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Breaking Loyalty

How Out-Group Ads Impact Brand Devotion

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Master Thesis

presented as partial requirement for obtaining a Master's Degree in Data-Driven Marketing

NOVA Information Management School

Instituto Superior de Estatística e Gestão de Informação
Universidade Nova de Lisboa

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Breaking loyalty: How out-group targeted ads impact brand devotion

by

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Master Thesis presented as partial requirement for obtaining the Master's degree in Data-Driven Marketing, with a specialization in Digital Marketing and Analytics.

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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism, any form of undue use of information or falsification of results along the process leading to its elaboration. I further declare that I have fully acknowledged the Rules of Conduct and Code of Honor from the NOVA Information Management School.

Lisboa, April 27th 2025

Catarina Caixas Cabral

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ABSTRACT

Neuromarketing combines neuroscience with marketing to better understand how emotions influence consumer decisions, especially those that are subconscious and not captured through traditional marketing research methods. This thesis investigates whether advertisements targeting non-loyal consumers (the out-group) influence the loyalty of existing loyal customers (the in-group), using emotional responses mediators. To investigate this, a two-step experimental study was conducted with 113 participants, integrating both the FaceReader and a questionnaire. Results showed that the out-group ad triggered higher levels of sadness and surprise among loyal participants, however these emotions did not reduce brand loyalty, change purchase intention, or disrupt personal goals. Mediation models confirmed that emotional responses did not influence the behavioral outcomes. Theoretically, this study contributes to Social Identity Theory by showing that emotional responses to group-targeted ads can shift without immediately altering consumer behavior. It highlights a possible gap between what people feel and what they do, especially in brand relationships. Practically, these findings suggest that is possible for brands to do rebranding with messaging aimed at new customer segments without losing the loyalty of their loyal base. However, emotional reactions like sadness and surprise, might have associated risks. Tools like FaceReader offer a cost-effective way for marketers to detect early emotional reactions and improve advertising strategies.

KEYWORDS

Brand loyalty; Social Identity Theory; Utilitarian and hedonic goals; Purchase intention; Emotions; Neuromarketing; Consumer behavior

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1. INTRODUCTION

Imagine you are walking around a store, not particularly looking for anything, yet something catches your eye. A brand you trust has released a new product, and without much thought, you are already adding it to your cart. What is driving this impulse? The trust in the brand, the memories associated, or something far deeper, perhaps hidden in the subconscious mind?

Many individuals consider marketing a strategic business tool that helps shape consumer purchasing decisions and drive revenue growth. While this perspective highlights the monetary value of marketing, its core purpose is still people-oriented. The goal is to understand consumer preferences and identify the most effective ways to meet their needs (Ariely & Berns, 2010). Furthermore, traditional marketing approaches use in-depth interviews, surveys, and focus groups to predict success and promote products that benefit consumers and businesses (Mashrur et al., 2024).

However, the effectiveness and accuracy of traditional marketing approaches have started to be questioned and debated. Despite offering advantages like cost efficiency and robust statistical analysis, these methods often lack quantitative and accurately predictable measures, resulting in potential biases. Besides, as these findings rely on researchers' interpretations of tests and experiments, biases can occur (Kajla et al., 2024; Mashrur et al., 2024).

More than two decades ago, Bagozzi & Dholakia (1999) already noted, a significant increase in consumer behavior theories and models. Recently, Mashrur et al. (2024) confirmed

this ongoing progression, noting that it still inspires researchers to seek more effective methods to predict consumer decisions and preferences that go beyond traditional approaches. Going beyond the challenges conventional marketing can not address, VanBergen et al. (2022) emphasized the importance that emotions have in consumer decision-making. As defined by Kidwell et al. (2008), consumer emotional intelligence is the ability of an individual to use emotional information to accomplish a specific consumer-related goal. According to the authors, emotional intelligence contributes to evaluate a brand, either positively or negatively and, therefore, needs to be considered by brands in order to improve their alignment with consumer decision-making.

Throughout the years, academics have been highlighting the importance of not targeting a different audience than the one they are used to. Doing so can lead to multiple issues, such as incompatibility with the new audience due to the brand's lack of understanding of their preferences, dilution of brand identity, or even alienation of the core audience. This last issue can also be interpreted as failing to meet expectations, since loyal customers may feel neglected or betrayed. When the values communicated by a brand contradict the emotional narrative that loyal customers associate it with, that can lead to emotional disconnection and, consequently, weaken their bond with the brand.

Despite frequent warnings, brands continue to make these mistakes, weakening the connection with their customers. A recent example is Jaguar's 2024 rebranding. While the previous Jaguar brand represented classic luxury, elegance, and high-performance sports cars, the new identity is moving towards a modern, minimalistic, and tech-focused approach. Jaguar's futuristic brand is centered around the "copy nothing" and "delete ordinary"

mantras. For some, this was an effective marketing move that sparked interest after a long period of silence. However, many loyal customers feel abandoned, and believe that Jaguar no longer values their preferences. In this situation, rebranding should still be implemented, but in a way that would not create an emotional disconnection from Jaguar's loyal base. How?

To prevent possible dissonances between brands and customers, emotions emerged as a new parameter to analyze consumer behavior, one that has not been incorporated into strategic planning so far (Núñez-Cansado et al., 2024). This brought marketing and neuroscience together, to understand consumer purchase behavior patterns, leading to the creation of neuromarketing. Since traditional methods fail to capture consumers' emotions, neuromarketing emerged as a viable tool to decipher their motivations, preferences, and decisions (Kajla et al., 2024; Lee et al., 2017). The rise of neuromarketing as a more accurate, data-driven approach to study consumer behavior represents a significant shift in marketing research. It addresses the limitations of traditional methods and creates new opportunities to optimize advertising and develop effective strategies (Mashrur et al., 2024).

Taking that into consideration, this thesis aims to challenge brand loyalty by getting a deeper understanding of emotional disconnection with the help of neuromarketing. More specifically, it will use neuromarketing techniques that measure emotional responses to understand whether out-group targeted ads disrupt the loyalty of the in-group towards a brand or if their loyalty will remain intact. In this context, the in-group refers to loyal customers of a specific brand, while the out-group refers to individuals who do not typically purchase from that brand. The research question this thesis will answer is: Can out-group

targeted ads disrupt the in-group customer loyalty, or will their brand loyalty remain unbreakable?

Despite the recent rise in publications related to neuromarketing, Kajla et al. (2024) noted the inconsistent growth within this field, supported by Figure 1-1, highlighting the need for further research. Although first spoken in the late 60s, neuromarketing had minimal attention until 2005. Reflecting an early adoption of neuromarketing technologies, the period between 2005 and 2015 was of emergence and growth, coinciding with the rise of brain imaging technology applied to neuromarketing, where some scholarly reports started to mention neuromarketing and some firms began to catch interest in this field (Fisher et al., 2010). Between 2015 and 2020 the rise was exponential, peaking around 2019, coinciding with the use of neuromarketing by major brands, the effectiveness of ads in social networks, and higher validation of neuromarketing techniques by academics (Vences et al., 2020). Although the peak around 2019-2021, from that period onwards a decrease in the publications related to the marketing field was registered. This raises the question: why haven't the previous results been enough to sustain steady research growth in this field? Are the proposed theories not convincing, or are the methods too challenging to implement in practice? (Clithero et al.,

2024)

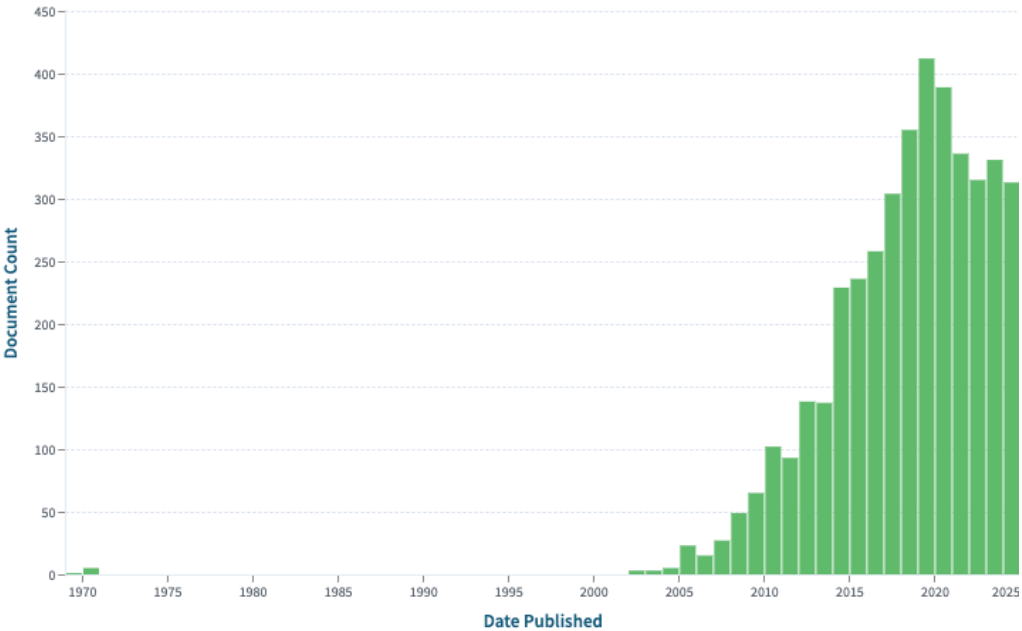


Figure 1-1: Distribution of neuromarketing scholar documents. Adapted from Neuromarketing Search Analysis, by Lens.org, 2025, Lens (<https://www.lens.org/lens/search/scholar/analysis?q=neuromarketing>). Retrieved November 19, 2024.

Even so, the recent journal articles, dissertations, and book chapters regarding neuromarketing, focus on bibliometric analysis along with the tools used to understand customer preference in response to marketing stimuli (Mashrur et al., 2024). Although some studies have explored the benefits of neuromarketing in consumer behavior, none have linked it to brand loyalty, creating the gap this thesis aims to address. Figure 1-2 validates the gap by showing the top fields of study related to neuromarketing. The more predominant topics are psychology, computer science, business, marketing, and advertising. Since brand loyalty is missing among those terms, this reinforces the need for further research.



Figure 1-2: Neuromarketing scholarship world cloud. Adapted from Neuromarketing Search Analysis, by Lens.org, 2025, Lens (<https://www.lens.org/lens/search/scholar/analysis?q=neuromarketing>). Retrieved November 19, 2024.

In summary, the intersection between neuromarketing and brand loyalty, will lead to more effective marketing campaigns to not only sell products, but to keep long-term emotional connections with the existing loyal customer base, while targeting possibly new

consumers. This will help marketers design ads that create a sense of belonging to a brand community, use neuroscience data to polish the messaging for specific social identities and use the power of rivalry to deepen brand loyalty. As stated before, the interplay of these concepts is under-explored, offering a chance to overcome the existent gap between neuroscience and marketing, by understanding how ads shape consumer identities and loyalty on a neurological and social level, contributing to both academic knowledge and practical marketing strategies.

To address this, the following chapter of this research will look further into key concepts such as brand loyalty, social identity theory, the role of emotions, and neuromarketing, by analyzing articles categorized as Q1 or Q2 on Scimago, rated 3 or 4 by ABS, or listed among the Financial Times top 50 journals. Following the literature the chosen methodology will be presented, detailing the study, and data collection techniques, along with the results to conclude whether the findings confirm or deny the initial hypotheses. In the results chapter, this thesis will first analyze emotional responses, arousal, and valence effects elicited by an out-group advertisement. These three components will correlate with brand loyalty, allowing us to assess whether the advertisements lead to stable or declining loyalty, influence purchasing behavior, and disrupt the personal goals established by consumers. Finally, the thesis will summarize the theoretical and practical contributions, the limitations encountered, as well as recommendations for future research directions.

2. LITERATURE REVIEW

2.1. BRAND LOYALTY AND GROUP IDENTIFICATION

In today's fast-growing marketing environment, understanding consumer behavior has become crucial. With businesses facing more knowledgeable and empowered customers, growing competition, and a decline in the effectiveness of traditional marketing strategies, companies' objectives have shifted towards understanding consumer decision-making (Hutchinson et al., 2024; Keller, 2003). According to researchers, the key to build a sustainable competitive advantage lies in the ability of marketing professionals to create strong-impactful brands (Aggarwal, 2004; Keller, 2003). Branding is a strategic process that involves enriching products and services with unique advantages to create strong and memorable brands (Keller, 2003). This process differentiates competitive brands in the market while building trust and emotional connections with consumers. As a result, branding is about influencing consumer behavior. It's why they say "yes". Consumers are not just asked to purchase from a company, but are rather invited to feel represented by a brand. Guo and Wang (2024) define this combination of brand commitment and repeat purchasing as brand loyalty, which is considered the most important indicator of brand performance and the most valuable factor across all marketing metrics to guarantee a brand's long-term success.

Consumers differ according to their perceptions and relationships with brands. Their attitude towards brands can also be influenced by factors like knowledge, experience, gender, attitudes, cultural background, and personal goals. These elements contribute to build strong relationships between consumers and brands (Aggarwal, 2004; Chartrand et al., 2008; Keller, 2020). Consumers may connect with brands through different dimensions, including brand

addiction, attachment, love, loyalty, passion, and trust. However, it is not simply about positive interactions between consumers and brands, as high customer satisfaction doesn't always lead to strong customer loyalty (Chitturi et al., 2008; Cui et al., 2018). With consumer behavior getting shaped by the evolution of the digital era, understanding how to sustain a brand has become more important than ever (Guo & Wang, 2024).

Research shows that consumer-brand relationships resemble social relationships, with emotions ranging from subtle affection to deep attachment. As individuals connect and identify with others, they can also form deep emotional connections with brands, experiencing feelings that grow over time (Aggarwal, 2004; Cui et al., 2018). In a marketing perspective, these consumers represent the loyal customers. From the point of view of the Social Identity Theory, they are called the in-group (Havard et al., 2021).

The Social Identity Theory, initially developed by Henri Tajfel, examines how group membership shapes the sense of self and influences intergroup relations, and proposes that the in-group defines its self-identity through associations with social groups. These connections help shape how the in-group wishes to be perceived by others and strengthen both their sense of self and their relationship with the brand (Brown, 2000; Islam, 2014). In contrast to the in-group, the theory adds that individuals who neither associate with nor identify with the same brands as the in-group are referred to as the out-group (Havard et al., 2021). In other words, in-group individuals have different habits and interests when compared to those in the out-group, possibly leading to negative attitudes towards one another such as criticism and discrimination (Brown, 2000; De Zavala, 2011).

In a study developed later by Billig & Tajfel (1973), the researchers assigned participants to groups based on meaningless criteria, such as the result when flipping a coin. Even without any real connection to these groups, participants show favoritism for their own group (the in-group) compared to the out-group. These studies showed that even minimal group distinctions can encourage a sense of group identity and bias. Moreover, they help understand how group identities shape behaviors and attitudes that lead individuals to favor their group and emphasize its positive qualities while perceiving the out-group more negatively (Islam, 2014). The social identity approach has become one of the most influential theories globally in understanding group dynamics and intergroup relations (Hornsey, 2008).

Research suggests that consumer loyalty can be influenced by cognitive factors, such as utilitarian benefits driven by price, features, and quality, as well as affective factors, which are hedonic benefits shaped by emotions and feelings towards the brand. Together, these elements create a positive emotional response that improves word of mouth and increases future purchase intention (Chitturi et al. 2008, Tyrväinen et al. 2023). Considering this, brands have the potential to evoke affection and trust, which creates a sense of unique value within the in-group that is not perceived by the out-group. This makes loyal customers willing to pay more, as they believe no alternative offers the same perceived worth (Chaudhuri & Holbrook, 2001).

Khamitov et al. (2019) study corroborates the previous theories and conclusions by finding that despite the limited evidence linking directly hedonic experiences to more positive customer-brand relationships, associating these with brand love and brand attachment could foster a strong bond. This is what creates the in-group, differentiating it from the out-group.

Ultimately, as VanBergen et al. (2022) suggest, staying true to oneself is predominantly an emotional experience, and therefore the emotions tied to in-group identities influence how individuals interact with brands and their communications, emphasizing the importance of emotional intelligence in crafting effective marketing strategies. By recognizing the deep emotional bonds within social identities, brands can understand and manage better consumer loyalty and preferences.

Despite these discrepancies, the conclusion remains the same. Overall, it is important to acknowledge that customer-brand relationships and the experiences offered are the key drivers for an enriched brand engagement, as this leads to the most significant outcome: brand loyalty. However, considering the findings from Brown (2000) and De Zavala (2011), this loyalty is compromised if the in-group's beloved brands begin to align more with an out-group. Thus, the following hypothesis is proposed:

Hypothesis 1: Exposure to out-group (vs. in-group) targeted ads decreases brand loyalty.

2.2. THE ROLE OF EMOTIONS

To understand consumer decision-making, companies must analyze how consumers think, feel, and decide. This comprehension is important to create effective marketing strategies and improve customer satisfaction, as strong relationships are built through emotional connections with consumers (Huang & Rust, 2024). As consumers balance a tightrope between reasoning and emotions during decision-making processes (VanBergen et al., 2022), researchers have found that consumer behavior is influenced by personal goals, whether hedonic or utilitarian, as well as external influences, even when these factors are not

consciously acknowledged (Bagozzi & Dholakia, 1999; Chartrand et al., 2008; Kidwell et al., 2008). This means that exposure to external factors, such as out-group targeted ads, can activate goals that differ from those previously established, thereby influencing decision-making.

It is the role of marketing to support customers' emotional well-being by being attentive to their emotions throughout marketing interactions and relationship-building efforts (Huang & Rust, 2024). Consumer's emotional decisions arise from neural and cerebral mechanisms (Bagozzi & Dholakia, 1999; Kajla et al., 2024), pushing researchers to explore deeply the intrinsic brain activity, by understanding the spontaneous activity of the brain that affects perception, memory, motor control, and decision-making (Lee et al., 2017). Understanding both conscious and subconscious emotions, as well as consumer motivations, is essential to analyze their choices and gain deeper insights into their decision-making processes (Ariely & Berns, 2010; Kajla et al., 2024). This is important because emotionally connected consumers are often more likely to become loyal customers (Huang & Rust, 2024).

Research on emotions is complex and challenging, with multiple models, studies, and theories proposing the representation of emotions in the brain (Xu et al., 2021). Emotions are biological responses triggered by a stimulus, resulting in physiological and cognitive activity in the nervous system (Núñez-Cansado et al., 2024). Xu et al. (2021) and Barrett (1998) identify two psychological models of emotion processing: the basic emotion model and the dimensional emotion model. The basic emotion model defends the existence of six basic emotion categories: anger, disgust, fear, happiness, sadness, and surprise. These are considered discrete emotions, each one psychologically distinct from the others. Combining

these basic emotions can lead to more complex ones, such as love or jealousy. The dimensional model defends that emotions consist of three fundamental dimensions: arousal, valence, and motivation. Arousal refers to the intensity of an emotional response (Citron et al., 2014; Xu et al., 2021). High arousal emotions are associated with excitement, fear, or anger, contributing to an increased heart rate, faster breathing, and a greater sense of alertness. Contrarily, low arousal emotions are associated with calmness, relaxation, or boredom. In turn, valence represents the degree of pleasure associated with an emotional experience (Barrett, 1998; Lewis et al., 2006). Essentially, positive valence emotions include happiness, joy, or excitement, while negative valence emotions include sadness, anger, or fear (Citron et al., 2014). Motivation directs consumers to approach or withdraw from an experience based on their emotional response (Xu et al., 2021).

These dimensions are often correlated, interacting in complex ways that influence the brain's processing of emotional stimuli. A positive-calm or negative-intense stimuli align more naturally with approach or withdrawal tendencies (Citron et al., 2014; Lewis et al., 2006). For example, anger can be understood as a combination of high arousal, negative valence, and a motivational tendency to approach the situation that triggers it (Xu et al., 2021), while joy can be a combination of high arousal, positive valence, and a strong tendency to engage with the emotional experience. Alternatively, stimuli that are positive yet intense or negative but calm create a mental conflict between the urge to approach or avoid, requiring a more cognitive effort from the brain (Citron et al., 2014).

On another note, the role of emotions in decision-making is also supported by dual-process theories in cognitive and social psychology, which assert that human perceptions and

behavior are guided by at least two types of processing: emotional processes, often termed "affective" or "automatic," and cognitive processes, referred to as "rational" or "controlled" (Schmitt, 2024, Reyna et al., 2025). Recognizing the interaction between these processes is crucial, as denying the emotional component can lead to a limited understanding of decision-making dynamics.

These ideas challenge outdated concepts, stating that the brain works as a set of parts, each having a single unique function. Instead, the authors support the idea of a more integrated and complex neural processing system for emotional experiences (Hutchinson et al., 2024; Xu et al., 2021). This highlights the importance of developing a basic understanding of the brain, which considers both emotion models and cognitive influences, to therefore better comprehend consumer behavior and brand loyalty, especially given their strong connection with brain activity (Hutchinson et al., 2024; Rampl et al., 2016). This can lead to recognizing the interaction of the brain regions involved in interoception and emotional awareness (Barrett, 1998; Citron et al., 2014).

2.3. NEUROMARKETING IN BRANDING AND CONSUMER BEHAVIOR

This is where neuromarketing comes into play, offering a scientific approach integrating neuroscience, traditional marketing, and advanced technology that goes beyond focus groups and surveys. It measures brain activity to understand how consumers respond to external stimuli (Ahmed et al., 2022; Hutchinson et al., 2024; Kajla et al., 2024; Lee et al., 2017; Mashrur et al., 2024).

Neuroscience, as developed by Gerald Zaltman, focuses on helping marketers comprehend how advertising and marketing strategies physiologically influence the human brain (Vences et al., 2020). Alongside neuroimaging tools, neuroscience helps to understand the structure and function of the human brain and how it influences behavior, cognition, and emotional processes (Ahmed et al., 2022; Vences et al., 2020). The knowledge gained from neuroscience helped clear the path for the development of neuromarketing, connecting the study of brain function with its use in marketing research. Many years before the creation of the term neuromarketing, Gerald Zaltman discussed, at an international conference in 1990, the use of fMRI technology in marketing research, submitting a patent for “Neuroimaging as a marketing tool”. This marked the establishment of the neuromarketing field (Ahmed et al., 2022; Fisher et al., 2010).

As previously mentioned in this study, humans tend to make decisions based on emotions rather than logic (Ahmed et al., 2022). Emotions and subconscious motivations play a significant role in decision-making, leading researchers to view neuromarketing as a promising approach to understand the biology of human behavior. Therefore, neuroimaging was incorporated into the marketing field to analyze neural signals to comprehend consumer behavior, enhance marketing strategies, and address complex marketing issues, while confirming or improving the conventional theories of consumer behavior (Ariely & Berns, 2010; Kajla et al., 2024). Neuromarketing, promises to optimize marketing efforts, marketing research, advertising, and product development, while reducing costs, reshaping strategies, and revealing consumer insights that traditional methods can not access. Although it seems more expensive, neuromarketing is less costly than many people assume (Eser et al., 2011; Hutchinson et al., 2024). Nevertheless, marketers hope neuromarketing will provide a precise

market research method that can be applied before a product is developed (Ariely & Berns, 2010; Núñez-Cansado et al., 2024).

According to Lee et al. (2017), on some neuromarketing tools, participants are exposed to a designed stimulus while researchers monitor their brain activity. The brain is a reactive system where sensory inputs activate neural activity, resulting in a response. Psychological models, alongside behavioral theories (Kajla et al., 2024) provide insights into consumer preferences that traditional methods can not reveal (Ariely & Berns, 2010). That said, neuromarketing emerged as a new method to understand consumer behavior (Eser et al., 2011). Figure 2-1 represents a conceptual scheme of neuromarketing research developed by Lee et al. (2017).

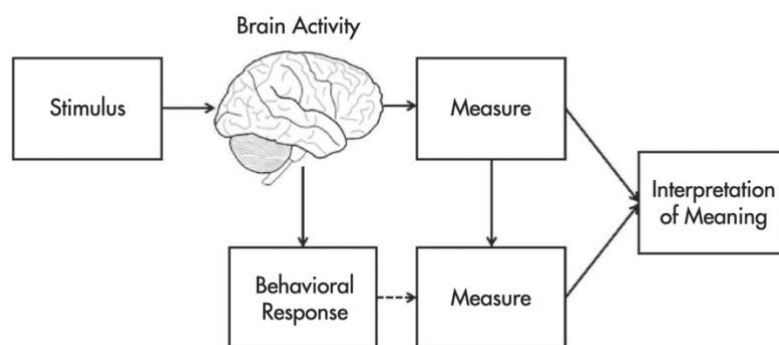


Figure 2-1: Conceptual schematic of neuromarketing research. Adapted from “This is your brain on neuromarketing: reflections on a decade of research”, by Lee et al., 2017, *Journal of Marketing Management*, p. 879 (<https://doi.org/10.1080/0267257X.2017.1327249>)

How can this be measured? Through data collection techniques that enable an unbiased monitoring of biological responses, allowing the comparison of peak and average reactions. This approach has been useful in consumer research to measure facial expressions, eye movements, skin conductance, and brain activity. Unlike self-report methods that capture consumer’s responses at a single point in time, these measurements provide real-time insights

into an individual’s psychological state (Eser et al., 2011; Kajla et al., 2024; Lee et al., 2017; Walters et al., 2023).

As stated by Walters et al. (2023), psychological data collection techniques have been broadly used in past literature research to study facial expressions, eye movements, skin conductance, and brain activity. Table 2-1 mentions the most common neuromarketing techniques along with the description of each one. These techniques enable a continuous, unbiased observation of the participants’ responses, allowing for further comparisons and conclusions (Ahmed et al., 2022; Mashrur et al., 2024; Walters et al., 2023).

Table 2-1: Neuromarketing tools and descriptions

Neuromarketing tool	Description
Electroencephalogram (EEG)	EEG measures electrical activity emitted as brain waves by using small sensors placed on the scalp. These waves help us understand how brain cells talk to each other and reveal different mental states, like whether someone is sleepy, relaxed, or focused.
Eye tracking	Eye tracking allows researchers to know precisely where a person is looking through monitoring and mapping eye movement. Fixation and gaze points determine where a person is looking and for how long, as well as saccades (meaning quick movements) between different focus points.
Face reading technology	The face reading tool analyzes movements of facial muscles to identify specific emotions. It can recognize seven basic feelings: joy, sadness, anger, fear, disgust, surprise, and neutrality. By tracking the movements of 43 facial muscles, the system can detect many different expressions and gauge overall positive or negative emotions. This technology allows to capture quick emotional changes that are hard to catch by the human eye.
Facial electromyography (EMG)	EMG measures electrical signals from facial muscles to understand human emotions. Movements on the cheek indicate positive feelings, while activity under the brow signals negative feelings.

Functional magnetic resonance imaging (fMRI)	The fMRI technique measures cerebral blood flow to identify the responsible brain region triggered by a stimulus. It creates a brain map to indicate how much each area is working. By using fMRI, researchers can see which brain regions are linked to emotions like pleasure, reward, and anxiety when a person reacts to a stimulus.
Galvanic skin response (GSR)	GSR measures how the skin reacts emotionally to different stimuli by tracking changes in electrical conductivity caused by sweat. This technique is often used in marketing research to understand how people respond to ads and websites. It's a simple, affordable, and portable method that allows participants to move around freely during experiments while collecting data on their emotional reactions.
Heart rate monitoring	Heart rate monitoring measures the heart's electrical activity to determine how fast it beats. By tracking the time between heartbeats, it helps assess a person's level of attention or excitement. Heart rate monitoring is often used alongside other biosensors and involves placing sensors on the skin to collect data.

Previous research linked consumer research to behavior patterns solely through brain imaging techniques, leaving other methods behind (Clithero et al., 2024). Although some of these techniques seem promising, their limitations, such as high costs and lack of portability, created the need for alternative solutions (Mashrur et al., 2024).

This is where face reading technology becomes relevant, as it provides a more accessible and cost-effective solution for analyzing emotional and facial expressions, without the need for complex setups, and with the potential to yield a higher return on investment than mass marketing. This neuromarketing data collection approach detects facial muscle movements by analyzing facial images and expressions (Landmann, 2023; Walters et al., 2023). Face recognition technology is now used in marketing to target specific customers by analyzing their emotional reactions towards products or services. By combining face recognition with emotion tracking, marketers can understand how customers respond to different stimuli. Studies show that customers are more likely to remember product images that spark emotions and that these emotions are essential in their final purchasing decisions. Therefore, using

facial recognition data is relevant for making better marketing decisions, as emotional responses affect how well people remember product information and their overall buying choices (Landmann, 2023). Because it is an artificial intelligence-based technology, it offers a powerful competitive advantage for a company, since the extracted neurological information it provides can help in customizing marketing tactics (Walters et al., 2023).

The existing literature highlighting the influence that emotions have on consumer impulsivity, purchase intentions, and motivations (Kidwell et al., 2008; Xu et al., 2021) set the stage for the possibility of expanding the scope of this research. In addition to examining whether an advertisement designed to challenge brand loyalty is effective as proposed in Hypothesis 1, it also becomes relevant to explore whether that same advertisement can also influence consumers' purchase intentions and motivations driven by personal hedonic or utilitarian goals. Based on this perspective, the following hypotheses were formulated:

Hypothesis 2: Exposure to out-group (vs. in-group) targeted ads disrupts consumer's purchase intentions.

Hypothesis 3: Exposure to out-group (vs. in-group) targeted ads influences consumer's motivations driven by personal goals.

With the help of neuromarketing, the three hypotheses will be mediated using the FaceReader, which will examine whether emotional reactions influence how participants responded to the ads (Landmann, 2023), particularly on brand loyalty, purchase intention, and purchase motivation. Thus, the last hypothesis was formulated:

Hypothesis 4: Emotional responses mediate the effect of exposure to out-group (vs. in-group) ads on brand loyalty, purchase intention and personal motivation.

To provide a clear and structured overview of the key findings and theoretical frameworks used for the development of the Literature Review, a summary table has been included in the Appendix section of this research (Appendix B).

Figure 2-2 is a visual representation of the research model and respective hypothesis. The main effect of this model examines the direct relationship between exposure to out-group (vs. in-group) targeted advertisements (independent variable) and brand loyalty, purchase intention, and personal goal disruption (dependent variables). This effect proposes that exposure to out-group-targeted ads will decrease brand loyalty, disrupt personal goals, and negatively impact purchase intentions. Additionally, the model evaluates the mediation of these effects through emotional responses, such as the six basic emotions, contempt, valence, arousal, and custom expressions.

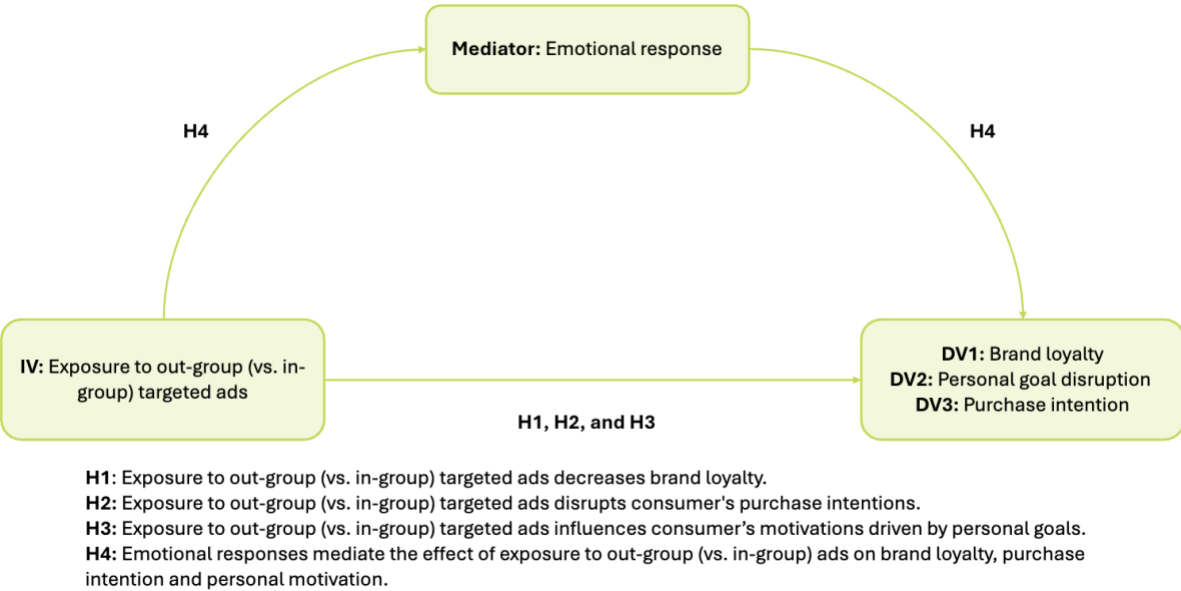


Figure 2-2: Research model and hypotheses

3. METHODOLOGY

Between the 2nd and the 19th of December 2024, a two-step study combining neuromarketing and traditional survey techniques was conducted at NOVA Marketing Analytics Lab, affiliated with the NOVA IMS Information Management School. The goal was to investigate whether out-group targeted advertisements influence in-group's perceptions and behavior towards a brand. As noted by Kajla et al. (2024), employing neuromarketing methods alongside conventional research methods can help address the limitations associated with traditional approaches.

3.1. PARTICIPANTS

A sample of 113 volunteer participants was invited to take part in the study after a detailed explanation of the process and providing informed consent. The study followed a two-step approach: first, the FaceReader measured and analyzed participants' emotional responses (mediator) to an advertisement (independent variable), followed by a questionnaire to understand participants' perceptions of post-ad brand loyalty, purchase intentions, and goal disruption (dependent variables).

Participants were required to meet specific eligibility criteria, including being at least 18 years old and passing an attention check question. Of the 113 participants, 111 (98%) passed the preliminary selection. The sample had an age range of 18 to 56 years old, an average of $M=29.41$ years old, and $SD=12.412$. Among them, 59 participants were female (53.2%), 51 were male (45.9%), and one identified as non-binary (0.9%). Portuguese nationality

represented most of the sample, with 96 participants (86.5%). Table 3-1 provides an overview of their demographics.

Table 3-1: Participants' demographics

Demographics	Value	Frequency	Percentage
Gender	Male	59	53.2%
	Female	51	45.9%
	Non-binary	1	0.9%
Age	[18-21]	39	35.1%
	[22-25]	29	26.1%
	[26-29]	8	7.2%
	[30-33]	3	2.7%
	[34-37]	1	0.9%
	[38-41]	6	5.4%
	[42-45]	2	1.8%
	[46-49]	7	6.3%
	[50-53]	14	12.6%
	[54-57]	2	1.8%
Nationality	Portuguese	96	86.5%
	Other	11	13.5%

3.2. FACEREADER

With an accuracy range of 95.7% to 99.3%, FaceReader is an AI-powered facial recognition software developed by Noldus. It analyzes video recordings in real-time, detecting facial expressions and classifying emotions by examining facial muscle movements (Landmann, 2023; Walters et al., 2023). Figure 3-1 and Figure 3-2 are a visual representation of this analysis.

The software analysis happens in three different stages. First, the FaceReader detects the participant's face within the video frame, followed by the identification of 468 facial points, and finally analyzes and classifies the participant's expressions using a trained neural network. By tracking muscle contractions, facial expressions, eye movements, blinks, pupil dilations, or head movements, the system determines the intensity (ranging from 0 to 1) of six basic emotions (happiness, sadness, anger, surprise, fear, and disgust) relative to a neutral state. Additionally, it detects an extra emotional expression: contempt.

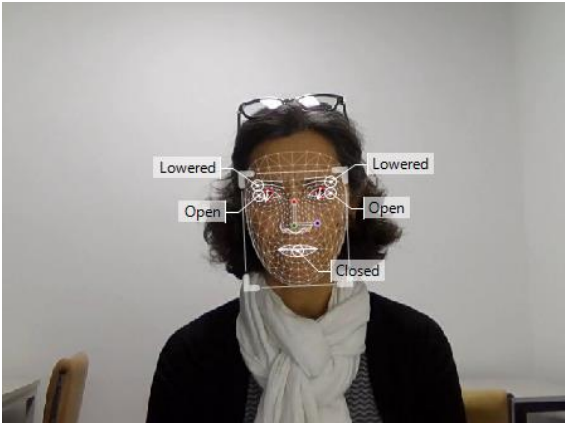


Figure 3-1: Participant's muscle movement detection

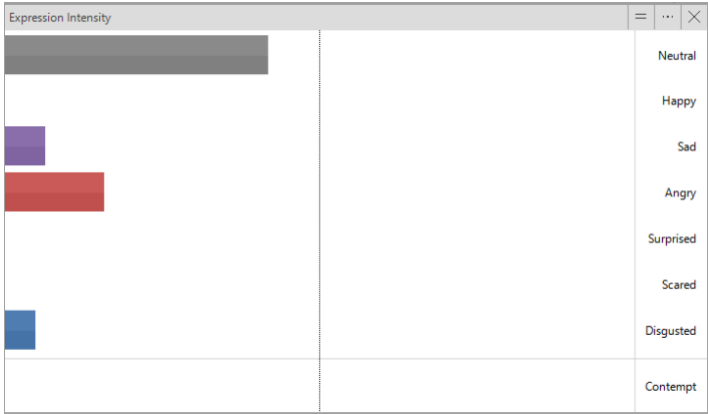


Figure 3-2: Participant's basic emotions bar chart

Beyond facial expressions, the FaceReader provides further insights into arousal, valence, action units, and custom expressions. As seen before, arousal refers to the intensity of an emotional response (Citron et al., 2014), ranging from 0 (not active) to +1 (active). Valence represents the degree of pleasure associated with an emotion (Barrett, 1998; Lewis et al., 2006), measured on a scale from -1 (negative) to 1 (positive). Moreover, the FaceReader identifies 20 key action units, which are facial muscle movements responsible for facial expressions. Custom expressions are personalized facial expressions that can be created by combining different action units. In Table 3-2 below, it is possible to see which action unit contributes to the different emotions or custom expressions detected by the FaceReader (Noldus Information Technology bv, 2021).

Table 3-2: Action units attribution

Action units (AU)	Custom expressions	Emotions
AU01 - Inner Brow Raiser	Interest; boredom	Sadness; surprise; fear
AU02 - Outer Brow Raiser	Interest; boredom	Surprise; fear
AU04 - Brow Lowerer	Confusion; boredom	Sadness; anger; fear
AU05 - Upper Lid Raiser	Interest	Sadness; anger; fear
AU06 - Cheek Raiser	Smiling; boredom; laughing	Happiness
AU07 - Lid Tightener	Confusion; boredom	Anger; fear
AU09 - Nose Wrinkle		Disgust
AU10 - Upper Lip Raiser	Not-defined	Not-defined
AU12 - Lip Corner Puller	Smiling; boredom; laughing	Happiness; contempt
AU14 - Dimpler	Boredom; boredom	Contempt
AU15 - Lip Corner Depressor	Confusion	Sadness; disgust
AU17 - Chin Raiser	Interest; confusion	
AU18 - Lip Pucker	Not-defined	Not-defined
AU20 - Lip Stretcher	Interest	Fear
AU23 - Lip Tightener	Confusion; boredom	Anger

AU24 - Lip Pressor	Boredom; boredom	
AU25 - Lips Part	Smiling; laughing	
AU26 - Jaw Drop	Interest; smiling; laughing	Surprise; fear
AU27 - Mouth Stretch	Not-defined	Not-defined
AU43 - Eyes Closed	Boredom; blink	

The study began with participants reading an informed consent form, which outlined the study’s procedures, and provided details about the FaceReader tool, along with data collection and respective analysis. After providing consent, each participant was shown one of two advertisements.

One of the advertisements, categorized as the “[In-group Ad](#)”, was an original Nike Running Ad designed to promote athletic performance and reinforce Nike’s reputation as a leading sports apparel and footwear brand. With the slogan “High-performance gear for all running conditions”, this ad served as the control and was shown to 57 participants (50.44%). The ad emphasized overcoming obstacles, perseverance, and both mental and physical resilience in running. Its core message aligned with Nike’s iconic slogan, “*Just Do It*”, encourages viewers to face challenges with determination. Figure 3-3 shows a frame of the in-group ad.



Figure 3-3: In-group Ad frame

The second advertisement, categorized as the “[Out-group Ad](#)”, was designed to target those less likely to purchase Nike sneakers for athletic purposes. Unlike traditional Nike ads, this version shifted the focus from sports performance to comfort and relaxation. Shown to 56 participants (49.56%), the ad transmitted the idea that Nike is not just for athletes but also for those who enjoy calm and comfort while maintaining the brand’s identity and commitment to quality. The ad featured phrases such as “Nike isn’t just for athletes.”, “Is for everyone who enjoys staying at home.”, “Maximum comfort, at minimum effort.”, “Why run when you can relax?”, and “Enjoy Nike from the comfort of your house.”. These messages were designed to alienate the in-group audience, who traditionally associate Nike with physical activity. Figure 3-4 shows a frame from the out-group ad.



Figure 3-4: Out-group Ad frame

This unexpected contrast between ads was intentional, as emotionally driven advertising tends to have a stronger impact than messages that rely only on rational appeals (Vences et al., 2020). These findings will give better results and lead to more insightful interpretations when combined with data from a follow-up questionnaire.

3.3. QUESTIONNAIRE

Following the neuromarketing assessment, participants completed a questionnaire to analyze the three variables from the theoretical framework: post-ad loyalty, purchase intention, and goal pursuit, in response to the targeted advertisements. The questionnaire began with three general questions with a straight “yes” or “no” answer: "Do you know Nike as a sports apparel brand?"; "Before this experience, did you consider yourself loyal to Nike?"; "After watching this ad, imagine the scenario where you need to purchase running shoes. Would you consider Nike for that purpose?".

This was followed by 9-point Likert Scale questions, ranging from 1-Strongly disagree to 9-Strongly agree. The three constructs, representing the three dependent variables, were based on validated scales with adapted items and respective measurements. “Brand loyalty” with seven items was adapted from Hemsley-Brown & Alnawas (2016), “Goal pursuit” with 6 items (utilitarian and hedonic) from Stocchi et al. (2018), and “Purchase intention” with two items from Ma et al. (2014). An attention check was included as one of the items in the brand loyalty construct, to which 98% of participants passed.

These questions were followed by a manipulation check. If more than 80% of participants answered the manipulation check correctly, it would indicate the manipulation was successful. The question was as follows: “Regarding the video you saw at the beginning of this study, Nike sneakers were perceived as:”. Participants could choose between “Sporty sneakers” or “Sneakers for non-sporty activities”. Of the 111 participants, 55 saw the in-group ad, and two (1.8% of the total) failed the manipulation check. The remaining 56 saw the out-group ad, and 20 of them (18% of the total) failed the manipulation check. Since only 20% of participants failed the manipulation check, the test is considered appropriately manipulated.

The questionnaire was followed with a demographic section asking for information such as age, gender, nationality, and the highest academic degree obtained. Finally, a feedback section was included to understand if the participant encountered any difficulty during the questionnaire and possible questions, suggestions, or feedback they might have. Feedback from participants is shown in Table 3-3 below.

Table 3-3: Participants' feedback

Participant number	Feedback
Participant 16	The first few questions made me feel as if it was taken for granted that I love Nike. It really is a brand I know and have a positive opinion of, but it's a long way from being the only company I think of when buying shoes.
Participant 34	I had troubles with "Please select 7". (Note: This participant is one of the two participants who failed the attention check and was disregarded for the result analysis.)
Participant 52	The questionnaire was very clear.
Participant 70	Some questions weren't very clear, so it was confusing to answer sometimes.

Before analyzing the results, a scale reliability test was conducted for all scales. For scales with at least three items, reliability was measured using Cronbach's Alpha, which ranges from 0 to 1. The higher the Cronbach's Alpha, the more reliable the scale. For the scale to be accepted, the alpha needs to be above the threshold of 0.7. The reliability test for the constructs yielded the following results: the brand loyalty construct reported an $\alpha=0.917$, the utilitarian goal disruption construct reported an $\alpha=0.957$, and the hedonic goal disruption construct reported an $\alpha = 0.786$. All the alphas were accepted.

For scales with less than three items, reliability was measured using Pearson’s Correlation. A correlation close to 1 suggests a strong relationship between the items, indicating potential redundancy. A Pearson’s correlation was conducted for the two items of the purchase intention scale. The results show a high correlation between them, $r(98) = 0.825$, $p < 0.001$, suggesting potential redundancy.

Table 3-4: Scale's reliability

Number of scale items	Constructs	Cronbach’s Alpha	Pearson’s Correlation
At least three items	Brand loyalty	0.917	-
	Utilitarian goal	0.957	-
	Hedonic goal	0.786	-
Less than three items	Purchase intention	-	0.825

Both the questionnaire design (Appendix C), the FaceReader measures (Appendix C.1), and the full questionnaire (Appendix D) can be found in the Appendix section of this thesis.

4. RESULTS AND DISCUSSION

4.1. PRIOR LOYALTY IMPACT

Before testing the relationship between all the variables, four Two-Way ANOVA analyses tests were conducted in SPSS to examine the effects of prior-ad brand loyalty and ad type on post-ad loyalty, goal pursuit, and purchase intention. The goal was to understand whether prior-ad loyalty influenced consumer responses to different ads and whether this effect varied depending on the ad type seen. In this analysis, prior loyalty (loyal vs. non-loyal) and ad type (out-group ad vs. in-group ad) served as independent variables. In contrast, post-ad loyalty, utilitarian goal, hedonic goal, and purchase intention were the dependent variables. For the prior loyalty impact to be statistically relevant, the observed level of significance, represented by the p-value, needs to be smaller than 0.05, with a confidence interval of 95%.

Regarding the effect that prior-ad loyalty has on post-ad loyalty, the results showed a significant main effect of prior-ad loyalty $F(1,107)=30.797$, $p<0.001$, indicating that previous loyal consumers reported higher post-ad loyalty ($M=6.39$, $SD=1.153$) than non-loyal consumers ($M=4.70$, $SD=1.597$). However, there was no significant main effect on ad type, $F(1,107)=0.06$, $p=0.806$, suggesting that the two ads did not significantly differ in their influence on post-ad loyalty. Furthermore, the interaction effect between prior loyalty and ad type was not significant, $F(1,107)=0.077$, $p=0.782$, suggesting that the effect of prior loyalty on post-ad loyalty did not significantly depend on which ad was viewed.

For the effect that prior-ad loyalty has on utilitarian goals, the results also show a significant main effect of prior-ad loyalty $F(1,107)=13.553$, $p<0.001$, indicating that prior-ad loyalty ($M=6.01$, $SD=1.194$) had a higher influence on participant's utilitarian goal pursuit than

on non-loyal consumers ($M=4.65$, $SD=2.046$). However, there was no significant main effect on ad type, $F(1,107)=0.153$, $p=0.696$, suggesting that the type of ad viewed did not impact utilitarian goal pursuit. Additionally, the interaction effect between prior loyalty and advertisement type was not significant, $F(1,107)=0.014$, $p=0.907$, indicating that the influence of prior loyalty on utilitarian goal pursuit did not vary by ad type.

For the effect that prior-ad loyalty has on hedonic goal pursuit, the results revealed a significant main effect of prior loyalty, $F(1,107)=23.604$, $p<0.001$, indicating that prior-ad loyalty influenced participants' hedonic goal pursuit, with a higher value on loyal consumers ($M=6.74$, $SD=0.999$) than on non-loyal ones ($M=5.23$, $SD=1.708$). However, there was no significant main effect on ad type, $F(1,107)=0.290$, $p=0.591$, suggesting that the type of ad seen did not affect hedonic goal pursuit. Additionally, the interaction effect between prior loyalty and advertisement type was not significant, $F(1,107)=0.397$, $p=0.530$, indicating that the influence of prior loyalty on hedonic goal pursuit did not depend on ad type.

Lastly, for the effect between prior-ad loyalty and purchase intention, the results showed a significant main effect of prior loyalty, $F(1,107)=12.318$, $p<0.001$, indicating that prior-ad loyalty ($M=6.76$, $SD=1.528$) had a higher influence on participant's purchase intentions than on non-loyal consumers ($M=5.42$, $SD=1.970$). However, there was no significant main effect on adv type, $F(1,107)=0.000$, $p=0.995$, suggesting that the type of ad viewed did not affect purchase intention. Additionally, the interaction effect between prior loyalty and advertisement type was not significant, $F(1,107)=0.112$, $p=0.739$, indicating that the influence of prior loyalty on purchase intention did not depend on ad type.

A clearer representation of the results discussed above is provided in Table 4-1 below.

Table 4-1: Prior-ad loyalty impact on DVs

Dependent variables	Independent variable	F	P-value	Prior loyalty?	Mean	Standard deviation
Post-ad brand loyalty	Prior loyalty	30.797	<0.001	Yes	6.39	1.153
	Ad group	0.060	0.806	No	4.70	1.597
	Prior loyalty * Ad group	0.077	0.782			
Utilitarian goal disruption	Prior loyalty	13.553	<0.001	Yes	6.01	1.194
	Ad group	0.153	0.696	No	4.65	2.046
	Prior loyalty * Ad group	0.014	0.907			
Hedonic goal disruption	Prior loyalty	23.604	<0.001	Yes	6.74	0.999
	Ad group	0.290	0.591	No	5.23	1.708
	Prior loyalty * Ad group	0.397	0.530			
Purchase intention	Prior loyalty	12.318	<0.001	Yes	6.76	1.528
	Ad group	0.000	0.995	No	5.42	1.970
	Prior loyalty * Ad group	0.112	0.739			

4.2. MAIN EFFECT

To understand the main effect between the independent variables (i.e. in-group ad (IV 1) vs. out-group ad (IV 2)) and the dependent variables (i.e. post-ad loyalty, goal disruption, and purchase intention), independent samples T-test were conducted on SPSS. None of the results reported statistical significance between the IV and the DVs.

Regarding the effect that the IV has on brand loyalty, individuals who saw the in-group ad represent lower levels of post-ad brand loyalty ($M=5.15$, $SD=1.787$) than the participants who saw the out-group ad ($M=5.41$, $SD=1.538$). Levene's test for equality of variances was not significant $F(1,109)=0.681$, $p=0.411$, indicating that the assumption of equal variances was met. The t-test results revealed no significant difference in brand loyalty means between the two groups, $t(109)=-0.806$, $p=0.422$.

When it comes to the effect of the IV on utilitarian goals, individuals who saw the in-group ad represent lower levels of utilitarian goal disruption ($M=5.05$, $SD=1.941$) than the participants who saw the out-group ad ($M=5.18$, $SD=1.890$). Levene's test for equality of variances was not significant $F(1,109)=0.139$, $p=0.710$, indicating that the assumption of equal variances was met. The t-test results revealed no significant difference in utilitarian goals means between the two groups, $t(109)=-0.358$, $p=0.721$.

For the effect of the IV on hedonic goals, individuals who saw the in-group ad represent lower levels of hedonic goal disruption ($M=5.70$, $SD=1.653$) than the participants who saw the out-group ad ($M=5.79$, $SD=1.682$). Levene's test for equality of variances was not significant $F(1,109)=0.000$, $p=0.988$, indicating that the assumption of equal variances was met. The t-test results revealed no significant difference in purchase intention means between the two groups, $t(109)=-0.280$, $p=0.780$.

Lastly, for purchase intention, individuals who saw the in-group ad represent lower levels of purchase intention ($M=5.72$, $SD=1.962$) than the participants who saw the out-group ad ($M=6.04$, $SD=1.905$). Levene's test for equality of variances was not significant $F(1,109)=0.026$, $p=0.873$, indicating that the assumption of equal variances was met. The t-test results revealed no significant difference in purchase intention means between the two groups, $t(109)=-0.889$, $p=0.376$.

A clearer representation of the results discussed above is provided in Table 4-2 below.

Table 4-2: Main effect analysis

DV	IV	Mean	Standard deviation	Levene's test for equality of variances		T-value	P-value
				F	P-value		
Post-ad brand loyalty	In-group Ad	5.15	1.787	0.681	0.411	-0.806	0.422
	Out-group Ad	5.41	1.538				
Utilitarian goal	In-group Ad	5.05	1.941	0.139	0.710	-0.358	0.721
	Out-group Ad	5.18	1.890				
Hedonic goal	In-group Ad	5.70	1.653	0.000	0.988	-0.280	0.780
	Out-group Ad	5.79	1.682				
Purchase intention	In-group Ad	5.72	1.962	0.026	0.873	-0.889	0.376
	Out-group Ad	6.04	1.905				

4.3. SIGNIFICANT VARIABLES

Furthermore, to understand the significance of emotions, custom expressions and action units, independent samples T-tests were conducted on SPSS for all variables across the two independent variables. Statistical significance was observed in the mediator's sadness and surprise.

Individuals who viewed the in-group ad exhibited lower levels of sadness ($M = 0.015$, $SD = 0.020$) compared to those who viewed the out-group ad ($M = 0.031$, $SD = 0.054$). Levene's test for equality of variances was significant, $F(1,109) = 7.316$, $p = 0.008$, indicating that the assumption of equal variances was not met. The t-test results showed a significant difference in sadness levels between the two groups, $t(109) = -2.013$, $p = 0.048$.

Table 4-3: Sadness - significant variable

Mediator	IV	Mean	Standard deviation	Levene's test for equality of variances		T-value	P-value
				F	P-value		
Sad	In-group Ad	0.015	0.020	7.316	0.008	-2.013	0.048
	Out-group Ad	0.031	0.054				

The figures below visually illustrate the differences in sadness (represented by the purple line) between participants who viewed the in-group and out-group ads. Participants who saw the in-group ad exhibited lower levels of sadness (Figure 4-1) compared to those who viewed the out-group ad (Figure 4-2).

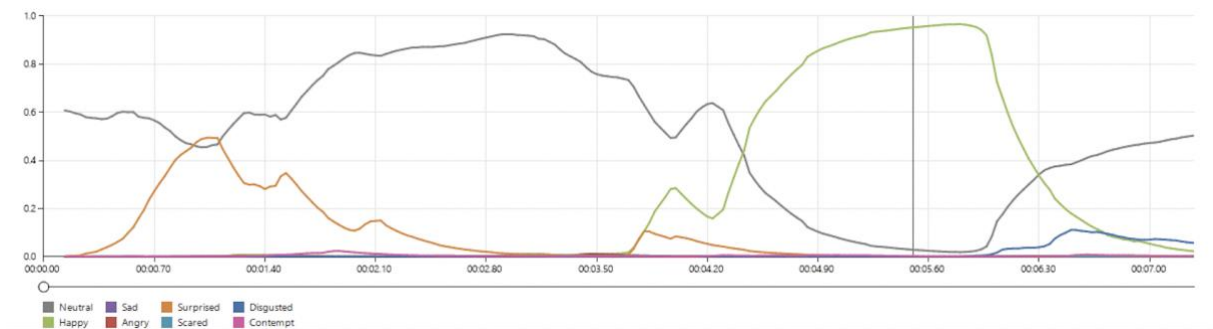


Figure 4-1: Sadness line chart for participant of In-group Ad

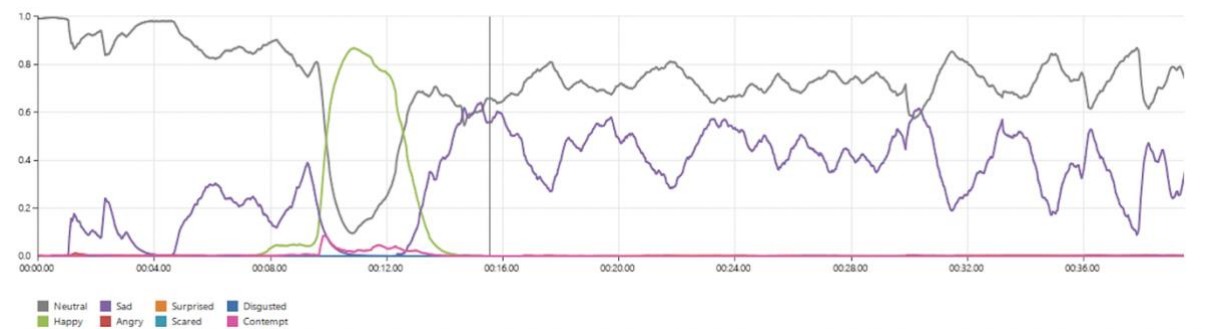


Figure 4-2: Sadness line chart for participant of Out-group Ad

For the surprise parameter, individuals who viewed the in-group ad exhibited lower levels of surprise ($M = 0.006$, $SD = 0.012$) compared to those who viewed the out-group ad ($M = 0.016$, $SD = 0.025$). Levene’s test for equality of variances was significant $F(1,109) = 19.693$, $p < 0.001$, indicating that the assumption of equal variances was not met. The t-test results showed a significant difference in surprise levels between the two groups, $t(109) = -2.519$, $p = 0.014$.

Table 4-4: Surprise - significant variable

Mediator	IV	Mean	Standard deviation	Levene’s test for equality of variances		T-value	P-value
				F	P-value		
Surprise	In-group Ad	0.006	0.012	19.693	<0.001	-2.519	0.014
	Out-group Ad	0.016	0.025				

The figures below visually illustrate the differences in surprise (represented by orange line) between participants who viewed the in-group and out-group ads. As expected, participants who saw the out-group ad (Figure 4-3) showed higher levels of surprise than those who saw the in-group ad (Figure 4-4).

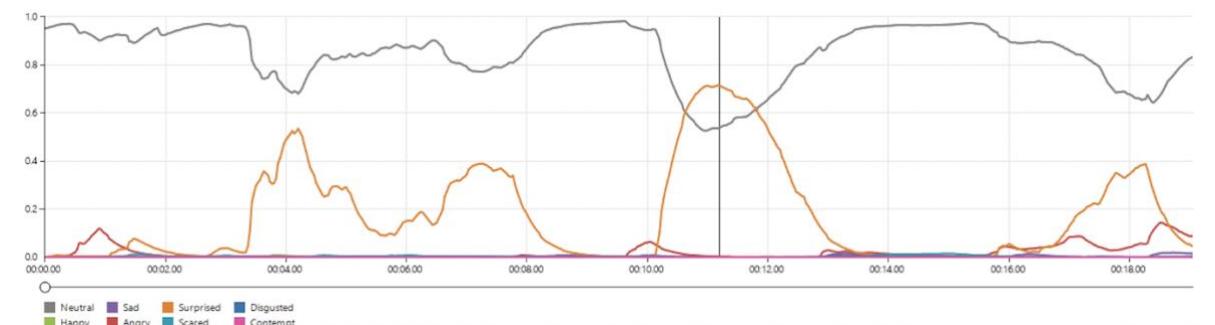


Figure 4-3: Surprise line chart for participant of Out-group Ad



Figure 4-4: Surprise line chart for participant of In-group Ad

4.4. EXPECTED SIGNIFICANT VARIABLES

As discussed in the Brand Loyalty and Group Identification chapter, delight and satisfaction were expected emotions among participants who viewed the in-group ad (Chaudhuri & Holbrook, 2001; Chitturi et al., 2008). Therefore, the variable happy was anticipated to show significant levels.

To test this, an independent samples t-test was conducted on the emotion happy. Results showed that individuals who viewed the in-group ad had higher levels of happiness ($M = 0.016$, $SD = 0.059$) compared to those who viewed the out-group ad ($M = 0.009$, $SD = 0.024$), as expected. Levene's test for equality of variances was not significant, $F(1,109) = 2.785$, $p = 0.098$, indicating that the assumption of equal variances was met. However, the t-test results revealed no significant difference in happiness levels between the two groups, $t(109) = 0.777$, $p = 0.439$.

The graphs below illustrate the differences in happiness levels (represented by the light green line) among participants who viewed different advertisements. Figure 4-5 displays the

happiness line chart for the participant with the highest average of happiness, while Figure 4-6 shows the chart for the participant with the lowest average of happiness, who exhibited strong angry emotions instead. These results were initially expected to be representative of all participants, however, they were not significant.

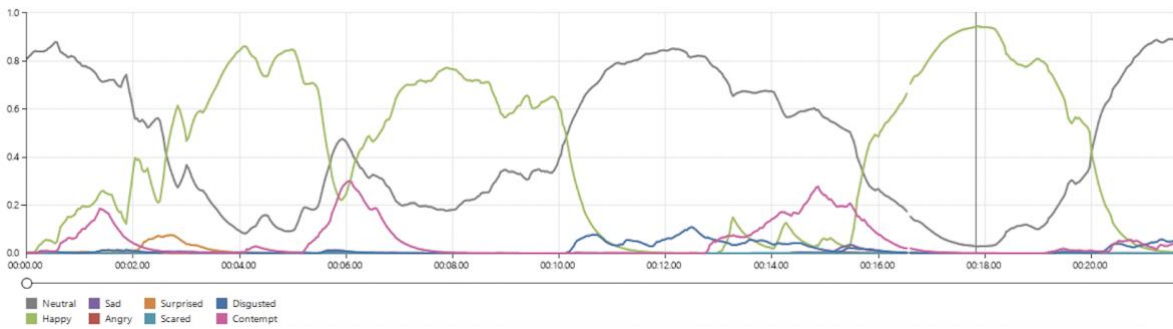


Figure 4-5: Happiness line chart for participant of In-group Ad

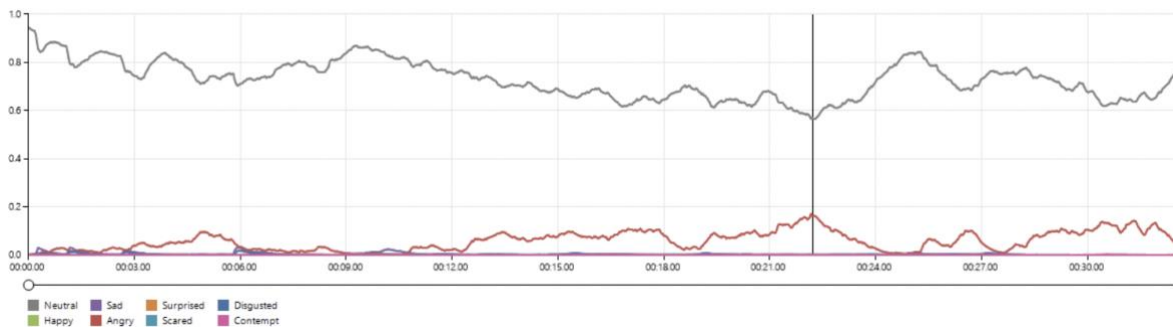


Figure 4-6: Happiness line chart for participant of Out-group Ad

According to De Zavala (2011), consumers are expected to feel repulsion when they experience a sudden loss of identification with a brand they are loyal to. Based on this, it was predicted that the variables disgust and the custom expression confusion would show significant levels, and be more representative for the individuals who saw the out-group ad.

As expected, an independent samples t-test revealed that individuals who viewed the in-group ad experienced lower levels of disgust (M = 0.004, SD = 0.007) compared to those who viewed the out-group ad (M = 0.005, SD = 0.01). Levene’s test for equality of variances was significant, $F(1,109) = 4.635, p = 0.034$, indicating that the assumption of equal variances was not met. The t-test results showed no significant difference in disgust levels between the two groups, $t(109) = -0.817, p = 0.416$.

The graphs below illustrate differences in disgust levels (represented by the blue line) among participants exposed to different advertisements. Figure 4-7 presents the disgust line chart for the participant with the lowest average disgust, while Figure 4-8 illustrates the chart for the participant with the higher average disgust. Although these cases were initially expected to reflect the overall pattern, they ultimately proved to be exceptions rather than the norm, since there was no significant difference for the disgust feeling towards both ads.



Figure 4-8: Disgust line chart for participant of In-group Ad

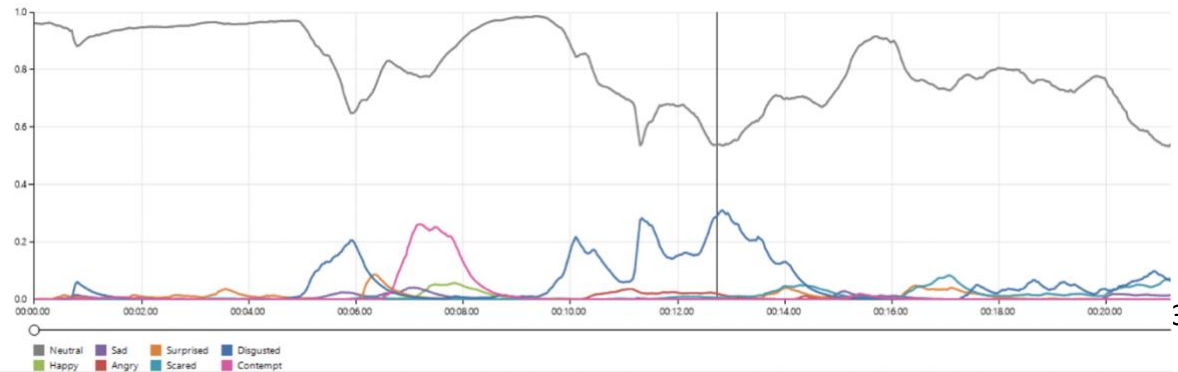


Figure 4-7: Disgust line chart for participant of Out-group Ad

For the CE Confusion, an independent sample t-test was also conducted, and contrary to what was expected, individuals who saw the in-group ad have higher levels of confusion ($M=0.021$, $SD=0.043$) than the participants who saw the out-group ad ($M=0.018$, $SD=0.03$). Levene’s test for equality of variances was not significant $F(1,109)=0.6$, $p=0.44$, indicating that the assumption of equal variances was met. The t-test results revealed no significant difference in confusion means between the two groups, $t(109)=0.387$, $p=0.7$.

The graphs below display variations in confusion levels (represented by the burgundy line) among participants who viewed different advertisements. Figure 4-9 illustrates the confusion line chart for the participant with the highest average confusion, while Figure 4-10 presents the chart for the participant with the lowest average confusion.

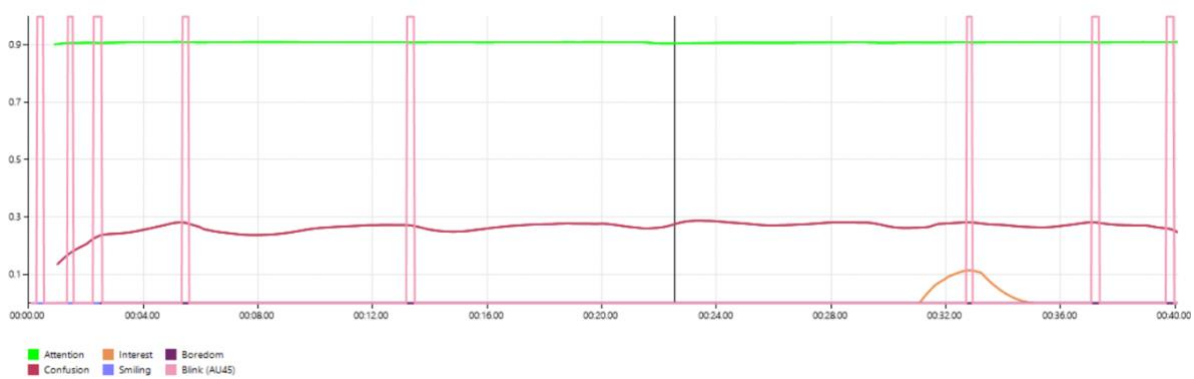


Figure 4-9: Confusion chart for participant of In-group Ad

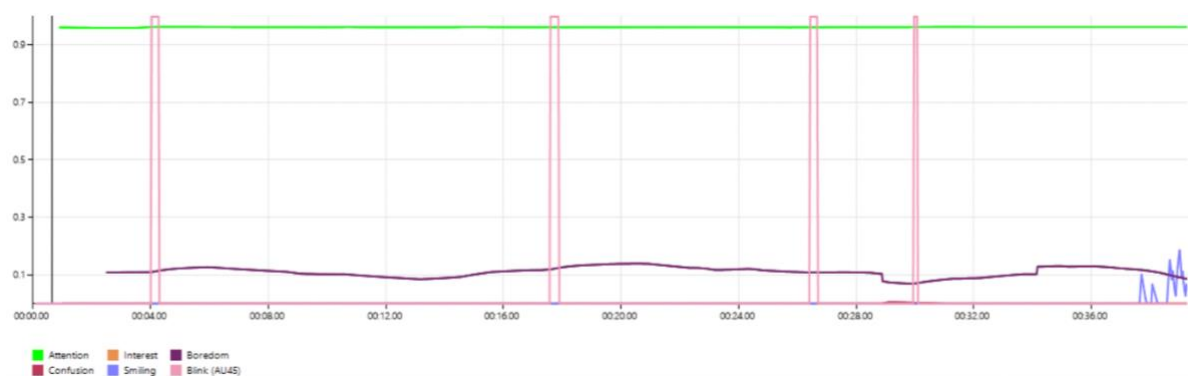


Figure 4-10: Confusion chart for participant of Out-group Ad

Valence, as a mediator, was also expected to show high significance, as it reflects how participants feel about the advertisement. Ranging from -1 to 1, negative valence values indicate negative emotions toward the ad, while positive values indicate positive emotions. A value of zero represents a neutral emotion. It was to be expected that participants who viewed the in-group ad have positive levels of valence, while individuals who saw the out-group ad have negative levels of valence.

After conducting an independent samples t-test on valence, the results showed that individuals who viewed the in-group ad had higher levels of valence ($M = -0.009$, $SD = 0.066$) compared to those who viewed the out-group ad ($M = -0.0295$, $SD = 0.052$). Levene’s test for equality of variances was not significant, $F(1,109) = 0.003$, $p = 0.959$, indicating that the assumption of equal variances was met. The t-test results showed no significant difference in valence levels between the two groups, $t(109) = 1.814$, $p = 0.072$.

The graphs below illustrate the differences in valence levels among participants who viewed different advertisements. The Figure 4-11 displays the valence line chart for the participant with the highest valence average, while the Figure 4-12 shows the valence line chart for the participant with the lowest valence average. These results were initially expected to be representative of all participants, however, they turned out to be exceptions rather than the norm.

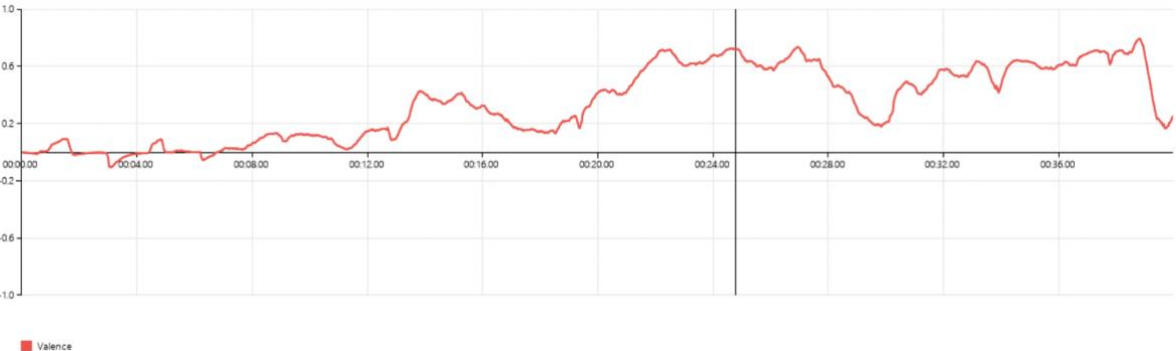


Figure 4-11: Valence chart for participant of In-group Ad

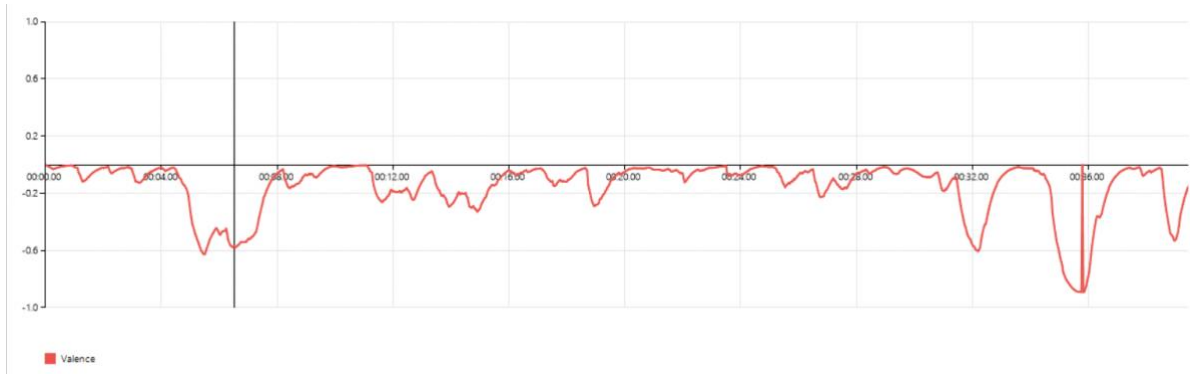


Figure 4-12: Valence chart for participant of Out-group Ad

4.5. MEDIATION ANALYSIS

A mediation analysis was conducted with the Macro-PROCESS (Hayes, 2013) by estimating 5000 bootstraps, and 95% confidence intervals (CI). This statistical approach is designed for mediation, moderation, and conditional process analysis within regression-based models, helping researchers to explore how (mediation), when (moderation), and under what conditions (conditional processes) an independent variable influences a dependent variable. Since this study focuses solely on mediation, Model 4 was applied, interpreting the direct, indirect, and total effects.

Mediation is considered present if the indirect effect is significant. If both the indirect and direct effects are significant, partial mediation occurs, whereas full mediation occurs when the direct effect is not significant. Macro-PROCESS provides bootstrap confidence intervals for indirect effects, which is a more reliable way to determine mediation significance. Mediation is considered significant if the bootstrap confidence interval does not include zero. This analysis aimed to understand whether the impact of the IV (In-group Ad vs. Out-group Ad) on

post-ad loyalty, goal disruption, and purchase intention (DV) was mediated by the participant's emotions.

After analyzing all mediators (six basic emotions, contempt, valence, arousal, and custom expressions) and all the dependent variables (brand loyalty, utilitarian and hedonic goal disruption, and purchase intention), 52 analyses were conducted. Given this, it was expected that the mediators that showed statistical significance (i.e. sadness and surprise) could contribute to the total effect on the dependent variables. However, as shown in the tables below, no mediation had a significant impact, even for variables with statistical significance.

Table 4-5 represents the total, direct, and indirect effects of the IV on brand loyalty mediated by sadness. The direct effect (IV → Brand loyalty) is $\beta=0.2812$ (SE=0.323, p-value=0.386, CI [-0.359; 0.922]), indicating a not significant effect. The indirect effect (IV → Sad → Brand loyalty) is $\beta=-0.026$ (SE=0.065, CI [-0.192; 0.074]), indicating a not significant effect. Finally, the total effect (IV → Brand loyalty) is $\beta=0.255$ (SE=0.316, p-value=0.422, CI [-0.372; 0.882]), proposing that the advertisement seen does not impact brand loyalty through the mediation of sadness.

Table 4-5: Mediation analysis IV → Sad → Brand loyalty

Effect	Path	Coefficient (β)	Standard error (SE)	P-value	Confidence interval (CI)
Direct effect	IV → Brand loyalty	0.281	0.323	0.386	[-0.359; 0.922]
Indirect effect	IV → Sad → Brand loyalty	-0.026	0.065	-	[-0.192; 0.074]
Total effect	IV → Brand loyalty	0.225	0.316	0.422	[-0.372; 0.882]

When it comes to the effect that the IV has on utilitarian goals mediated by sadness, Table 4-6 represents the total, direct, and indirect effects. The direct effect (IV → Utilitarian goal) is $\beta=0.132$ (SE=0.372, p-value=0.724, CI [-0.605; 0.869]), indicating a not significant effect. The indirect effect (IV → Sad → Utilitarian goal) is $\beta=-0.002$ (SE=0.069, CI [-0.174; 0.112]), indicating a not significant effect. Finally, the total effect (IV → Utilitarian goal) is $\beta=0.130$ (SE=0.364, p-value=0.721, CI [-0.591; 0.851]), suggesting that the IVs do not impact the utilitarian goals mediated by sadness.

Table 4-6: Mediation analysis IV → Sad → Utilitarian goal

Effect	Path	Coefficient (β)	Standard error (SE)	P-value	Confidence interval (CI)
Direct effect	IV → Utilitarian goal	0.132	0.372	0.724	[-0.605; 0.869]
Indirect effect	IV → Sad → Utilitarian goal	-0.002	0.069	-	[-0.174; 0.112]
Total effect	IV → Utilitarian goal	0.130	0.364	0.721	[-0.591; 0.851]

For hedonic goals mediated by sadness, Table 4-7 represents the total, direct, and indirect effects. The direct effect (IV → Hedonic goal) is $\beta=0.043$ (SE=0.323, p-value=0.895, CI [-0.598; 0.683]), indicating a not significant effect. The indirect effect (IV → Sad → Hedonic goal) is $\beta=0.046$ (SE=0.087, CI [-0.153; 0.199]), indicating a not significant effect. Finally, the total effect (IV → Hedonic goal) is $\beta=0.089$ (SE=0.317, p-value=0.780, CI [-0.539; 0.716]), concluding that sadness does not mediate the effect of the IVs on hedonic goals.

Table 4-7: Mediation analysis IV → Sad → Hedonic goal

Effect	Path	Coefficient (β)	Standard error (SE)	P-value	Confidence interval (CI)
Direct effect	IV → Hedonic goal	0.043	0.323	0.895	[-0.598; 0.683]
Indirect effect	IV → Sad → Hedonic goal	0.046	0.087	-	[-0.153; 0.199]
Total effect	IV → Hedonic goal	0.089	0.317	0.780	[-0.539; 0.716]

Purchase intention was the DV mediated by sadness, represented in Table 4-8. The direct effect (IV → Purchase intention) is $\beta=0.408$ (SE=0.373, p-value=0.276, CI [-0.331; 1.148]), indicating a not significant effect. The indirect effect (IV → Sad → Purchase intention) is $\beta=-0.082$ (SE=0.093, CI [-0.319; 0.038]), indicating a not significant effect. Finally, the total effect (IV → Purchase intention) is $\beta=0.327$ (SE=0.367, p-value=0.376, CI [-0.401; 1.054]), indicating that the IVs do not impact the participant's purchase intention mediated by sadness.

Table 4-8: Mediation analysis IV → Sad → Purchase intention

Effect	Path	Coefficient (β)	Standard error (SE)	P-value	Confidence interval (CI)
Direct effect	IV → Purchase intention	0.408	0.373	0.276	[-0.331; 1.148]
Indirect effect	IV → Sad → Purchase intention	-0.082	0.093	-	[-0.319; 0.038]
Total effect	IV → Purchase intention	0.327	0.367	0.376	[-0.401; 1.054]

Looking now to the other statistically significant mediator, surprise, Table 4-9 represents the total, direct, and indirect effects of the IV on brand loyalty mediated by sadness. The direct effect (IV → Brand loyalty) is $\beta=0.201$ (SE=0.326, p-value=0.539, CI [-0.445; 0.847]), indicating a not significant effect. The indirect effect (IV → Surprise → Brand loyalty) is $\beta=0.054$ (SE=0.075, CI [-0.071; 0.226]), indicating a not significant effect. Finally, the total effect (IV →

Brand loyalty) is $\beta=0.255$ (SE=0.316, p-value=0.422, CI [-0.372; 0.882]), proposing that the advertisement seen does not impact brand loyalty through the mediation of surprise.

Table 4-9: Mediation analysis IV \rightarrow Surprise \rightarrow Brand loyalty

Effect	Path	Coefficient (β)	Standard error (SE)	P-value	Confidence interval (CI)
Direct effect	IV \rightarrow Brand loyalty	0.201	0.326	0.539	[-0.445; 0.847]
Indirect effect	IV \rightarrow Surprise \rightarrow Brand loyalty	0.054	0.075	-	[-0.071; 0.226]
Total effect	IV \rightarrow Brand loyalty	0.255	0.316	0.422	[-0.372; 0.882]

When it comes to the effect that the IV has on hedonic goals mediated by surprise, Table 4-10 represents the total, direct, and indirect effects. The direct effect (IV \rightarrow Utilitarian goal) is $\beta=0.038$ (SE=0.374, p-value=0.919, CI [-0.703; 0.779]), indicating a not significant effect. The indirect effect (IV \rightarrow Surprise \rightarrow Utilitarian goal) is $\beta=0.092$ (SE=0.079, CI [-0.045; 0.274]), indicating a not significant effect. Finally, the total effect (IV \rightarrow Utilitarian goal) is $\beta=0.130$ (SE=0.364, p-value=0.721, CI [-0.591; 0.851]), suggesting that the IVs do not impact the utilitarian goals mediated by surprise.

Table 4-10: Mediation analysis IV \rightarrow Surprise \rightarrow Utilitarian goal

Effect	Path	Coefficient (β)	Standard error (SE)	P-value	Confidence interval (CI)
Direct effect	IV \rightarrow Utilitarian goal	0.038	0.374	0.919	[-0.703; 0.779]
Indirect effect	IV \rightarrow Surprise \rightarrow Utilitarian goal	0.092	0.079	-	[-0.045; 0.274]
Total effect	IV \rightarrow Utilitarian goal	0.130	0.364	0.721	[-0.591; 0.851]

In the case of hedonic goals mediated by surprise, Table 4-11 represents the total, direct, and indirect effects. The direct effect (IV → Hedonic goal) is $\beta=0.040$ (SE=0.327, p-value=0.902, CI [-0.607; 0.687]), indicating a not significant effect. The indirect effect (IV → Surprise → Hedonic goal) is $\beta=0.048$ (SE=0.077, CI [-0.069; 0.234]), indicating a not significant effect. Finally, the total effect (IV → Hedonic goal) is $\beta=0.089$ (SE=0.317, p-value=0.780, CI [-0.539; 0.716]), concluding that surprise does not mediate the effect of the IVs on hedonic goals.

Table 4-11: Mediation analysis IV → Surprise → Hedonic goal

Effect	Path	Coefficient (β)	Standard error (SE)	P-value	Confidence interval (CI)
Direct effect	IV → Hedonic goal	0.040	0.327	0.902	[-0.607; 0.687]
Indirect effect	IV → Surprise → Hedonic goal	0.048	0.077	-	[-0.069; 0.234]
Total effect	IV → Hedonic goal	0.089	0.317	0.780	[-0.539; 0.716]

Purchase intention was the DV mediated by surprise, represented in Table 4-12. The direct effect (IV → Purchase intention) is $\beta=0.318$ (SE=0.379, p-value=0.404, CI [-0.434; 1.070]), indicating a not significant effect. The indirect effect (IV → Surprise → Purchase intention) is $\beta=0.008$ (SE=0.086, CI [-0.140; 0.211]), indicating a not significant effect. Finally, the total effect (IV → Purchase intention) is $\beta=0.327$ (SE=0.367, p-value=0.376, CI [-0.401; 1.054]), indicating that the IVs do not impact the participant's purchase intention mediated by surprise.

Table 4-12: Mediation analysis IV → Surprise → Purchase intention

Effect	Path	Coefficient (β)	Standard error (SE)	P-value	Confidence interval (CI)
Direct effect	IV → Purchase intention	0.318	0.379	0.404	[-0.434; 1.070]
Indirect effect	IV → Surprise → Purchase intention	0.008	0.086	-	[-0.140; 0.211]
Total effect	IV → Purchase intention	0.327	0.367	0.376	[-0.401; 1.054]

5. CONCLUSION

This study highlighted the need to integrate the study of emotions to better understand consumer behavior. Emotional connections between brands and consumers not only foster strong brand relationships (Huang & Rust, 2024), but also directly influence impulsive buying, purchase intentions, and underlying motivations (Kidwell et al., 2008; Xu et al., 2021). As a result, neuromarketing has emerged as a complementary approach to traditional research methods, enriching the existing knowledge of consumer behavior and purchasing motivations (Hutchinson et al., 2024; Mashrur et al., 2024).

With the research question, “Can out-group targeted ads disrupt in-group customer loyalty, or will their brand loyalty remain unbreakable?”, this thesis aimed to understand the impact that advertisements designed for non-loyal consumers have on loyal ones. Specifically, it examined their impact on consumer’s post-ad loyalty, goal pursuit, and purchase intention. To investigate this relationship, a study was conducted using FaceReader to assess the role of emotions as a mediator. It provides a competitive advantage over other neuromarketing technologies, not only for providing a more accessible and cost-effective solution, but also for capturing consumer’s emotional responses that are becoming relevant for making better marketing decisions (Landmann, 2023). The study had the purpose to examine whether emotional reactions influenced how participants responded to the ads. However, the analysis found no statistically significant relationship between the type of advertisement viewed (In-group Ad vs. Out-group Ad) and post-ad loyalty, goal pursuit, or purchase intention. As a result, hypotheses one, two, and three were not supported.

Additionally, mediation analysis revealed no statistical significance in any of the emotional factors (emotions, valence, arousal, actions units, and custom expressions), meaning hypothesis four was also not supported. Despite these findings, FaceReader identified sadness and surprise as the key emotions distinguishing the two ads, with higher levels observed in participants who viewed the out-group ad. However, emotions such as happiness, disgust, and confusion, which were expected to show significant differences between groups, did not.

Another question that emerged along with this research concerns whether the surprise effect had a positive or a negative connotation. While it is evident that surprise can significantly impact consumer reactions, it has an unclear valence emotion, making it a less reliable emotion to trigger in consumer engagement (Holiday et al., 2023). However, in the context of this study, surprise came along with sadness, suggesting that participants experienced a more negative emotional response to the advertisement rather than a positive one.

In conclusion, this study could not determine whether out-group targeted ads influence brand loyalty, goal pursuit, and purchase intention through emotions. While prior-ad brand loyalty strongly predicted post-ad brand loyalty, the statistical tests did not show significance in any of the four interaction effects. Therefore, it remains unclear whether strong prior-ad loyalty had any impact on post-ad loyalty, goal pursuit, or purchase intention.

5.1. THEORETICAL IMPLICATIONS

This study contributed to the existing literature on consumer behavior, especially on brand loyalty, purchase intention, consumer motivations, and on Social Identity Theory by

incorporating the study of emotions through neuromarketing, which had not been seen so far in the existing literature. As defended by Núñez-Cansado et al. (2024) emotions emerged as a new factor for analyzing and predicting consumer behavior.

Based on the findings of Guo & Wang, 2024, understanding how to sustain a brand has become more important than ever, and it's important to understand consumer's motivations in order to avoid compromising the brand by deviating from its established image, through unexpected advertisements, product changes, or rebranding (Brown, 2020; De Zavala, 2011). Despite the unclear results, they were enough to show that consumers can be surprised with advertisement tailored to non-loyal consumers. This uncertainty on whether curiosity motivates consumers to approach or withdrawal any type of existent commitment to the brand (Xu et al., 2021), corroborates the ideas defended by existent research.

As seen, Social Identity Theory states that individuals who do not perceive themselves as part of the same group tend to respond differently to marketing stimuli, branding, and emotional messaging (Billig & Tajfel, 1973; Havard et al., 2021). This theory was corroborated by this research through the theoretical introduction of neuromarketing in brand loyalty. Although practically the results did not reveal significant discrepancies between groups as initially expected, subtle differences were observed in consumers' emotional reactions, particularly in levels of sadness and surprise, depending on the advertisement they were exposed to.

Overall, using the FaceReader as a neuromarketing tool to analyze facial expressions proved to be more accessible, offering a smooth and user-friendly experience for both the participants and the researcher (Landmann, 2023; Walters et al., 2023). The results showed

that the participant's emotions, custom expressions, and levels of arousal and valence were effectively captured, and the intersection of these emotions with the dependent variables under study, such as brand loyalty, demonstrated promising potential. This suggests that researchers should begin to consider tools like FaceReader as a substitute for the neuroimaging methods, consequently offering new insights that go beyond the commonly used techniques (Clithero et al., 2024).

Despite the small impact, neither the original nor the disruptive advertisements were persuasive enough to see major changes in consumer perceptions. This highlights the need for further research to understand whether stronger advertising strategies, psychological influences, or external factors, which were not examined in this study, may influence consumer perceptions and potentially affect brand loyalty.

5.2. PRACTICAL IMPLICATIONS

The link between neuromarketing and brand loyalty, which was previously unexplored, not only offers valuable insights for companies looking to improve long-lasting relationships with their consumers, but also to help them target new ones without harming their loyal customer base. Marketers can also use neuromarketing to retarget former loyal consumers and communicate more effectively with specific social identities that may be harder to attract using traditional strategies (Brown, 2000; De Zavala, 2011; Huang & Rust, 2024).

Using the example mentioned in the introduction, this research provides practical insights, that brands like Jaguar, known for their well-established and highly loyal customer base, can use for their rebranding efforts without alienating their core audience. Jaguar's 2024 rebranding, shifting from a classic luxury, high-performance sports car identity to a more

modern, minimalistic, and tech-focused one, sparked interest and created a sense of abandonment among many loyal customers. Similar to the results of this research, Jaguar's rebranding also relied on the emotional impact of surprise. As this is a feeling with mixed emotional value (Holiday et al., 2023), this highlights the importance of considering consumer emotions carefully when implementing such strategic changes. By using neuromarketing techniques to analyze how loyal customers react to ads aimed for new, non-loyal consumers, Jaguar can ensure that their rebranding efforts are more effective and do not disrupt the emotional connection with their existing audience. The findings suggest that, while rebranding can be essential for growth, it must be carefully managed to maintain an emotional bond with existing customers while attracting new ones (Havard et al., 2021; Khamitov et al., 2019).

Although neuromarketing has only recently begun to be applied within the field of consumer behavior (Kajla et al., 2024), its insights could have been used to address not only recent rebranding challenges but also past cases such as Gap's 2010 rebranding attempt. Aiming to modernize its visual identity, Gap ended up alienating its loyal customer base. The original logo, with its bold white lettering over a blue square, had been in use for over 20 years and was instantly recognizable. However, the rebranded logo featured a simpler font with a small blue gradient box, which drastically changed the visual identity that loyal customers had grown attached to. After an immediate backlash, within one week, Gap reverted to its original logo.

As we can see, throughout the years, rebranding attempts have led to significant failures, either due to changing a brand's visual identity, or by shifting brand positioning. Both examples of Gap and Jaguar highlight the importance of understanding consumers' emotional

reactions. Neuromarketing offers valuable tools, such as the FaceReader, that capture these responses, helping brands make informed decisions that preserve emotional connections and avoid alienating loyal audiences.

Although this study did not find strong statistical evidence on the relationship between the different advertisements and consumers' post-loyalty, goal pursuit, and purchase intention, it is important to consider the scientifically proven risks that this disruption can have on consumers (Bagozzi & Dholakia, 1999; Chartrand et al., 2008; Kidwell et al., 2008).

5.3. STUDY LIMITATION AND FUTURE RESEARCH GUIDELINES

Regardless of careful planning and rigorous methodologies, this research had limitations that may have influenced the findings and can help to guide future studies.

One key limitation relates to affective chronometry, a concept in psychology and neuroscience that examines the timing and progression of emotional responses. Throughout the literature, Davidson (2015) and Núñez-Cansado et al. (2024) highlighted the relevance of incorporating it when studying emotional processes. Affective chronometry suggests that individuals experience emotions differently based on two main factors: how quickly emotions intensify and how long they persist. The recovery period of emotions depends on their intensity. For instance, intense emotions such as sadness tend to last longer than boredom (Hemenover, 2003). This represents a limitation when using a tool like FaceReader since detected emotions with high arousal might not be solely related to the ad but could come from previous experiences. The misattribution of past emotional states to a new stimulus is known as the paradigm of erroneous attribution. Future researchers should explore options

to account for this effect to therefore ensure a more accurate emotional analysis in consumer studies.

Despite the efforts to minimize external biases, certain uncontrollable factors may have impacted the reliability of the results. The FaceReader itself has some limitations, such as the need for strict light conditions, and unobstructed facial visibility. Elements like hats, hair covering the forehead, heavy facial hair, or hands in front of the face can interfere with accurate emotion detection (Noldus Information Technology bv, 2021). Additionally, conducting the study in a lab setting may have caused participants to feel nervous, potentially influencing their emotional responses which would directly impact the research outcomes. On top of this, expanding the sample size and including a more age-diverse group would help to reduce bias and improve the reliability of future findings. Furthermore, using new constructs or scales to measure brand loyalty, goal pursuit, and purchase intention could bring more insights into consumer behavior.

Another limitation concerns the out-group ad used in the study, which was created with the free version of [Pictory.AI](#), an AI-based video generator that relies on a limited image bank. Developing a fully customized video and testing different ad messages could enhance engagement and bring more insightful results.

As previously concluded in this research, surprise is a very unpredictable emotion (Holiday et al., 2023), therefore future research could benefit from exploring surprise as a standalone variable to better understand its specific impact on consumer behavior and brand perception.

Future research should consider these observations to improve test analysis and generate more effective and impactful findings.

BIBLIOGRAPHICAL REFERENCES

- Aggarwal, P. (2004). The Effects of Brand Relationship Norms on Consumer Attitudes and Behavior. *Journal of Consumer Research*, 31(1), 87–101.
<https://doi.org/10.1086/383426>
- Ahmed, R. R., Streimikiene, D., Channar, Z. A., Soomro, H. A., Streimikis, J., & Kyriakopoulos, G. L. (2022). The Neuromarketing Concept in Artificial Neural Networks: A Case of Forecasting and Simulation from the Advertising Industry. *Sustainability*, 14(14), 8546.
<https://doi.org/10.3390/su14148546>
- Ariely, D., & Berns, G. S. (2010). Neuromarketing: The hope and hype of neuroimaging in business. *Nature Reviews Neuroscience*, 11(4), 284–292.
<https://doi.org/10.1038/nrn2795>
- Bagozzi, R. P., & Dholakia, U. (1999). Goal Setting and Goal Striving in Consumer Behavior. *Journal of Marketing*. <https://doi.org/10.2307/1252098>
- Barrett, L. F. (1998). Discrete Emotions or Dimensions? The Role of Valence Focus and Arousal Focus. *Cognition & Emotion*, 12(4), 579–599.
<https://doi.org/10.1080/026999398379574>
- Billig, M., & Tajfel, H. (1973). Social categorization and similarity in intergroup behaviour. *European Journal of Social Psychology*, 3(1), 27–52.
<https://doi.org/10.1002/ejsp.2420030103>
- Brown, R. (2000). Social identity theory: Past achievements, current problems and future challenges. *European Journal of Social Psychology*, 30(6), 745–778.
[https://doi.org/10.1002/1099-0992\(200011/12\)30:6<745::AID-EJSP24>3.0.CO;2-O](https://doi.org/10.1002/1099-0992(200011/12)30:6<745::AID-EJSP24>3.0.CO;2-O)

- Chartrand, T. L., Huber, J., Shiv, B., & Tanner, R. J. (2008). Nonconscious Goals and Consumer Choice. *Journal of Consumer Research*, 35(2), 189–201. <https://doi.org/10.1086/588685>
- Chaudhuri, A., & Holbrook, M. B. (2001). The Chain of Effects from Brand Trust and Brand Affect to Brand Performance: The Role of Brand Loyalty. *Journal of Marketing*, 65(2), 81–93. <https://doi.org/10.1509/jmkg.65.2.81.18255>
- Chitturi, R., Raghunathan, R., & Mahajan, V. (2008). Delight by Design: The Role of Hedonic versus Utilitarian Benefits. *Journal of Marketing*. <https://doi.org/10.1509/jmkg.72.3.48>
- Citron, F. M. M., Gray, M. A., Critchley, H. D., Weekes, B. S., & Ferstl, E. C. (2014). Emotional valence and arousal affect reading in an interactive way: Neuroimaging evidence for an approach-withdrawal framework. *Neuropsychologia*, 56, 79–89. <https://doi.org/10.1016/j.neuropsychologia.2014.01.002>
- Clithero, J. A., Karmarkar, U. R., Nave, G., & Plassmann, H. (2024). Reconsidering the path for neural and physiological methods in consumer psychology. *Journal of Consumer Psychology*, 34(1), 196–213. <https://doi.org/10.1002/jcpy.1397>
- Cui, C. C., Mrad, M., & Hogg, M. K. (2018). Brand addiction: Exploring the concept and its definition through an experiential lens. *Journal of Business Research*, 87, 118–127. <https://doi.org/10.1016/j.jbusres.2018.02.028>
- Davidson, R. J. (2015). Comment: Affective Chronometry Has Come of Age. *Emotion Review*, 7(4), 368–370. <https://doi.org/10.1177/1754073915590844>

- De Zavala, A. G. (2011). Collective Narcissism and Intergroup Hostility: The Dark Side of 'In-Group Love.' *Social and Personality Psychology Compass*, 5(6), 309–320. <https://doi.org/10.1111/j.1751-9004.2011.00351.x>
- Eser, Z., Isin, F. B., & Tolon, M. (2011). Perceptions of marketing academics, neurologists, and marketing professionals about neuromarketing. *Journal of Marketing Management*, 27(7–8), 854–868. <https://doi.org/10.1080/02672571003719070>
- Fisher, C. E., Chin, L., & Klitzman, R. (2010). Defining Neuromarketing: Practices and Professional Challenges. *Harvard Review of Psychiatry*, 18(4), 230–237. <https://doi.org/10.3109/10673229.2010.496623>
- Guo, B., & Wang, D. (2024). Will Online Shopping Lead to More Brand Loyalty Than Offline Shopping? The Role of Uncertainty Avoidance. *Journal of Marketing Research*, 61(1), 92–109. <https://doi.org/10.1177/00222437231153075>
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. The Guilford Press.
- Havard, C. T., Ferrucci, P., & Ryan, T. D. (2021). Does messaging matter? Investigating the influence of media headlines on perceptions and attitudes of the in-group and out-group. *Journal of Marketing Communications*, 27(1), 20–30. <https://doi.org/10.1080/13527266.2019.1620838>
- Hemenover, S. H. (2003). Individual differences in rate of affect change: Studies in affective chronometry. *Journal of Personality and Social Psychology*, 85(1), 121–131. <https://doi.org/10.1037/0022-3514.85.1.121>
- Hemsley-Brown, J., & Alnawas, I. (2016). Service quality and brand loyalty: The mediation effect of brand passion, brand affection and self-brand connection. *International*

- Journal of Contemporary Hospitality Management*, 28(12), 2771–2794.
<https://doi.org/10.1108/IJCHM-09-2015-0466>
- Holiday, S., Hayes, J. L., Park, H., Lyu, Y., & Zhou, Y. (2023). A Multimodal Emotion Perspective on Social Media Influencer Marketing: The Effectiveness of Influencer Emotions, Network Size, and Branding on Consumer Brand Engagement Using Facial Expression and Linguistic Analysis. *Journal of Interactive Marketing*, 58(4), 414–439.
<https://doi.org/10.1177/10949968231171104>
- Hornsey, M. J. (2008). Social Identity Theory and Self-categorization Theory: A Historical Review. *Social and Personality Psychology Compass*, 2(1), 204–222.
<https://doi.org/10.1111/j.1751-9004.2007.00066.x>
- Huang, M.-H., & Rust, R. T. (2024). The Caring Machine: Feeling AI for Customer Care. *Journal of Marketing*, 88(5), 1–23. <https://doi.org/10.1177/00222429231224748>
- Hutchinson, J. W., Reimann, M., Knutson, B., & Huber, J. (2024). Commentaries on “Reconsidering the path for neural and physiological methods in consumer psychology.” *Journal of Consumer Psychology*, 34(1), 214–221.
<https://doi.org/10.1002/jcpy.1398>
- Islam, G. (2014). Social Identity Theory. *Encyclopedia of Critical Psychology*.
<https://doi.org/10.1007/978-1-4614-5583-7>
- Kajla, T., Raj, S., Kansra, P., Gupta, S. L., & Singh, N. (2024). Neuromarketing and consumer behavior: A bibliometric analysis. *Journal of Consumer Behaviour*, 23(2), 959–975.
<https://doi.org/10.1002/cb.2256>
- Keller, K. L. (2003). Brand Synthesis: The Multidimensionality of Brand Knowledge. *Journal of Consumer Research*, 29(4), 595–600. <https://doi.org/10.1086/346254>

- Keller, K. L. (2020). Consumer Research Insights on Brands and Branding: A JCR Curation. *Journal of Consumer Research*, 46(5), 995–1001. <https://doi.org/10.1093/jcr/ucz058>
- Khamitov, M., Wang, X. (Shane), & Thomson, M. (2019). How Well Do Consumer-Brand Relationships Drive Customer Brand Loyalty? Generalizations from a Meta-Analysis of Brand Relationship Elasticities. *Journal of Consumer Research*, 46(3), 435–459. <https://doi.org/10.1093/jcr/ucz006>
- Kidwell, B., Hardesty, D. M., & Childers, T. L. (2008). Consumer Emotional Intelligence: Conceptualization, Measurement, and the Prediction of Consumer Decision Making. *Journal of Consumer Research*, 35(1), 154–166. <https://doi.org/10.1086/524417>
- Landmann, E. (2023). I can see how you feel—Methodological considerations and handling of Noldus’s FaceReader software for emotion measurement. *Technological Forecasting and Social Change*, 197, 122889. <https://doi.org/10.1016/j.techfore.2023.122889>
- Lee, N., Brandes, L., Chamberlain, L., & Senior, C. (2017). This is your brain on neuromarketing: Reflections on a decade of research. *Journal of Marketing Management*, 33(11–12), 878–892. <https://doi.org/10.1080/0267257X.2017.1327249>
- Lewis, P., Critchley, H., Rotshtein, P., & Dolan, R. (2006). Neural Correlates of Processing Valence and Arousal in Affective Words. *Cerebral Cortex*, 17(3), 742–748. <https://doi.org/10.1093/cercor/bhk024>
- Ma, Z., Yang, Z., & Murali, M. (2014). Consumer Adoption of New Products: Independent versus Interdependent Self-Perspectives. *Journal of Marketing*, 78(2), 101–117. <https://doi.org/10.1509/jm.12.0051>
- Mashrur, F. R., Rahman, K. M., Miya, M. T. I., Vaidyanathan, R., Anwar, S. F., Sarker, F., & Mamun, K. A. (2024). Intelligent neuromarketing framework for consumers’

- preference prediction from electroencephalography signals and eye tracking. *Journal of Consumer Behaviour*, 23(3), 1146–1157. <https://doi.org/10.1002/cb.2253>
- Noldus Information Technology bv. (2021). *Reference Manual—FaceReader Version 9* (9th ed.).
- Núñez-Cansado, M., Carrascosa Méndez, G., & Juárez-Varón, D. (2024). Analysis of the residual effect using neuromarketing technology in audiovisual content entrepreneurship. *Sustainable Technology and Entrepreneurship*, 3(3), 100069. <https://doi.org/10.1016/j.stae.2023.100069>
- Rampl, L. V., Opitz, C., Welppe, I. M., & Kenning, P. (2016). The role of emotions in decision-making on employer brands: Insights from functional magnetic resonance imaging (fMRI). *Marketing Letters*, 27(2), 361–374. <https://doi.org/10.1007/s11002-014-9335-9>
- Reyna, V. F., Roue, J. E., Edelson, S. M., Singh, A., & Fennema, M. G. (2025). High in numeracy, high in reflection, but still irrationally biased: How gist explains risky choices. *Journal of Experimental Psychology: Learning, Memory, and Cognition*. <https://doi.org/10.1037/xlm0001441>
- Schmitt, B. (2024). Consumer Information Processing and Decision-Making: Origins, Findings, Applications, and Future Directions. *Journal of Consumer Research*, 51(1), 2–6. <https://doi.org/10.1093/jcr/ucae008>
- Stocchi, L., Michaelidou, N., Pourazad, N., & Micevski, M. (2018). The rules of engagement: How to motivate consumers to engage with branded mobile apps. *Journal of Marketing Management*, 34(13–14), 1196–1226. <https://doi.org/10.1080/0267257X.2018.1544167>

- Tyrväinen, O., Karjaluoto, H., & Ukpabi, D. (2023). Understanding the Role of Social Media Content in Brand Loyalty: A Meta-Analysis of User-Generated Content Versus Firm-Generated Content. *Journal of Interactive Marketing*, 58(4), 400–413. <https://doi.org/10.1177/10949968231157281>
- VanBergen, N., Lurie, N. H., & Chen, Z. (2022). More Rational or More Emotional Than Others? Lay Beliefs About Decision-Making Strategies. *Journal of Consumer Psychology*, 32(2), 274–292. <https://doi.org/10.1002/jcpy.1244>
- Vences, N. A., Díaz-Campo, J., & Rosales, D. F. G. (2020). Neuromarketing as an Emotional Connection Tool Between Organizations and Audiences in Social Networks. A Theoretical Review. *Frontiers in Psychology*, 11, 1787. <https://doi.org/10.3389/fpsyg.2020.01787>
- Walters, G., Jiang, Y., & Li, S. (2023). Physiological Measurements in Hospitality and Tourism Research: A Systematic Review and New Theoretical Directions. *Journal of Hospitality & Tourism Research*, 10963480231199990. <https://doi.org/10.1177/10963480231199990>
- Xu, P., Peng, S., Luo, Y., & Gong, G. (2021). Facial expression recognition: A meta-analytic review of theoretical models and neuroimaging evidence. *Neuroscience & Biobehavioral Reviews*, 127, 820–836. <https://doi.org/10.1016/j.neubiorev.2021.05.023>

APPENDIX

APPENDIX A: ETHICS COMMITTEE APPROVAL



This is to certify that

Project No.: **DDMKT2024-11-167466**

Project Title: **Breaking Loyalty: How Out-Group Ads Impact Brand Devotion**

Principal Researcher: **Catarina Caixas Cabral**

according to the regulations of the Ethics Committee of NOVA IMS and MagIC Research Center this project was considered to meet the requirements of the NOVA IMS Internal Review Board, being considered **APPROVED** on 11/16/2024.

It is the Principal Researcher's responsibility to ensure that all researchers and stakeholders associated with this project are aware of the conditions of approval and which documents have been approved.

The Principal Researcher is required to notify the Ethics Committee, via amendment or progress report, of

- Any significant change to the project and the reason for that change;
- Any unforeseen events or unexpected developments that merit notification;
- The inability of the Principal Researcher to continue in that role or any other change in research personnel involved in the project.

Lisbon, 11/16/2024

NOVA IMS Ethics Committee
ethicscommittee@novaims.unl.pt

APPENDIX B: LITERATURE REVIEW TABLE

Author	Journal	Key variables	Theories used	Key findings
Aggarwal, 2004	Journal of Consumer Research	IV: Brand relationship type DV: Consumer attitudes and behavior Mediator: Perceived norm violation or conformity Moderator: Timing of brand action, type of benefit Controls: Participant's demographics	Social relationship theory; Norm-violation theory.	Brand relationship norms impact consumer attitudes and behaviors. Trust and commitment increase emotional attachment to brands, which leads to repeated customer purchases and an increase in their loyalty. It is important for brands to build stronger relationships with the customers.
Ahmed et al., 2022	Sustainability	IV: Advertisement characteristics (product packaging, features, content, celebrity endorsement) DV: Consumer buying behavior Mediator: Artificial neural networks Moderator: AI features Controls: N/A	Neuromarketing; ANNs; Neuroscience.	The study concluded that artificial neural networks could work as a powerful and cost-effective tool for neuromarketing studies. With these brands do not need to spend big amounts of money in the neuromarketing tools so commonly known (e.g. EEG, eye-tracking, fMRI, etc). Some of the factors that influence consumer behavior are: product features, creative value, celebrity endorsement, and product packaging.
Ariely & Berns, 2010	Nature Reviews Neuroscience	N/A	Neuromarketing and neuroimaging theories	In this article, the authors mention the potential of using neuroimaging to better understand consumer behavior. However, it is important to not overestimate this technology and use more rigorous research to validate findings and explore the practical applications in marketing.
Bagozzi & Dholakia, 1999	Journal of Marketing	IV: Type of goal CV: Consumer behavior Mediator: Goal intentions Moderator: Product familiarity Controls: Participant's demographics, and previous experiences with similar products	Theory of reasoned action; Goals in consumer choice; Control process theory; Theory of action control.	Goal setting helps consumers to decide if a new product meet their needs. Checking if products fulfill consumer needs is the key for brand loyalty. Based on this, marketers should track the various stages of a consumer's goal pursuit.
Barrett, 1998	Cognition & Emotion	IV: Valence and arousal focus DV: Co-occurrence of discrete emotions Mediator: Emotional differentiation Moderator: Level of focus on valence vs arousal Controls: Participants demographics	Dimensional vs. discrete emotion theory	Individuals with high valence tend to view emotions in a more dimensional way. Those with higher arousal focus tend to distinguish between discrete emotional states (like anxiety and depression) more effectively.

Billig & Tajfel, 1973	European Journal of Social Psychology	IV: Social categorization and similarity DV: In-group favoritism Mediator: Group identity Moderator: Type of categorization Controls: Participants demographics and context of the experiment (no prior interaction/anonymity)	Social identity theory; Minimal group paradigm.	Even arbitrary categorization led to in-group favoritism, suggesting that mere group categorization is enough to generate bias. Similarity enhanced in-group favoritism further, but fairness also influenced group decision-making.
Brown, 2000	European Journal of Social Psychology	N/A	Social identity theory; Self-categorization theory.	SIT explains that people seek positive social identities through favorable in-group comparisons, influencing behaviors like in-group favoritism and stereotyping. This theory presents some issues as self-esteem, in-group biases, and identity maintenance in low-status groups.
Butler, 2008	Journal of Consumer Behaviour	N/A	Perception of knowledge	Neuromarketing Research Model proposes a more integrated approach, involving multiple frameworks to enhance the understanding of consumer behavior, and filling the gaps between researchers and practitioners. This model suggests addressing these gaps by focusing on knowledge creation, diffusion, and the roles of different reporting forms (basic, applied, media).
Chartrand et al., 2008	Journal of Consumer Research	IV: Primed goals DV: Consumer choices between products Mediator: Goal satiation through choice Moderator: Time delay between priming and choice, type of choice Control: Studies were conducted in a way for participants to not be aware of goal manipulation	Nonconscious goal theory; Goal satiation theory.	Nonconscious goals primed by environmental cues (e.g., brand names) significantly affect consumer choices outside of awareness. Choices align with the activated goal (e.g. thrift or prestige), with effects intensifying over time but diminishing once a real, goal-consistent choice has been made.
Chaudhuri & Holbrook, 2001	Journal of Marketing	IV: Brand trust, brand effect DV: Brand performance Mediator: Brand loyalty Moderator: Product category attributes (hedonic vs. utilitarian) Controls: Brand differentiation, share of voice; hedonic and utilitarian values	Brand equity theory; Relationship marketing theory.	Brand trust and brand affect positively influence brand loyalty, which in turn improves market share and relative price. Purchase loyalty primarily affects market share, while attitudinal loyalty contributes more to premium pricing.

Chitturi et al., 2008	Journal of Marketing	IV: Product design benefits (hedonic vs utilitarian) DV: Post-consumption emotions and loyalty Mediator: Promotion/prevention emotions Moderator: Product category attributes Controls: Participant's demographics	Regulatory focus theory; Consumer emotions.	Utilitarian benefits fulfill prevention goals, evoking satisfaction through feelings of security and confidence, while hedonic benefits fulfill promotion goals, evoking delight through cheerfulness and excitement. Delight feelings contribute to a higher brand loyalty, then satisfaction.
Citron et al., 2014	Neuropsychologia	IV: Emotional valence and arousal DV: Brain activation during word recognition Mediator: Approach vs withdrawal Moderator: Word arousal levels Controls: Participants demographics and stimulus (word choice)	Neuropsychological theory; Pleasure-arousal theory; Approach-withdrawal theory.	fMRI study showed that valence (positive or negative feelings) and arousal (level of intensity) work together when we process emotional information. This shows that emotions affect the way humans process things. The right insular cortex helps to integrate automatic responses to emotional stimuli, for example whether we want to approach or avoid something.
Clithero et al., 2024	Journal of Consumer Psychology	N/A	Consumer neuroscience framework	Neural and physiological methods offer untapped potential in consumer psychology by uncovering implicit processes, refining measurement, and improving predictions. The authors argue for integrating these tools within multi-level theoretical frameworks to better understand consumer behavior. They also highlight challenges in adoption, such as training, conceptual clarity, and interdisciplinary collaboration.
Cui et al., 2018	Journal of Business Research	N/A	Addiction theories; Consumer-brand relationship theory.	Brand addiction is distinct from other consumer-brand relationships (like brand loyalty or brand love) and is characterized by behaviors such as acquisitiveness, compulsive urges, and emotional preoccupation.
De Zavala, 2011	Social and Personality Psychology Compass	N/A	Narcissism theory; Social identity theory.	Collective narcissism leads to intergroup hostility when the in-group's image is perceived as threatened, and might be linked to out-group hostility, potentially leading to aggression. It's important to make a distinction between narcissism and genuine love, so it is possible to create positive intergroup relations.
Eser et al., 2011	Journal of Marketing Management	IV: Group type (academics, neuroscientists, and marketing managers) DV: Perceptions of neuromarketing Mediator: Knowledge and awareness of neuromarketing Moderator: Professional background, costs, ethics, availability Controls: Participant's demographics	Consumer research theories; Neuromarketing theories and possible limitations; Theory of perceptions.	Neuromarketing is not a manipulative way to sell unnecessary goods and services. Three factors – interest and participation, knowledge and awareness, and ethics – illustrate the most important aspects of neuromarketing. Possible difficulties in neuroimaging, such as cost, participant attitude, and lack of knowledge, might be overcome with the cooperation of neurologists and academics.

Fisher et al., 2010	Harvard Review of Psychiatry	N/A	Neuromarketing theories	Ethical concerns: Neuromarketing exemplifies the complexities surrounding the ethics of collaborations between academic researchers and commercial industries. It is important for companies to communicate the methods they are using and respective implications, since neuromarketing is not positively perceived by people, and there is a concern about the quality and integrity of neuromarketing search.
Guo & Wang, 2024	Journal of Marketing Research	IV: Shopping environment (online vs. offline) DV: Brand loyalty Mediator: Predictability of product experience Moderator: Uncertainty Avoidance, Intangibility of product value, Information availability, Product performance variability Controls: Cultural dimensions, transaction risk, satisfaction, and size	Uncertainty Avoidance; Cue Utilization Theory	Across 8 studies, the authors show that online shopping leads to more brand loyalty among high-UA individuals (who prefer predictability), and less brand loyalty among low-UA individuals (who embrace uncertainty). Predictability of product experience mediates this effect, and it is moderated by product type (tangible vs. intangible), performance consistency, and information availability. The paper highlights the cultural, contextual, and psychological underpinnings of consumer loyalty in digital environments.
Havard et al., 2021	Journal of Marketing and Communications	IV: Type of media message (negative vs. positive media story) DV: Perceptions and attitudes towards the in-group and out-group Mediator: Emotional reaction to the media content Moderator: Effect of group identification or rivalry intensity Controls: Prior attitudes toward both in-group and out-group	Social identity theory; Linguistic intergroup bias; Shaming behavior in sport fans.	Media messages impact the consumers perception of a brand, whether the consumer belongs to the out-group or the in-group of that same brand. Negative media messages damage not only the out-group's brand image but also hurt the in-group's brand image. Media expose influences social identity and behavior.
Hornsey, 2008	Social and Personality Psychology Compass	N/A	Social identity theory; Self-categorization theory.	The theories explain how group identification shapes social behavior, with group biases increasing under conditions of perceived threat or instability. SIT and SCT say that individuals seek positive distinctiveness, influencing attitudes and actions toward out-groups.
Huang & Rust, 2024	Journal of Marketing	IV: Implementation of Generative AI (GenAI) in customer care DV: Customer emotional well-being, customer lifetime value Mediator: Emotional recognition, understanding, management Moderator: Type of AI, customer context, level of empathy expressed Controls: N/A	Affective computing; Appraisal theory of emotion; AI intelligence framework (doing, thinking, feeling AI)	GenAI has the potential to effectively support emotionally charged customer care through emotion recognition, empathetic responses, emotion management, and emotional connection. The study proposes a four-stage "AI-enabled customer care journey" and outlines marketing and technical requirements to successfully implement "feeling AI." Key takeaway: strategic emotional support from AI can increase both customer emotional well-being and lifetime value.

Hutchinson et al., 2024	Journal of Consumer Psychology	N/A	Marr's levels of analysis (function, algorithm, implementation); Inductive vs. deductive reasoning paradigms	This commentary offers multiple perspectives on Clithero et al.'s (2024) article, agreeing that neural and physiological methods hold promise but are underutilized in consumer psychology. Hutchinson stresses complexity in brain-behavior links; Reimann identifies four paths in consumer neuroscience (excavation, exploration, one-shot technical, and integrative); Knutson provides evidence that brain activity can predict and generalize consumer choices. Authors call for interdisciplinary collaboration, better education in neuroscience, and more theoretically grounded research.
Islam, 2014	Encyclopedia of Critical Psychology	N/A	Social identity theory; Self-categorization theory.	Social identity is formed through categorization into in-groups and out-groups, leading to in-group favoritism and out-group discrimination. The intergroup bias increases when groups perceive threats or compete for resources.
Kajla et al., 2024	Journal of Consumer Behaviour	N/A	Neuromarketing theory	The bibliometric analysis done in this study states that besides the number of articles regarding neuromarketing is increase, its depth has not been improving. The focus of the last researchers regarding neuromarketing tools surrounds EEG and fMRI. According to word co-occurrence the six major themes around neuromarketing are: consumers, consumer behavior, advertisement, non-invasive techniques in advertisement effectiveness, ERP and brand extension, brand and fMRI.
Keller, 2003	Journal of Consumer Research	N/A	Cognitive psychology theories; Brand leverage theories.	Branding strategies should consider some components such as brand awareness, attributes, benefits, feelings, and experiences. For strategies to be effective, brands should cover this multidimensional approach. By partnering with endorsements (e.g. celebrities), marketers can leverage brand knowledge, improving brand equity.
Keller, 2020	Journal of Consumer Research	N/A	Consumer-brand relationships; Brand attachment; Consumer behavior.	These are the important topics to consider when it comes to consumer-brand relationships: emotional experience, brand attachment and loyalty, brand differentiation, consumer opinion/communication, and managerial decisions related to the brand.

Khamitov et al., 2019	Journal of Consumer Research	IV: Brand attachment, brand love, self-brand connection, brand identification, and brand trust DV: Attitudinal and behavioral loyalty Mediator: N/A Moderator: Time, brand status, consumption context, brand type, and type of loyalty Controls: Brand, sample, consumer, journal, and methodologic characteristics	Consumer-brand relationships; Commitment-trust theory; Brand loyalty.	Comparing five types of customer-brand relationships, brand love and brand attachment are the ones that have higher influence on brand loyalty. No status, public brands have better customer-relationships. The impact is greater when customer brand loyalty is measured through attitudinal loyalty (consumers' feelings and attitudes) rather than behavioral loyalty (actual purchasing behavior).
Kidwell et al., 2008	Journal of Consumer Research	IV: Consumer emotional intelligence DV: Quality of consumer decisions, food choices, and product preferences Mediator: Perception, facilitation, understanding, management of emotions Moderator: N/A Control: Cognitive ability, self-monitoring, compulsive behavior, prior brand attitudes, gender	Emotional intelligence	Consumer Emotional Intelligence (CEI) is domain-specific and more predictive of consumer-related outcomes than general Emotional Intelligence (EI) scales like MSCEIT. CEI significantly influences consumer decision-making quality in contexts such as food choices and product selection, even beyond cognitive knowledge. Specific abilities like managing and understanding emotions are critical in reducing impulsive and unhealthy decisions. Higher emotional intelligence also helps in resisting brand attachment and selecting objectively better products.
Landmann, 2023	Technological Forecasting and Social Change	N/A	Dimensional and categorical emotion theories; Circumplex model of affect.	There is no standard procedure for data collection, use of the software, and further analysis and handling of the data obtained by FaceReader. FaceReader requires adequate training for researchers to understand the software's functionalities, including its limitations.
Lee et al., 2017	Journal of Marketing Management	IV: Neuromarketing tools (EEG, fMRI) DV: Consumer decision-making process; Brain activity measurements Mediator: Brain activity Moderator: Type of experiment Controls: Study design and methodology	Cognitive neuroscience; Neuromarketing.	Although neuromarketing studies remain in the same position they were since the beginning of its study, the neuromarketing tools are seen as a viable tool to study consumer behavior and preferences. However, it faces some limitations like over-inferences from brain activity to psychological and social processes., and so it is suggested to look for other alternative tools such as EEG or MEG.
Lewis et al., 2006	Cerebral Cortex	IV: Emotional valence and arousal DV: Brain activation during word recognition Mediator: Interaction between valence and arousal Moderator: Type of emotional stimulus Controls: Participants demographics and stimulus	Emotion valence-arousal theory	A new model, where emotions are measured by their distance from neutral, was created to show that emotions are seen as more than a single scale from negative to positive. Positive and negative emotions are processed separately. Valence and arousal engage distinct brain regions. Orbitofrontal cortex processes valence, while the amygdala is primarily responsible for arousal. There is a double dissociation between these brain areas, and the study supports models that treat valence as an independent construct.

Mashrur et al., 2024	Journal of Consumer Behaviour	IV: EEG, eye-tracking DV: Consumer's preferences predictions Mediator: Neuromarketing Insights Moderator: Consumer's demographics Controls: Experimental conditions	Neuromarketing theories	By integrating neuromarketing tools such as EEG and eye-tracking, companies can have better insights on consumer behavior and improve their marketing strategies.
Núñez-Cansado et al., 2024	Sustainable Technology and Entrepreneurship	IV: Emotional charge of audiovisual content (low/high) DV: Phycological activation and decision-making (withdrawal/approach) Mediator: Emotional activation Moderator: Type of emotion Controls: Neuromarketing technologies (EEG, GSR)	Excitation transfer theory	High emotional content in audiovisuals causes a residual effect, intensifying responses to adjacent stimuli. This leads to biased decision-making due to emotional carryover.
Rampl et al., 2016	Marketing Letters	IV: Brand attractiveness DV: Neural activation in decision-making areas Mediator: Emotional processing Moderator: Brand familiarity Controls: Participant interest in consulting, handedness, vision, reaction times	Dual-process theory	Emotions have an important role. Decision-making for attractive employer brands is linked to an increase on the emotional brain activity and decrease in cognitive brain activity.
Reyna et al., 2025	Journal of Experimental Psychology: Learning, Memory, and Cognition	IV: Framing (gain vs. loss), Allais problem framing DV: Risky choice behavior Mediator: Gist-based intuition Moderator: Cognitive reflection (CRT scores), participant type (accountant vs. student), domain (business vs. health) Controls: N/A	Fuzzy-trace theory (FTT); Dual-process theory	Despite high levels of numeracy and cognitive reflection, both accountants and students exhibited framing effects and the Allais paradox. The findings support FTT, which proposes that even expert decision-makers rely on gist-based (intuitive) processing over analytical (verbatim) evaluation. Framing effects were robust and not attenuated by numeracy or expertise, challenging assumptions of rational choice theory and classic dual-process models.
Schmitt, 2024	Journal of Consumer Research	N/A	Information processing theory; Decision-making theory; Dual-processing models	This article provides a comprehensive overview of how consumer information processing and decision-making theories have evolved over time. It highlights the transition from rational, linear models to more emotionally and context-driven approaches. Emphasis is placed on how consumers construct preferences in real-time and how technological advances (like AI and digital interfaces) are reshaping decision environments. The article encourages the integration of cognitive, emotional, and contextual factors to better understand consumer behavior in future research.

Tyrväinen et al., 2023	Journal of Interactive Marketing	IV: Social media content attributes (information quality, credibility, usefulness, positive emotions, self-congruity, interactivity) DV: Brand loyalty Mediator: N/A Moderator: Product improvement, product value, product durability, HDI, social media platform Controls: Student vs. non-student, published vs. non-published, year of publication, geography	Customer engagement theory; Source credibility theory; Self-congruity theory; Persuasion knowledge model	This research finds that content attributes like information quality, credibility, usefulness, positive emotions, self-congruity, and interactivity significantly predict brand loyalty, often with stronger effects for FGC. Moderator analysis shows these effects are shaped by contextual factors such as product involvement, product type, and regional development levels. The study concludes that social media is especially effective in influencing brand loyalty for low-risk, hedonic, and nondurable products, particularly in high-HDI countries.
VanBergen et al., 2022	Journal of Consumer Psychology	IV: Rational vs. emotional decision-making DV: Self-assessment of decision-making strategy, task delegation, ad preferences Mediator: Motivation to self-enhance, perceived superiority of rationality Moderator: Self-affirmation Controls: Participant's demographics, stimuli controls	Self enhancement theory	People perceive themselves as more rational (vs. emotional) in decision-making than others, driven by self-enhancement motives. Beliefs about rationality as superior intensify this effect, while self-affirmation weakens it. The belief influences behaviors like ad preference (rational for self, emotional for others) and task delegation. The study highlights that in contexts emphasizing emotionality as superior, individuals are more willing to view their decisions as emotionally based, reversing typical rationality biases.
Vences et al., 2020	Frontiers in Psychology	N/A	Neuromarketing; Emotional / psychological theory.	Content with high emotional level (such as sadness) has higher engagement, social networks occurs because users need to satisfy their social needs, to find validation and to make a good impression on their network, engagement between companies and consumers improves on social networks when they post entertainment content, during crises users support companies that are more supported by other users, and messages linked with strong emotions are more likely to go viral
Walters et al., 2023	Journal of Hospitality & Tourism Research	N/A	Emotional response theory; Engagement theory.	This article shows the effectiveness that psychological measurements have on hospitality and tourism research to understand consumer behavior and emotions. These neuromarketing methods are important to avoid biases and limitations caused by traditional methods, however it is important to combine these two for better results. The paper gives us a detail explanation and description of each neuromarketing tool.
Xu et al., 2021	Neuroscience & Biobehavioral Reviews	N/A	Discrete emotion theory; Dimensional emotion theory; Psychological hypothesis.	There is a consistent engagement between the amygdala and its connectivity with distributed networks across discrete and dimensional emotions. These networks are widely involved in the processing of attention, motivation, memory, language, and cognitive control. The study challenges the old idea that the right side of the brain is mainly responsible for emotions, or that emotions are simply split by positive or negative feelings.

APPENDIX C: QUESTIONNAIRE DESIGN – ADAPTED SCALES AND ITEMS

Constructs	Adapted items	Adapted measurement of the items	Adapted from
Brand loyalty	<ol style="list-style-type: none"> 1. I will continue to choose Nike before other brands. 2. I would continue to favor Nike's sporty sneakers before other brands. 3. I am willing "to go the extra mile" to purchase Nike's sneakers. 4. I would rather purchase from Nike than try a different brand I am unsure of. 5. Next time I am looking for sneakers to do sports, I will choose Nike. 6. I will recommend Nike brand to someone who seeks for sportive sneakers. 7. I am very committed to Nike. 	9-point Likert scale from 1 (strongly disagree) to 9 (strongly agree)	Hemsley-Brown & Alnawas, 2016
Goal pursuit	Utilitarian <ol style="list-style-type: none"> 1. Using Nike sneakers improves my sportive performance in my daily life. 2. Using Nike sneakers increases my sportive productivity in my daily life. 3. Using Nike sneakers enhances my sportive effectiveness in my daily life. 	9-point Likert scale from 1 (strongly disagree) to 9 (strongly agree)	Stocchi et al., 2018
	Hedonic <ol style="list-style-type: none"> 1. I use Nike because it is entertaining. 2. I use Nike because I like it. 3. I use Nike because it is enjoyable. 	9-point Likert scale from 1 (strongly disagree) to 9 (strongly agree)	
Purchase intention	<ol style="list-style-type: none"> 1. Interest in purchasing. 2. Likely to buy. 	9-point Likert scale from 1 (strongly disagree) to 9 (strongly agree)	Ma et al., 2014

APPENDIX C.1: FACEREADER MEASURES

Constructs	Measured indicators																				
Emotions	Happiness, Sadness, Anger, Fear, Disgust, Surprise, Neutral, Contempt																				
Valence	Ranging from 0 (not active) to 1 (active)																				
Arousal	Ranging from -1 (negative) to +1 (positive)																				
Custom Expressions	Attention, Confusion, Interest, Smiling, Boredom, Blink																				
Action Units (AU)	<table border="0"> <tr> <td>AU01 – Inner brow raiser</td> <td>AU07 – Lid tightener</td> <td>AU15 – Lip corner depressor</td> <td>AU24 – Lip pressor raiser</td> </tr> <tr> <td>AU02 – Outer brow raiser</td> <td>AU09 – Nose Wrinkle</td> <td>AU17 – Chin raiser</td> <td>AU25 – Lip part</td> </tr> <tr> <td>AU04 – Brow lowerer</td> <td>AU10 – Upper lip raiser</td> <td>AU18 – Lip pucker</td> <td>AU26 – Jaw drop</td> </tr> <tr> <td>AU05 – Upper lid</td> <td>AU12 – Lip corner puller</td> <td>AU20 – Lip stretcher</td> <td>AU27 – Mouth Stretch</td> </tr> <tr> <td>AU06 – Cheek raiser</td> <td>AU14 – Dimpler</td> <td>AU23 – Lip tightener</td> <td>AU43 – Eyes closed</td> </tr> </table>	AU01 – Inner brow raiser	AU07 – Lid tightener	AU15 – Lip corner depressor	AU24 – Lip pressor raiser	AU02 – Outer brow raiser	AU09 – Nose Wrinkle	AU17 – Chin raiser	AU25 – Lip part	AU04 – Brow lowerer	AU10 – Upper lip raiser	AU18 – Lip pucker	AU26 – Jaw drop	AU05 – Upper lid	AU12 – Lip corner puller	AU20 – Lip stretcher	AU27 – Mouth Stretch	AU06 – Cheek raiser	AU14 – Dimpler	AU23 – Lip tightener	AU43 – Eyes closed
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APPENDIX D: QUESTIONNAIRE

Dear participant,

You are invited to participate in a research study titled "Breaking loyalty: How out-group ads impact brand devotion". Before you decide to participate, you must understand the purpose, procedures, and benefits of the study. Please take your time to read the following information carefully and feel free to ask any questions you may have.

The purpose of this study is to investigate facial expressions in response to a stimuli using FaceReader software, which is a facial expression analysis tool that uses computer algorithms to identify and analyze facial expressions based on facial muscle movements. If you choose to participate, you will be asked to watch a video while your facial expressions are recorded using FaceReader software, and afterwards you are invited to respond to a survey. Your participation will take about 5 minutes.

There are no risks associated with this study, and there are no right or wrong answers. The potential benefits of this research include contributing to a better understanding of facial expressions in response to the stimuli.

Your identity will be kept confidential. Any information collected during the study will be anonymized and stored securely. Only the research team will have access to the data, and it will be used for research/academic purposes only. Your participation in this study is voluntary. You may choose not to participate or withdraw from the study at any time without penalty.

Informed Consent Form

I declare that I am 18 or over 18 and agree to participate in this research. I declare that I was informed that my participation in this study is voluntary and that I can leave this survey at any time without penalty, and all data is confidential. I understand that I will evaluate responses and that this study does not offer serious risks.

I agree to participate.

I do not agree to participate.

Do you know Nike as a sports apparel brand?

Yes.

No.

Before this experience, did you consider yourself loyal to Nike?

Yes.

No.

After watching this ad, imagine the scenario where you need to purchase running shoes. Would you consider Nike for that purpose?

Yes.

No.

Considering the **new Nike advertisement** you saw prior to this questionnaire, using a scale from 1 (strongly disagree) to 9 (strongly agree), please rate the extent to which you agree with the following items regarding your **loyalty** towards **Nike**:

	1 - Strongly disagree	2	3	4	5 - Neither agree or disagree	6	7	8	9 - Strongly agree
I will continue to choose Nike before other brands.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would continue to favor Nike's sporty sneakers before other brands.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am willing "to go the extra mile" to purchase Nike's sneakers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would rather purchase from Nike than try a different brand I am unsure of.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Next time I am looking for sneakers to do sports, I will choose Nike.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please select 7.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I will recommend Nike brand to someone who seeks for sportive/athletic apparel.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am very committed to Nike.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Considering the **new Nike advertisement** you saw prior to this questionnaire, using a scale from 1 (strongly disagree) to 9 (strongly agree), please rate the extent to which you agree that using **Nike shoes** will contribute to your **athletic/sportive goals** when it comes to **usefulness**:

	1 - Strongly disagree	2	3	4	5 - Neither agree or disagree	6	7	8	9 - Strongly agree
Using Nike sneakers improves my sportive performance in my daily life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using Nike sneakers increases my sportive productivity in my daily life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using Nike sneakers enhances my sportive effectiveness in my daily life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Considering the **new Nike advertisement** you saw prior to this questionnaire, using a scale from 1 (strongly disagree) to 9 (strongly agree), please rate the extent to which you agree that using **Nike shoes** will contribute to your **athletic/sportive goals** when it comes to **entertainment**:

	1 - Strongly disagree	2	3	4	5 - Neither agree or disagree	6	7	8	9 - Strongly agree
I use Nike because it is entertaining.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use Nike because I like it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use Nike because it is enjoyable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Considering the **new Nike advertisement** you saw prior to this questionnaire, using a scale from 1 (not at all) to 9 (strongly agree), please will rate your **likelihood to purchase Nike shoes** for athletic purposes:

	1 - Strongly disagree	2	3	4	5 - Neither agree or disagree	6	7	8	9 - Strongly agree
Interest in purchasing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Likely to buy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Regarding the video you saw at the beginning of this study, Nike sneakers were perceived as:

Sporty sneakers.

Sneakers for non-sporty activities.

Please indicate your age (in years):

Please indicate your gender:

Male

Female

Non-binary

Prefer not to answer

Please indicate your last degree acquired:

Less than high school diploma

High school diploma

Some university, but no degree

Bachelor's degree

Master's degree

Doctorate

Please indicate your nationality:

Portuguese

Other (please indicate which)

APPENDIX E: GENERATIVE AI USED

Tasks done with the help of GenAI	GenAI tools
Understand better or brainstorm some key concepts (Appendix E)	ChatGPT; Elicit
Grammar check	Grammarly
Find synonyms for repeating words	ChatGPT
Create table with the summary of the literature review table	ChatGPT
Create the advertisement to target the out-group	Pictory.AI

APPENDIX F: GENERATIVE AI PROMPTS

Prompts	GenAI answer	GenAI tool
Can we brainstorm for a second? Would you say that people are skeptical about marketing because they are afraid of being 'exploited'?	Absolutely! Let's brainstorm. Yes, I'd say skepticism toward marketing often stems from a fear of being exploited or manipulated. Many consumers feel wary because they know marketing can subtly influence their decisions, sometimes without them realizing it. This fear is compounded by concerns about privacy, data collection, and the use of persuasive techniques like targeted ads, which can feel invasive. People may also feel that marketing is designed to make them act against their best interests, encouraging impulsive purchases or creating desires for things they don't need. In this sense, marketing is sometimes perceived as manipulative, which feeds the skepticism. Neuromarketing, with its focus on understanding unconscious responses, can deepen these concerns, as it may seem like companies are trying to "hack" people's brains to sell products more effectively. What do you think—do you see this skepticism growing with the rise of more advanced marketing technologies, or do you think people will become more accepting as they get used to these tactics?	ChatGPT
People are often threatened by neuromarketing. Thinking that the goal is to get inside people's mind and exploit them. How can we overcome these negative perceptions that people have of neuromarketing? Please only use papers from top ranking ABS3/4/FT journals.	Neuromarketing, a field using brain scanning to understand consumer behavior, faces perception challenges despite its growing acceptance in academia and industry. Studies show mixed attitudes towards neuromarketing among different stakeholder groups. While marketing professionals and neurologists view it more favorably, marketing academics are more skeptical (Eser et al., 2011). Consumers express concerns about its potential for manipulation and intrusiveness, with 93% in one study perceiving it as manipulative (EL Oquadifi et al., 2022). However, research suggests that increased knowledge about neuromarketing, positive attitudes towards science and technology, and ethical considerations can improve perceptions and willingness to participate in neuromarketing studies (Bakardjieva & Kimmel, 2017). To overcome negative perceptions, educating the public about neuromarketing's true nature and applications is crucial. This involves addressing ethical concerns and highlighting its legitimate uses in product development and understanding consumer decision-making processes (Varga & Csordás, 2021).	Elicit
When it comes to emotions, according to Xu, P., Peng, S., Luo, Y., & Gong, G. (2021). Facial expression recognition: A meta-analytic review of theoretical models and neuroimaging evidence. <i>Neuroscience & Biobehavioral Reviews</i> , 127, 820–836. https://doi.org/10.1016/j.neubiorev.2021.05.023 study, there are two types of classical psychological models of emotion processing: the basic emotion model and the dimensional emotion model. When it comes to the dimensional emotion model, we are considering arousal, valence (positive or negative), and motivation (approach or withdrawal). Please explain better the meaning of arousal.	Research on emotion processing has focused on two key dimensions: valence (positive/negative) and arousal (intensity). These dimensions interact in complex ways during word recognition and emotional processing. Studies have shown that words evoking conflicting approach-withdrawal tendencies (positive high-arousal and negative low-arousal) elicit slower reaction times and greater neural activation in the insular cortex compared to words with congruent tendencies (Citron et al., 2014; Citron, 2011). This interaction is observed in early processing stages, as evidenced by ERP components like the early posterior negativity (Citron, 2011). The amygdala has been found to preferentially process arousal, while subregions of the orbitofrontal cortex process valence (Lewis et al., 2006). Additionally, emotional words receive enhanced perceptual processing in the extrastriate cortex compared to neutral words (Citron et al., 2014). These findings highlight the importance of considering both valence and arousal in emotion research and suggest that their integration involves brain regions associated with interoception and emotional awareness (Barrett, 1998; Citron et al., 2014).	Elicit



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