements characteristics

Product Advertisement	Brand	YouTube Link	Type of Ad	Country	Duration (min: sec)
Skin Ritual Face Serum	Costa Brazil	https://www.youtube.com/watch?v=oQmEHXpnfrQ (Assessed on 4th February 2022)	Emotional	Brazil	0:30
Bum Bum Body Scrub	Sol de Janeiro	https://www.youtube.com/watch?v=yv9s9VBSB0Y (Assessed on 4th February 2022)	Rational	Brazil	1:33
Orchidée Impériale: The New High Regeneration Cream	Guerlain	https://www.youtube.com/watch?v=uEGv131ewjg (Assessed on 4th February 2022)	Rational	France	0:47
Orchidée Impériale: The Imperial Sense of the Orchid	Guerlain	https://www.youtube.com/watch?v=0IGXRfWeXuM (Assessed on 4th February 2022)	Emotional	France	1:19
Concentrated Ginseng Renewing Serum	Sulwhasoo	https://www.youtube.com/watch?v=jh7rx14c5P4 (Assessed on 4th February 2022)	Rational	Korea	0:30
Timestreasure Renovating EX	Sulwhasoo	https://www.youtube.com/watch?v=erUdWktpncg (Assessed on 4th February 2022)	Emotional	Korea	1:23

Table 2: Study design characteristics

Type of EDA measurement	EDA device	Preprocessing of EDA data	Software used to process EDA data	EDA metrics
Skin conductance	Shimmer3 GSR+	Filtering	iMotions software	Peak detection, peak count

(mean difference=2.468), and 1. Skin Ritual vs. 6. Timestreasure EX (mean difference=1.971).

For total peak count, it was observed that 2. Bum Bum Body Scrub (mean=2.556) was the advertisement with more peak counts followed by 6. Timestreasure EX (mean=1.444) as depicted in Figure 2a).

In Figure 2 b), it is shown that 1. Skin Ritual product advertisement is the one with more peaks per minute (mean=3.003), while 5. Ginseng Serum is the product advertisement with fewer peaks per minute (mean=0.5344). The differences between the advertisement with more peak count and more peaks per minute, it is explained by the duration of the advertisements since 2. Bum Bum Body Scrub was the lengthier advertisement (1:33 min) followed by 6. Timestreasure Renovating EX (1:23 min) and therefore, the ones with more peak count in total, but not peaks per minute.

In Figure 3, it can be observed that 6. Timestreasure EX was the product advertisement with more votes as the favorite product advertisement, followed by 5. Ginseng Serum, although those were the product advertisements with lower emotional arousal displayed. A correlation has been performed between the higher emotional arousal per participant using peak count per minute. None of the participants have voted for the product advertisement for which they showed higher emotional arousal. The same correlation has

been performed using total peak count as a metric, and two participants of the eighteen included in this study have voted for the product advertisement for which they showed the higher emotional arousal.

Based on the results shown in Figure 3b), it is suggested that the participants' preference is for the products for which the brand awareness is stronger since the product advertisements with more votes are the ones for the Korean brand Sulwhasoo (5. Ginseng Serum and 6. Timestreasure EX). The hedonic product advertisement for Sulwhasoo is the one with more voting and has had more emotional arousal between the two Sulwhasoo advertisements. However, for Guerlain, the hedonic product advertisement (4. Orchidee Imperiale) is the one with more voting, although 3. Orchidee Imperiale is the one that has created more emotional arousal. From the results obtained, the hedonic product advertisements were not the ones that produced more emotional arousal, even if compared by the country of origin.

From Figure 3c), it is understood that the product advertisements with Asian faces were the ones with more votes, suggesting that Asian faces have engaged consumer preference. However, the product advertisements for the Brazilian brands, unknown to the Chinese public, were the ones with fewer votes, as displayed in figure 3b). However, those product advertisements were the ones with more emotional arousal per minute, as shown in Figure 2b). Those

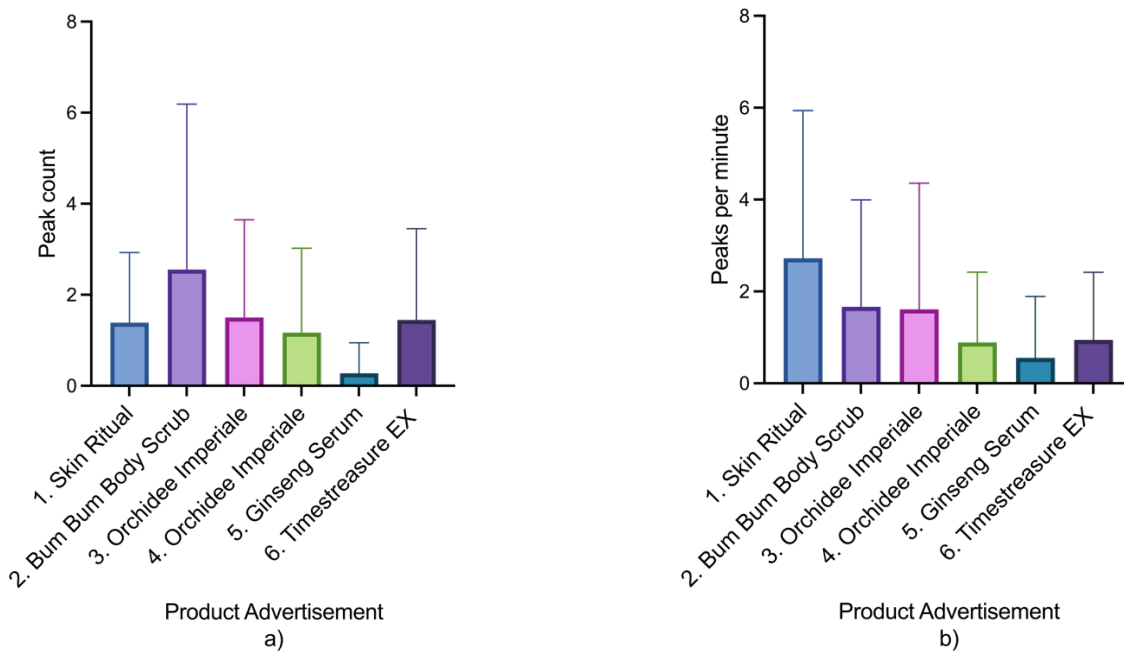


Figure 2: Average and Standard Deviation of all participants of EDA metrics collected for each ad. (a) EDA Peak Count, (b) EDA Peaks per minute.

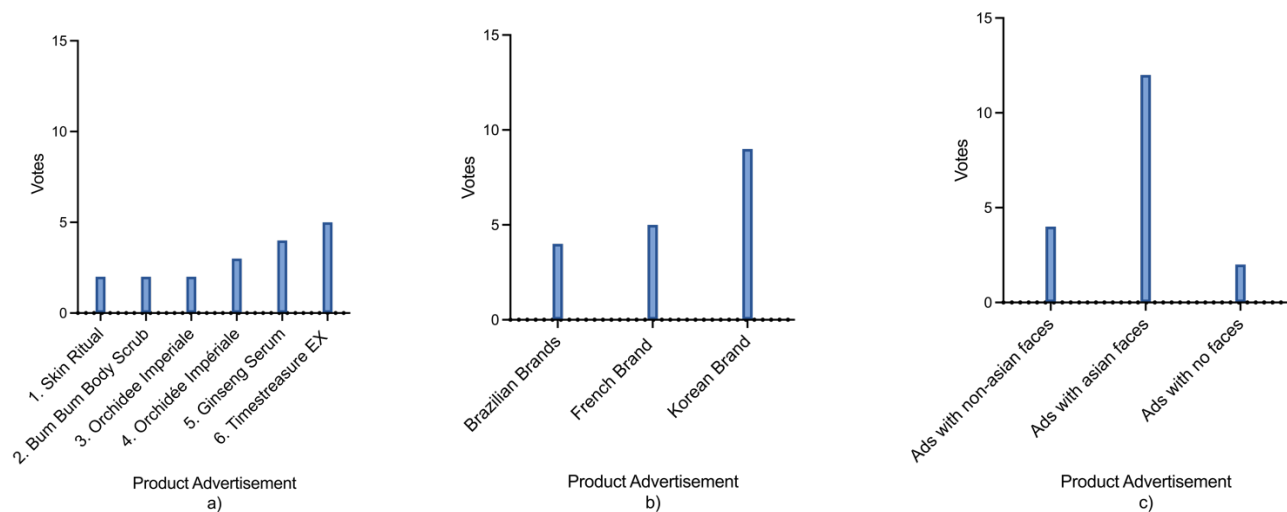


Figure 3: Voting Pool of the proposed experiment: (a) for product advertisement, (b) by Country-of-Origin Brand, (c) for the type of advertisement

advertisements were also those with non-Asian faces, suggesting that this feature influenced voting decisions.

5 CONCLUSION

The main objective of the study employing EDA tool to evaluate cosmetic brands' marketing strategy to understand better if immediate emotional responses can be measured using Electrodermal

Activity (EDA) has been achieved. This research suggests that although consumers value emotional experiences, brand awareness is required to influence product preference. Those conclusions are aligned with [16], that by using fMRI, it was understood that when participants recognized the brand, several brain areas such as the hippocampus, dorsolateral prefrontal cortex, and the midbrain were activated. Therefore, it is recommended that brands create a strong

brand awareness for the emotional arousal to be translated into product advertisement preference. Furthermore, one of the EDA limitations is that it only reflects the intensity of the stimuli and not its type. This conclusion has been corroborated by previous studies in the neuromarketing field [13]. As a result, using EDA in conjunction with other measurements like facial expression analysis is suggested for future studies to have evidence about the nature of the emotions raised. It is evident from this study that sensory information is only one element determining consumer behavior and by itself cannot be translated into consumer engagement. Therefore, it is also proposed to evaluate brand awareness in future studies related to product advertisements. Another element to be considered while designing product cosmetics advertisements is the physical features of the people included since a different cultural background seems to influence the consumers' engagement. This conclusion suggests that cosmetics engagement is stronger when the physical characteristics are similar to the ones of the consumers involved. Since several advertisement cosmetics campaigns for international brands are deployed worldwide, it is suggested that future studies investigate further this correlation on cosmetic brands' marketing strategy.

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