Neuromarketing applied to Ferrero products: influences of product shape on consumer behavior

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ABSTRACT
This study investigates the impact of neuromarketing on consumer behavior, focusing on techniques that brands can use to influence purchasing decisions. The need for this research is justified by the growing importance of neuromarketing in the current business landscape. The methodology used includes both qualitative and quantitative analyzes through surveys and laboratory work. The results show a significant correlation between neuromarketing strategies and consumers' positive perception of brands. The discussion highlights how brands can use these findings to improve their marketing campaigns, understand the impact of their products (according to the characteristics investigated, in this case, the shape of the chocolates) and more effectively attract their target audience. The conclusion of the study emphasizes the relevance of neuromarketing as a powerful tool to create more effective and personalized marketing strategies.

Keywords: Neuromarketing, Consumer Behavior, Neuromarketing Technologies, Consumer Perception, Impact of Products.

1 INTRODUCTION

Neuromarketing is an interdisciplinary field that combines neuroscience, psychology, and marketing to understand how consumers' brains respond to marketing stimuli. This field has gained significant traction in recent years as brands seek more effective ways to connect with their audiences and influence their purchasing decisions. Traditional marketing methods often fall short in predicting consumer behavior because they do not account for the subconscious processes that drive decision-making. Neuromarketing addresses this gap by providing insights into the neural mechanisms underlying consumer responses to advertisements, products, and brands.

Neuromarketing bridges the gap between neuroscience and marketing by studying how consumers' brains respond to marketing stimuli. For a brand like Ferrero, understanding these responses can be crucial in designing products that resonate more deeply with consumers. This paper focuses on the shape of Ferrero chocolates and its influence on consumer perception and behavior.
In today’s highly competitive market, product differentiation is essential. While traditional marketing focuses on the conscious aspects of consumer choice, neuromarketing delves into the subconscious drivers of decision-making. This study aims to shed light on how the physical form of a product can influence a consumer’s emotional and cognitive responses, ultimately affecting their buying decisions.

With the market investigation of the products to be measured (Ferrero Rocher Chocolates vs. Lindt Chocolates) and using neuromarketing technologies: Galvanic Skin Response (GSR), Electroencephalogram (EEG) and Eye Tracking; The objective of this document is to know the influence of the shape of Ferrero Rocher chocolates on the process of choosing and purchasing chocolates.

2 THEORETICAL FRAMEWORK

The study of consumer behavior through neuromarketing offers profound insights into how sensory attributes, particularly the shape of products, influence consumer preferences and purchasing decisions. This research focuses on Ferrero products, renowned for their distinctive shapes and innovative packaging designs, aiming to explore how these shapes impact consumer emotions and behaviors.

Neuromarketing examines how the brain responds to marketing stimuli, revealing that sensory attributes, such as shape, evoke specific neural responses linked to emotions and memory (Lee et al., 2007, p. 201). This neurological engagement highlights the critical role of product design in shaping consumer perceptions and responses.

According to Knutson et al. (2007, p. 151), "Visual stimuli are processed rapidly and automatically in the brain, influencing consumer preferences before conscious evaluation occurs." This suggests that the initial visual impression of a product, influenced by its shape, can significantly affect consumer attraction and interest.

Research by Hagtvedt and Brasel (2017, p. 495) emphasizes that "aesthetic attributes of products, including shape, evoke cognitive and affective responses that influence consumer choice." This insight implies that product shapes, such as rounded forms associated with comfort and angular forms with intensity, can evoke specific emotional responses that influence purchasing decisions.

Ferrero products, such as Ferrero Rocher and Kinder Bueno, are known for their unique shapes and packaging designs that enhance their appeal. The roundness of Ferrero Rocher evokes a sense of luxury and indulgence, appealing to consumers seeking a premium experience (Hagtvedt; Brasel, 2017). In contrast, the angularity of Kinder Bueno may appeal to younger consumers seeking excitement and novelty.

Understanding consumer behavior through neuromarketing enables marketers to optimize product shapes to align with desired emotional responses and market segments. By leveraging the psychological impact of shapes, marketers can enhance brand perception and consumer loyalty.
The study of neuromarketing applied to Ferrero products highlights the intricate relationship between product shapes, consumer emotions, and purchasing decisions. By leveraging insights from neuromarketing research, marketers can strategically design product shapes that resonate with consumers' subconscious preferences and enhance brand appeal.

These authors open the door to investigating whether the success of Ferrero Rocher products is due to their taste or whether the shape of their product affects the purchasing decision. That is why for this investigation it has been decided to make a comparison between the already named Ferrero Rocher and one of its greatest competitors in Europe, Lindt.

Figure 1. Graph of the confectionery companies with the highest net sales in Europe in 2021

Source: Orús, Abigail; Statista (2022)

Furthermore, the application of neuromarketing to Ferrero products exemplifies how understanding the cognitive and affective processes underlying consumer behavior can lead to more effective marketing interventions. By aligning product shapes with consumer expectations and emotional responses, marketers can create deeper connections with consumers and drive sustainable brand growth.
In essence, the study of neuromarketing applied to Ferrero products provides a robust framework for enhancing consumer engagement and optimizing product design strategies. By embracing the complexities of consumer perception and behavior, marketers can navigate competitive landscapes with confidence, ensuring that their products not only meet functional needs but also evoke meaningful emotional responses that drive purchase decisions and foster long-term brand loyalty.

3 METHODOLOGY

The study employs a sophisticated methodological design integrating qualitative and quantitative neuromarketing techniques. This approach aims to provide a comprehensive understanding of consumer perceptions and preferences regarding chocolates across different brands. By capturing emotional, cognitive, and sensory responses, the study seeks to uncover the intricate factors that influence purchasing decisions within the target market.

3.1 MAIN METHODOLOGY

To ensure robustness and reliability, the study utilizes methodological triangulation. This involves the convergence of multiple data collection techniques, including in-depth interviews, neuromarketing technologies (such as eye tracking, galvanic skin response (GSR), and electroencephalography (EEG)), and standard quantitative assessments. By triangulating these methods, the study not only validates findings but also provides a nuanced understanding of consumer behavior and preferences.

- **in-depth interviews:** structured interviews are conducted to explore participants' subjective perceptions and personal experiences with chocolates. This qualitative approach allows researchers to delve deeply into how individuals conceptualize and evaluate chocolate products beyond immediate sensory responses. Insights gathered from these interviews provide context and richness to complement quantitative data;

- **eye tracking:** this technology records and analyzes participants’ eye movements and visual fixation patterns when presented with chocolates. By tracking gaze behavior, researchers can identify which product attributes or packaging elements attract visual attention most effectively. This information is crucial for understanding the visual stimuli that influence consumer decision-making processes at the point of purchase.
Figure 2. Eye Tracker Operation

Source: Tobii; Tobii (2024)

- **galvanic skin response (GSR):** GSR measures changes in skin conductance, reflecting emotional arousal levels in response to stimuli. During chocolate evaluation, GSR data helps capture subconscious emotional reactions that may influence consumer preferences. By monitoring physiological responses, researchers gain insights into the emotional impact of different brands or product presentations;

Figure 3. GSR Operation

Source: Christian, Albert et al.; ResearchGate (2017)

- **electroencephalography (EEG):** EEG records electrical activity in the brain, offering insights into participants’ deeper emotional and cognitive responses. This neuroscientific approach helps identify neurological patterns associated with positive or negative emotions towards specific chocolates. By analyzing EEG data, researchers uncover the neurophysiological basis of consumer preferences and decision-making processes;
3.1.1 Sample Composition

The study sample consists of 20 carefully selected participants, ensuring demographic diversity in terms of gender (equally distributed between males and females) and age (ranging from 20 to 40 years). This diversified sample allows researchers to capture a broad spectrum of consumer perspectives and behaviors relevant to the target market segment. The sample size is adequate to achieve data saturation, ensuring comprehensive insights into consumer preferences and reactions.

3.1.2 Study Procedure

The study unfolds in two distinct phases, each designed to explore different facets of consumer perception and emotional responses towards chocolates:

1. **visual taste testing phase**: during this phase, participants visually inspect and taste chocolates while their responses are recorded using neuromarketing technologies. This phase captures immediate sensory feedback, emotional reactions, and visual attention patterns during direct product evaluation;

2. **blind taste testing phase**: in this phase, participants evaluate chocolates without knowledge of brand identity. By removing brand influence, researchers assess pure sensory experiences and preferences. This approach reveals how product attributes and taste profiles alone influence consumer choices, providing unbiased insights into sensory appeal and flavor preferences;
3. **interview phase**: at the end of the experimental, each user will be asked a series of questions to compare the answers with the results obtained from the use of neuromarketing technologies and thus obtain a more reliable and reliable result with respect to the objectives.

### 3.1.3 Study Objectives

The primary objective of the study is to gain a comprehensive understanding of consumer preferences and emotional responses towards chocolates from various brands. By analyzing both conscious and subconscious reactions, the study aims to uncover underlying factors driving consumer decisions. Insights derived from the study inform strategies for product development, branding, and marketing communication tailored to resonate with consumer expectations and desires.

### 3.1.4 Implications and Practical Applications

The integrated methodological approach not only facilitates comprehensive data collection but also ensures the practical application of findings in real-world marketing strategies. Insights from the study empower brands to optimize product offerings, enhance consumer engagement, and strengthen market positioning. By aligning product attributes with consumer preferences identified through neuromarketing techniques, companies can effectively differentiate themselves in competitive markets, fostering sustained brand loyalty and profitability.

### 3.2 TABLES

Below are detailed tables outlining the methods employed and study phases:

<table>
<thead>
<tr>
<th>Table 1. Data Collection Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Method</strong></td>
</tr>
<tr>
<td>In-depth Interviews</td>
</tr>
<tr>
<td>Eye Tracking</td>
</tr>
<tr>
<td>Galvanic Skin Response (GSR)</td>
</tr>
<tr>
<td>Electroencephalography (EEG)</td>
</tr>
</tbody>
</table>

Source: Own elaboration (2023)
Table 2. Study Phases

<table>
<thead>
<tr>
<th>Study Phase</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Taste Testing</td>
<td>Evaluation of products while recording sensory and emotional responses using eye tracking, GSR, and EEG.</td>
</tr>
<tr>
<td>Blind Taste Testing</td>
<td>Evaluation of products without knowledge of brand to unravel the impact of brand perceptions on taste preferences and sensory experience.</td>
</tr>
</tbody>
</table>

Source: Own elaboration (2023)

These tables provide a structured overview of the methodologies and study phases, enhancing clarity and understanding of the neuromarketing study’s approach and objectives. This comprehensive methodology ensures that the study yields valuable insights into consumer behavior and preferences towards chocolates, enabling actionable recommendations for brands in the competitive marketplace.

On the other hand, the stimuli chosen for the Eye Tracker part have been two images of the packaging of the products, one from Lind and the other from Ferrero, in which we wanted to observe what type of packaging and bomb is most striking for users. The sequence shown to users was:

Figure 5. Experimental process

![Experimental process diagram](source)

The images of the Ferrero and Lindt chocolates are displayed randomly for each user, avoiding any kind of bias. The order is noted down in a computer so that the data collection can be performed correctly.
4 RESULTS AND DISCUSSIONS

Once the experimental study had been carried out, we proceeded to organize the results obtained from the technologies and the programs that run them in an Excel spreadsheet in order to subsequently clean up and begin the analysis. A total of 20 users were registered, 10 men and 10 women, fulfilling the necessary sample for the realization of this research.

4.1 EYE TRACKER

The starting point of the experiment was the Eye Tracker, since it is data that provides us with additional information to the one that interests us in this research (the shape of the chocolates) and is the packaging of the product. Next, we will show an image detailing the hot spots of each of the images accompanied by the table of data obtained from this phase.

In these images we chose some areas of interest (AOI) that are considered important for the research, 3 from Ferrero and 3 from Lindt. These areas are: Ferrero logo, Ferrero open chocolate (Bombom Abierto Ferrero), Ferrero closed chocolate (Bombom Cerrado Ferrero), Lindt logo, Lindt open chocolate (Bombom Abierto Lindt), Lindt closed chocolate (Bombom Cerrado Lindt).

It is important to remember that for this first part only 10 users participated in order to correctly perform the second part of the identification of the bombom according to its shape.
Table 3. The final data obtained from the 10 users who participated in the Eye Tracker

<table>
<thead>
<tr>
<th>Media Name</th>
<th>AOI Name</th>
<th>Viewers (#)</th>
<th>Ave Time to 1st View (sec)</th>
<th>Ave Time Viewed (sec)</th>
<th>Revisitors (#)</th>
<th>Average Revisits (#)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrero</td>
<td>LOGO FERRERO</td>
<td>10</td>
<td>0.432</td>
<td>1.837</td>
<td>10</td>
<td>4.600</td>
</tr>
<tr>
<td>Ferrero</td>
<td>BOMBOM ABIERTO FERRERO</td>
<td>10</td>
<td>1.592</td>
<td>1.732</td>
<td>10</td>
<td>3.800</td>
</tr>
<tr>
<td>Ferrero</td>
<td>BOMBOM CERRADO FERRERO</td>
<td>10</td>
<td>1.648</td>
<td>2.011</td>
<td>10</td>
<td>3.800</td>
</tr>
<tr>
<td>Lindt</td>
<td>LOGO LINDT</td>
<td>10</td>
<td>0.466</td>
<td>1.995</td>
<td>8</td>
<td>4.625</td>
</tr>
<tr>
<td>Lindt</td>
<td>BOMBON ABIERTO LINDT</td>
<td>10</td>
<td>2.781</td>
<td>1.268</td>
<td>9</td>
<td>2.222</td>
</tr>
<tr>
<td>Lindt</td>
<td>BOMBON CERRADO LINDT</td>
<td>8</td>
<td>3.064</td>
<td>0.770</td>
<td>5</td>
<td>1.400</td>
</tr>
</tbody>
</table>

Source: Own elaboration (2024)

As can be seen in the table, Ferrero outperformed Lindt in all data. In the first place (third column), the 3 AOI's of Ferrero were viewed by all participants, while the "Bombom cerrado Lindt" was missed by two users.

In the fourth column we can observe the average time that users took to see the AOI, a result that once again leaves Ferrero the winner, where its logo was seen 0.034 seconds faster than the Lindt logo; the "Bombom abierto Ferrero" caught the attention of users faster than the "Bombom abierto Lindt" with a difference of 1.189 seconds and, as expected, the "Bombom cerrado Ferrero", when seen by all users, had a much higher first view than the "Bombom cerrado Lindt" with a wide difference of 1.416 seconds.

These first columns show that, for users, Ferrero, as a brand, is at first sight more interesting than Lindt, despite the flashy colors of the latter brand.

Continuing with the table, the AOI with the longest retention time was the "Ferrero closed bombom" with an average display of 2.011 seconds, followed by "Lindt logo" and "Ferrero logo". In this fifth column, the average time of visualization of "Open Bombom Ferrero" stands out, which is 0.464 seconds longer than "Open Bombom Lindt", thus giving a striking indication of the shape of the Ferrero bombom by the users.

It is considered that the shape of the Ferrero bombom is striking due to its heterogeneous circular shape and the objects that accompany the image, such as hazelnuts.

The last two columns highlight the number of users who have returned to see the AOI's and it is striking how Ferrero has created so much interest among users that they have all returned to see the
highlights. Lindt, on the other hand, has not reached that point of interest, but has managed to get "Bombom abierto Lindt" to be seen again by 9 out of 10 users. However, what stands out in this section is that in the last column it was the "Lindt Logo" that obtained the highest total viewing time, with two magazines less than Ferrero, a higher total viewing time by users.

One of the possible reasons why the Lindt logo has had more time of visualization is because of its perpendicular location to the users' eyes. However, when contrasting the information with the questions asked to the users, the main reason is due to its typography and the circular highlighting.

Likewise, when asking users about the visual points that most caught their attention in each of the images, 90% said that the chocolates, both Ferrero and Lindt is what most caught their attention, but not what they have noticed most, because they agree and agree that their view has focused mostly on the packaging of the products, thus corroborating the data obtained.

4.2 ELECTROENCEPHALOGRAPHY (EEG)

The electroencephalogram has 6 emotions that can be measured. However, for this research it was only necessary to consider two of them, engagement and excitement.

For this section, the data of each of the users had to be plotted separately since; in order to obtain comparative data, it is necessary to review the reaction of each of the subjects and obtain the information independently, since a summary processing would not be valid since it would not allow comparing the emotions of each user.

The order of consumption of chocolates per user was as follows:

<table>
<thead>
<tr>
<th>User</th>
<th>Gender</th>
<th>First Chocolate</th>
<th>Second Chocolate</th>
</tr>
</thead>
<tbody>
<tr>
<td>User01</td>
<td>Male</td>
<td>Ferrero</td>
<td>Lindt</td>
</tr>
<tr>
<td>User02</td>
<td>Female</td>
<td>Ferrero</td>
<td>Lindt</td>
</tr>
<tr>
<td>User03</td>
<td>Male</td>
<td>Ferrero</td>
<td>Lindt</td>
</tr>
<tr>
<td>User04</td>
<td>Male</td>
<td>Ferrero</td>
<td>Lindt</td>
</tr>
<tr>
<td>User05</td>
<td>Female</td>
<td>Lindt</td>
<td>Ferrero</td>
</tr>
<tr>
<td>User06</td>
<td>Male</td>
<td>Ferrero</td>
<td>Lindt</td>
</tr>
<tr>
<td>User07</td>
<td>Female</td>
<td>Lindt</td>
<td>Ferrero</td>
</tr>
<tr>
<td>User08</td>
<td>Female</td>
<td>Lindt</td>
<td>Ferrero</td>
</tr>
<tr>
<td>User09</td>
<td>Female</td>
<td>Lindt</td>
<td>Ferrero</td>
</tr>
<tr>
<td>User10</td>
<td>Male</td>
<td>Lindt</td>
<td>Ferrero</td>
</tr>
</tbody>
</table>

Source: Own elaboration (2024)

The duration of the experiment per subject for this phase was approximately 110 seconds, during which time the subjects consumed the two chocolates and drank water in between to reduce the taste. The results are shown below as a graph for each of the 10 users.
In this first part we can observe the reaction of the users who have first consumed the Ferrero bombom (emotional peaks between the time value of 20 and 60), where in four cases, it has been the one that has caused the greatest engagement and excitement in the subjects. The emotional peaks of the Lindt bombom are located between the time interval of 80 to 110.

Lindt, on the other hand, only had a higher engagement and excitement in user 4 and obtained very similar results in user 6. In the interviews, user 4 emphasized that the liquid inside the Lindt bonbon
generated more taste than the rocky sensation of Ferrero, while user 6 said that the taste of Lindt is stronger than that of Ferrero, which is the reason why Lindt surpassed Ferrero in these two users.

The remaining users affirm that the shape of the Ferrero bonbon is more pleasant than Lindt’s because it has less hardness and its rocky shape generates unusual sensations, which generates curiosity, taste (because of its ingredients) and greater product recall.

Figure 8. Lindt graphics as the first chocolate consumed by users

![Figure 8](image)

Unlike the previous five users, in this batch the Lindt chocolate was tested first and then the Ferrero. Where the first peak (provoked by Lindt) occurs between the time interval of 20 and 60 and the second (Ferrero product) is shown in the interval of 80 to 110.
In this part, we can see how Lindt has achieved a little more engagement and excitement in three of the five users, when asked about which has been more liked, the three have responded that Ferrero. However, when asked about the sensations, two of them said that they liked the Lindt filling more because it is much more invasive than Ferrero. The remaining user stated that he prefers the smooth chocolates because he plays with them in his mouth.

For the other two cases in which Ferrero had more engagement and excitement, the users, like the other batch, again emphasize that it is because of its rocky shape that they prefer Ferrero chocolate and confirm that this would be the reason why this product generates higher emotional peaks than its competitor.

With the results obtained from the EEG and contrasting them with the questions asked to the users after the experimental, it can be assured that in 85% of the cases, Ferrero has a greater emotional impact than its competitor due, among other characteristics, to its rocky shape, which generates unique sensations in the subjects, thus allowing to have a higher recall rate.

Lindt has a more generic shape, so it does not have a greater emotional impact on users than its flavor, since what has stood out most about this product has been its filling.

Table 5. Grouped engagement and excitement results

<table>
<thead>
<tr>
<th></th>
<th>Engagement</th>
<th>Excitement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrero</td>
<td>0.80</td>
<td>0.42</td>
</tr>
<tr>
<td>Lindt</td>
<td>0.67</td>
<td>0.29</td>
</tr>
</tbody>
</table>

Source: Own elaboration (2024)

As can be seen when grouping the data and looking at the engagement and excitement of both products, Ferrero gives a higher value than Lindt, confirming that the shape of its chocolates is more emotionally attractive to the user when consuming the product.

4.3 GALVANIC SKIN RESPONSE (GSR)

For this last phase, the data were separated according to the chocolates, on the one hand the results obtained from Lindt and on the other hand those obtained from Ferrero. This graph was made by noting the order of the chocolates consumed and joining the data according to the product to obtain the results in an easier and more orderly way. The graph was as follows:
As can be seen, these graphs form a circular timeline, starting with Lindt chocolate and then with Ferrero and then back to Lindt. This graph was formed in this way due to the organization of data and allows to clearly observe the reaction of users at the time of consuming each chocolate, showing how Ferrero is the clear winner.

At this point they were asked about their consumption preference, to which most users would prefer to buy Ferrero due to the type of chocolate it is, its flavor, the sensation it generates in the mouth (due to its shape) and its recognition, over Lindt, which was only chosen by one user because it is a more economical chocolate.

5 CONCLUSION

The present study demonstrates the powerful influence of neuromarketing on consumer perception and behavior, emphasizing the significant impact of product shape, particularly in the case of Ferrero chocolates. Through rigorous methodology, including neuromarketing techniques such as Eye Tracking, GSR, and EEG, the study reveals that the distinctive round shape of Ferrero chocolates evokes more favorable emotional and cognitive responses compared to other shapes.

Ferrero’s round chocolates, such as the Ferrero Rocher, are designed to stand out on the shelf and in consumers’ minds. The spherical shape is not only visually appealing but also easy to handle and consume, creating a memorable sensory experience. This shape plays a crucial role in attracting consumers’ initial visual attention and maintaining their interest, leading to a more enjoyable and engaging interaction with the product.

The findings suggest that the unique round shape of Ferrero chocolates enhances the overall consumer experience by triggering positive emotions and associations. This sensory appeal is reinforced by the luxurious packaging and presentation, further differentiating Ferrero products from competitors.
Brands can leverage these insights to improve their marketing campaigns and product designs, ensuring that their offerings not only capture consumers' attention but also foster long-term loyalty.

In a highly competitive market, understanding and applying neuromarketing principles can provide brands with a crucial advantage. By focusing on the sensory attributes that resonate most with consumers, such as the appealing shape of Ferrero chocolates, brands can create more effective and personalized marketing strategies. These strategies not only meet consumers' functional needs but also generate meaningful emotional experiences that drive purchasing decisions and long-term brand loyalty.

ACKNOWLEDGEMENTS

Through this research work I express my most sincere gratitude, first of all, to my Family who have given me all their moral and financial support and who, with their wise advice, have managed to carry out this work. Also to the professors of the Master in Applied Neuromarketing at the Polytechnic University of Valencia (UPV – MACOM) who with patience and knowledge have been able to guide us, support us and provide us with the necessary material to carry out this research.

DEDICATION

To Adriana, you have always trusted me. For guiding and protecting me. For giving me the courage to move forward. Because you taught me that there is life before death and that it is worth smiling. I love you mom.
REFERENCES


