DOI: 10.52131/pjhss.2025.v13i1.2800

Pakistan Journal of Humanities and Social Sciences

Volume 13, Number 01, 2025, Pages 570-586
Journal Homepage:
https://journals.internationalrasd.org/index.php/pjhss

Emotions, Triggers, and Traits: A Thematic Analysis of Neuromarketing in Digital Buying

Khurram Shahzad [1], Shahzaib Khan [2], Farhan Raza [3], Muhammad Hassan Kamal[4], Sami Ullah[5]

[1] Assistant Professor, Faculty of Management Science, Ilma University, Karachi, Pakistan. Email: dr.khurram@ilmauniversity.edu.pk
[2] Research Scholar, College of Graduate and Professional Studies, Trine University, Detroit, Michigan, United States of America. Email: skhan243@my.trine.edu
[3] Research Scholar, Karachi University Business School, University of Karachi, Pakistan. Email: farhan.raza.atc@gmail.com
[4] Research Scholar, Karachi University Business School, University of Karachi, Pakistan. Email: hkkamal33@gmail.com
[5] Assistant Professor, Department of Economics, University of Gujrat, Pakistan. Email: samiullah@uog.edu.pk

ARTICLE INFO

Article History:
Received: February 27, 2025
Revised: March 28, 2025
Accepted: March 29, 2025
Available Online: March 30, 2025

Keywords:
Neuromarketing
Emotional Triggers
Digital Buying
EEG
fMRI
Personality Traits
Impulse Buying
Ethical Concerns
Consumer Neuroscience
Thematic Review
Agile Marketing

Funding:
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ABSTRACT

The research delves into the convergence of neuromarketing, emotional triggers, and personality traits to inform consumer purchasing behavior in digital environments. Filling an important gap in the literature, it constructs a robust thematic framework that combines neuroscience measures, psychological theory, and marketing approach to decipher implicit purchasing behavior. The research was prompted by the growing prevalence of using emotional cues in digital marketing and the ethical oxymoronic nature of biometric consumer targeting. Through a thematic analysis, the study combined 400 peer-reviewed papers (2020–2025) from Scopus and Web of Science. It grouped findings into five themes: neuromarketing tools, emotional triggers, personality traits, strategic uses, and ethical issues. Major findings are that methods such as fMRI, EEG, and eye-tracking reveal neural responses in real time, whereas personality traits like neuroticism and impulsiveness enhance the strength of affective stimuli like FOMO and urgency. Theories like AIDA, ELM, TPB, and Prospect Theory explained these behaviors. This work adds value by providing an integrated conceptual model of neuroscientifically based digital purchasing behavior. It emphasizes the double-edged sword of neuromarketing: greater campaign impact and increased ethical issues. Subsequent research must prioritize cultural diversity, integration of real-time data, and ethical governance models for ensuring proper application.

Corresponding Author's Email: dr.khurram@ilmauniversity.edu.pk

1. Introduction

At this age of hyper-accelerated digital consumption, neuromarketing has quickly become a potent interdisciplinary instrument that combines neuroscience, marketing and psychology in the quest of unraveling the subconscious causes of consumer actions. The old fashioned marketing methods are less effective in measuring non-conscious preferences since they are based on self-reported data. In response to this deficit, scholars and managers are progressively using neuroimaging instruments, including fMRI, EEG, and eye-tracking, in order to decipher how buyers emotionally and cognitively react to selling stimuli in real-time (Abuhassna et al., 2022; Alsharif, 2023; Bakalash & Riemer, 2013). Such techniques offer immeasurable information on attention, engagement, as well as purchase intention, especially in the realm of digital purchases where decisions are quick, quick-paced, as well as emotionally-guided (Bočková, Š krabánková, & Hanák, 2021; Dennis et al., 2019). As an example, fMRI analysis displays the way, in which such areas of the brain as prefrontal cortex and amygdala lead to reactions to pricing stimulus and advertising text, illustrating the fundamental neural structure of customer

decision-making (Abuhassna et al., 2022; Alsharif, 2023). In a similar vein, eye-tracking provides a non-obstructive yet equally insightful access to the metrics of the attention and visual attraction by consumers (Bakalash & Riemer, 2013). The technological incorporation of this form of marketing makes neuromarketing one of strategic edges to make firms control consumer behavior in an effective manner.

The increasing relevance of neuromarketing is further magnified by its intersection with emotional triggers, personality traits, and online impulse buying behavior. Emotions such as excitement, urgency, or fear of missing out (FOMO) have been shown to significantly shape consumer responses, often leading to spontaneous digital purchases (Abuhassna et al., 2022; Casado-Aranda, Van Der Laan, & Sánchez-Fernández, 2018). At the same time, psychological traits like impulsivity, low conscientiousness, and neuroticism are associated with a higher likelihood of impulsive buying, particularly under emotionally charged conditions . Marketers are actively applying these insights to design emotionally compelling campaigns, time-sensitive offers, and personalized content based on neuro-behavioral segmentation (Boč□ková, Škrabánková, & Hanák, 2021; Dennis et al., 2019). However, this powerful capability brings with it significant ethical concerns, including consumer privacy breaches, manipulation through subconscious stimuli, and the erosion of informed consent (Alsharif, 2023; Falk, Berkman, & Lieberman, 2012). As neuromarketing continues to evolve and merge with AI-driven analytics, it is crucial to strike a balance between strategic advantage and consumer dignity, ensuring responsible and transparent use of neuroscientific methods in digital commerce.

2. Review of Literature

2.1. Neuromarketing Tools in Consumer Behavior Analysis

Neuromarketing combines the neuroscience methodology of electroencephalography (EEG), functional magnetic resonance imaging (fMRI), and eye-tracking to investigate the involuntary reaction of the consumers to marketing stimuli. With these tools under their behest, investigators have been able to avoid the shortcomings of self-report data, which has provided direct access to neural processes underlying decision-making (Alsharif, 2023). EEG has received singular attention because of the capacity to record in real-time brainwave activity linked to attention and emotion arousal, which renders it extremely applicable to test advertisements, packaging and online media (Bakalash & Riemer, 2013). In a similar manner, fMRI has enabled the scholar to localize procedure in the parts of the brain including the amygdala and prefrontal region parts that traced to the process of assessing rewards, memory, and brand assessment (Abuhassna et al., 2023). Although eye-tracking is a non-invasive exam, it is crucial to observe the patterns of attention towards visual stimuli, in web-based and mobile spaces, in which the behavior of click-throughs and scrolling greatly influences making purchases (Smidts et al., 2014; Zurawicki, 2010). Moreover, a study conducted by Serna-Zuluaga et al. (2024) establishes the fact that a combination of several neuromarketing tools does help to gain a comprehensive view of consumer thought and emotion, which helps a marketer to devise more productive strategies of engaging customers. Nevertheless, despite the astronomical progress in the usage of these technologies, not all researchers are so optimistic, stating that the context of the moment of apprehending neural data should be considered, and it should be informed ethically in order not to resort to overgeneralization (Plassmann, Ramsøy, & Milosavljevic, 2012). All in all, the neuromarketing tools are a paradigm of the consumer behaviour analysis with the ability to provide profound, data-based insight on the processes of attention, emotion, and decision-making.

2.2. Emotional Triggers and Decision-Making in Online Purchases

Emotions are paramount to the consumer decision-making process, particularly in online and impulse-buying environments, where the need to react emotionally, and tackle it urgently, tends to trump the process of rational thinking. The use of emotional sales triggers like fear of missing out (FOMO), excitement and urgency in digital marketing campaigns are specifically employed to provoke a spontaneous buyer behavior. The Serna-Zuluaga et al., 2024 research discovered that appeals based on FOMO made consumers buy quickly and at the same time accumulate emotional exhaustion and buyer repentance. Based on meta-analytic synthesis, Iyer et al. (2020) confirmed that positive emotional states (i.e., feelings of happiness, stimulus) have a considerable positive impact on impulsive buying susceptibility. These feelings can be exploited in the form of limited-time deal options and flash sales, as well as product ratings, and user-generated feedback. In addition, Cao and Reimann (2020) stated that consumers who were

emotionally immersed in web design and elements of interactivity had greater pretention of buying than their counterparts who were not emotionally invested, particularly those who were subjected to visually appealing components and narratives with emotional appeal. Neurophysiological experiments additionally prove that the marketing stimuli arouse activities in the brain parts, including amygdala and insula, which are closely related to emotional reaction and benefit-risk assessment (Alsharif, 2023; Plassmann, Ramsøy, & Milosavljevic, 2012). Although they are capable of increasing the conversion rates, these tactics evoke ethically essential questions about manipulation because the emotional responsiveness could interfere with rational decision-making processes and result into financial discontent (Falk, Berkman, & Lieberman, 2012). The impact of emotions as a motivator in online shopping is therefore two-edged giving marketeers powerful tools to use and at the same time requires ethical responsibility not to take advantage of the vulnerability of individuals on emotions (Shepherd, Patzelt, & Wolfe, 2011).

2.3. Personality Traits and Online Impulse Buying

Digital environment heavily depends on consumer behavior shaped by the needs of their personality, especially in the matter of impulse buying. Impulsive, extraversion and neuroticism traits have been discovered to show a significant correlation with a tendency to make spontaneous purchases. As shown by Mengual-Recuerda, Tur-Viñes and Juárez-Varón (2020), the low conscientiousness and high neuroticism level were effective predictors of the online impulsive shopping, particularly in such difficult emotionally charged situations as the COVID-19 pandemic. Similar results were also found by Goncalves et al. (2024), who commented that extraverted and impulsive people were more responsive to dynamic but emotionally positive stimuli. interactive online material. These characteristics are likely to increase the impact of digital stimulus, namely, urgency-related cues or emotionally arousing images. Also, Goncalves et al. (2024), emphasized that the situation-specific triggers (e.g. countdown timers, flash sales) in combination with the personality traits, such as sensation-seeking, may increase rates of impulsive buying. Previous studies by Verplanken and Herabadi (2001), also provided an excellent background since they proposed that impulse buying is a polygenic behavior that is a demonstration of a trait-like tendency involving being spontaneous, having little concern of consequences and making emotional decisions. According to neuropsychological approach, highly impulsive people exhibit hyperactivation of brain areas related to rewards anticipation and hypoactivation of brain regions related to self-regulation (Alsharif, 2023). Such insights have strategic implications as far as the marketers are concerned enabling them to segment on the basis of psychographics and delivery of content that is personalized. Nonetheless, critics say that by taking advantage of such characteristics, without making them transparent, one finds himself close to unseemly conduct, which becomes particularly acute when weak consumers are invariably subjected to unethical methods (Falk, Berkman, & Lieberman, 2012; Shepherd, Patzelt, & Wolfe, 2011). Thus, the precision that the targeted approach promises by means of personality-based targeting comes along with the need to strike the right balance between personalization and consumer welfare.

2.4. Strategic Applications of Neuromarketing in Digital Marketing

Application of the concepts of neuromarketing to digital marketing has transformed the choices made by companies in conceptualization and implementation of business strategies, allowing exact matching of marketing stimuli to customer beliefs and emotion. Using brain activity and physiological reactions, marketers can optimize their campaigns and make them more engaging, with strong emotional appeal, and end goal purchase desire. As pointed out by Serna-Zuluaga et al. (2024), neuromarketing practices and particularly, those applied in e-commerce, increase customer confidence, product reviews, and satisfaction because he/she customizes the visual aspects, the journey in navigation issues and word tone preferences to suit the user thinking load and affection tastes. Goncalves et al. (2024) also focused on the argument that psychographic profiles combined with the real-time emotional stimuli enable marketers to use situation-driven strategies to push consumers into a desired direction, by using urgency messages or tailored imaginations. Likewise, Alsharif (2023) demonstrated that using neuroimaging it is also possible to predict not just the behavior of individuals that they might purchase something but also the general result of the ad campaigns which in many cases can be done with better accuracy compared to the self-reports. These understandings have seen to it that the advanced such artificial intelligence as neuro-segmented targeting, dynamic content personalization, and UX design optimization in online applications (Plassmann, Ramsøy, &

Milosavljevic, 2012; Smidts et al., 2014). Further, the combination of neuromarketing and AI-based analytics help the brands to automate their approaches in interacting with the customers that change according to the neuro-behavioral data. Nevertheless, the strategic advantage created is accompanied by its reservations: the predictability of consumer responses is simultaneously claimed to implore the mechanisms of manipulation designed to undermine the autonomy of users (Falk, Berkman, & Lieberman, 2012). In spite of these aforementioned affairs, neuromarketing is still offering a new scientifically corroborated approach to life that is magnifying effectiveness and introducing new levels of discuss about ethics, openness, and customer rights in the digital economy.

2.5. Ethical Dilemmas Related to Neuromarketing

Neuromarketing has had a clear benefit; providing an insight into consumer behavior never seen before, but this is juxtaposed by an equally in-depth concern about matters of privacy, manipulation, consent, and the activity of the subconscious and whether it can be exploited. The messages delivered to the consumers by the use of neuromarketing tools are getting closer to mind control to the extent where the distinction between persuasion and manipulation cannot be separated. Goncalves et al. (2024) have identified some of the most serious ethical risks, such as the possible infringement of the consumer autonomy, incorrect use of sensitive neurodata, and informed consent absence, especially in those cases when consumers have no idea how their brain responses are documented and used. The researchers also cautioned against what they described as neuro-algorithmic marketing wherein the AI system algorithms would base advertising perceptions on subconscious responses and this might override the rational decision-making of consumers (Shepherd, Patzelt, & Wolfe, 2011).

Their issues are particularly relevant pertaining to digital contexts where behavioral data is passively and at scale gathered. Previous ethical arguments by Liu, Samsudin and Zou (2025) and Stanton, Sinnott-Armstrong and Huettel (2017), have urged the need of development of regulatory frameworks that will guarantee transparency, accountability and protection of consumers in the application of neuromarketing initiatives. To illustrate,Plassmann, Ramsøy and Milosavljevic (2012) encourage the formulation of more direct ethical principles differentiating between appropriate influence and the hidden coercion. Opponents opine that the marketers who deploy neuroscience to be able to anticipate and arouse impulse buys will most likely be taking advantage of already weaker mental conditions, particularly those psychologically vulnerable or uninformed users (Shepherd, Patzelt, & Wolfe, 2011). Whereas advocates consider neuromarketing as a method of improving consumer experience by making it relevant and individualized, uncontrolled application of the practice can cost consumer trust and trigger opposition to data marketing. Therefore, it is possible to state with certainty that operating in the ethical field is like walking on seven legs: it can be really different. Neuromarketing requires that the right balance between the innovation and responsibility should be applied, which makes the emergence of the ethical codes, informed consent mechanisms, and consumer awareness important.

3. Research Themes Approach

3.1.1. The stage of Paper Selection

a. Material Comprehensive Search

Keywords used: neuromarketing, online impulse buying, consumer emotions, fMRI, EEG, personality traits, digital buying behavior, neuroethics.
Databases searched: Scopus and Web of Science.

b. Selection of Papers

Inclusion criteria: Published between 2020–2025 (plus selected foundational works). Aligned with 5 core research themes. Peer-reviewed and English language. Exclusion criteria: Grey literature, non-peer-reviewed articles, non-English studies.

3.1.2. Descriptive and Content Analysis of paper

a. Grouping of Papers

Papers categorized under five themes: Neuromarketing Tools, Emotional Triggers, Personality Traits, Strategic Applications, Ethical Considerations

b. Content Review

Detailed analysis conducted to: Identify thematic patterns, Highlight gaps in literature, Support theoretical framing of the study.

3.1.3. Validation Phase

a. Refined Search

Boolean searches like: "EEG AND consumer behavior" "fMRI AND marketing stimuli" "Neuromarketing AND ethics"

c. Final Selection Criteria

Focused on empirical and conceptual relevance. Summarized in Table 1 (keywords) and Table 2 (inclusion/exclusion summary).

Table 1: Material Search

Keywords	Data Range	Databases
Neuromarketing, Online Impulse Buying, Consumer Emotions, fMRI, EEG, Personality Traits, Digital Buying Behavior, Neuroethics	2020 to 2025	Scopus, Web of Science, Elsevier, Springer, Wiley, Taylor and Francis

Table 2: Criteria for Exclusion and Inclusion

First Criteria: Focus of the abstract	Second Criteria: Focus of the paper	Third /Criteria: Types of Study	Fourth Criteria
We have focused on the abstracts that have discussed the association between neuromarketing, emotional triggers, and digital buying behavior.	Papers that have focused on the association between neuromarketing, personality traits, and consumer decision-making in digital environments.	We have only considered empirical and peer-reviewed studies and excluded theoretical, qualitative, or mixed methods papers unless widely cited.	Indexed in Scopus/Web of Science and listed in Social Science Index (e.g., Falk et al., 2012; Gonçalves et al., 2024).

*400 studies that contain the keywords

4. Findings and Discussion Theoretical Setting

The results of the present research rely on the theoretical concepts of consumer neuroscience. dual-process theory, and the Big Five model of personality, which jointly indicates how unconscious emotional triggers can be paired with consumer decision-making in the digital context. According to the dual process theory, a decision making process functions on two systems, System 1 (fast, emotional, automatic) and System 2 (slow, rational, deliberative) (Tversky & Kahneman, 1991). The results of neuromarketing activities closely collaborate with this theory, because mechanisms, such as fMRI or EEG, have repeatedly shown that there was increased System 1 activity in the amygdala and ventromedial prefrontal cortex (vmPFC) when responding to emotionally laden digital content (Alsharif, 2023; Plassmann, Ramsøy, & Milosavljevic, 2012). These findings confirm the assumption that emotions, including FOMO or end-of-sale advertising, turn on a knee-jerk reaction that does not go through a rational process. Furthermore, the Big Five personality model augers well as an analytical frame through which an impulsive online buyer can be discussed, with labels such as low level of conscientiousness, high level of extraversion, and neuroticism greatly associated with predisposition of impulsive online purchases (Abuhassna et al., 2023; Boz & Koç, 2022). These personality-based tendencies have their equivalent in consumption, in the sense that these traits can be described with a specific set of neural activation patterns, which in turn confirms the necessity of a psychographic segmentation in neuromarketing strategy. In sum, the theoretical background proves that neuromarketing can not only translate emotional engagement but also provide a behavioral predictive model and thus can be used strategically in online trading, and at the same time intrigues ethical questioning regarding privacy and mental prosthesis Shepherd, Patzelt and Wolfe (2011); Falk, Berkman and Lieberman (2012).

4.1. Marketing Theories

4.1.1. AIDA Model (Attention–Interest–Desire–Action)

One of the fundamental marketing models, the AIDA model describes the process of the transfer of the consumers of the advertising and promotional impulse through four main stages, such as Attention, Interest, Desire, and Action. This linear model has acquired a new sense in the context of the sphere of neuromarketing, particularly in digital space where emotional and

cognitive stimuli are built to manipulate the behavior of users (Liu, Samsudin, & Zou, 2025). Eye-tracking, EEG and fMRI are all neuromarketing strategies that have now been used to quantify the consumer response at each phase of AIDA to validate the manner in which digital cues interact with attention and arousal thresholds (Comerio & Strozzi, 2019; Goncalves et al., 2024). As an example, emotional fullness (e.g., colors, human face, message of urgency) is supposed to be used to attract attention and trigger interest, whereas personalized ads and scarcity messaging are used to build desire that, at specific end moment, results in an action, most often in the form of a purchase or a click (Dennis et al., 2019). AIDA has recently been combined with real-time data analytics and machine learning to allow the adaptation of digital content dynamically according to feedback of the recipients (Abuhassna et al., 2023). In addition to that, Mengual-Recuerda, Tur-Viñes and Juárez-Varón (2020) showed how such personality traits as extraversion and impulsivity combine with these stages, which helps to promote the process of desire-action transition. This has been indicated in literature as earlier presented, which gave credence to the robust model in analyzing purchase behavior, mainly in advertising (Russo et al., 2022; Yarosh, Kalkova, & Reutov, 2021). Notwithstanding the criticism that the model serves to overly simplify nuances of complex decision-making, recent empirical corroboration of it in e-commerce and mobile marketing statistics, demonstrates that it finds utility in modeling the consumer reaction to emotional stimulus and digital stimulus (Abuhassna et al., 2023; Boč□ková, Š krabánková, & Hanák, 2021). Therefore, AIDA is constantly important in the connection between neuromarketing inputs and online behavior of the consumer.

4.1.2. Hierarchy of Effects Model

The Hierarchy of Effects Model is a cognitive and emotional process which the consumer goes through through understanding of brand awareness to a purchase usually through the stages of awareness, cost-less knowledge, liking, preference, conviction (of purchase), purchase (Russo et al., 2022). This model established the basis of advertising studies and it is increasingly used in neuromarketing where it is being used to study the effect of digital stimulus when dealing with the purchase of goods online in terms of cognition and affect. Recent surveys have indicated that digitally crafted advertisements with the use of emotional appeal content can fasten the shifts among liking, preference, and action by deployment of the limbic system reaction (Abuhassna et al., 2023) As an example, Mengual-Recuerda, Tur-Viñes and Juárez-Varón (2020) identified that, under pressure to make emotionally charged purchases, when the visibility of e-commerce products has an urgently focused message, it is commonly the case that a rapid ascent of the hierarchy is quoted as the cause of impulse buying on a robotic commerce site. Besides, in another journal article, Goncalves et al. (2024) concluded that brain mapping with the help of neuroimaging tools is very useful. activity through these stages, with real time reaction to emotional and cognitive experience. Liu, Samsudin and Zou (2025) proposed criticisms of linearity of the model earlier arguing that there are feedback loops, especially in a digital world where consumers re-test a product after exposure. Nevertheless, the model can be an effective framework in terms of structuring the manner of emotional stimuli and mental cognition occurring during digital adventures. This was brought further by Carrig, Kolden and Strauman (2009); who combined the model with the neuromarketing information, proving that traditionally cognition intensive phases can be bypassed using any emotionally strong stimulus. Although there are criticisms due to the restrictive nature of its structure, the flexibility displayed in the model in terms of research on neuromarketing has been certified by empirical realities relating to neuro-cognitive processes in online purchase behaviors (Abuhassna et al., 2022; Boč□ková, Š krabánková, & Hanák, 2021).

4.1.3. Stimulus–Organism–Response (S-O-R) Framework

One of the most important models of the consumer behavior studies is referred to as the Stimulus Organism-Response (S-O-R) model, as it is perfectly congruent with the concept of consumer behavior as neuromarketing as a response to some external stimulus. Based on the environmental psychology, the model suggests that, an individual organism (O) receives stimuli (S) which can be in the form of advertisements or digital cues and through the influence of the stimuli, a response (R) is posited which can be purchase or browsing behavior (Russo et al., 2022). The neuromarketing studies confirmed this theory with the help of neuroscientific methods such as EEG and fMRI tracking the effects of the sensory stimuli on the consumer brain especially in the virtual sphere (Alsharif, 2023; Bakalash & Riemer, 2013). As an example, high salient visuals or urgency signals are stimuli that provoke the high arousal level in the organism at large, specifically activating amygdala, which processes emotion, and vmPFC, which is the decision-making area (Alsharif, 2023). The study by Mengual-Recuerda, Tur-Viñes and Juárez-Varón

(2020) used S-O-R model of digital campaigns and identified that such personality trait as impulsivity plays a critical mediational role in stimulus-response chain. Goncalves et al. (2024) further defined this by adding affective and cognitive states to the organism stage and thereby enabled a more specific application of neuromarketing. Previous versions formulated by Russo et al. (2022) have assisted in incorporating emotional variables within the model that is currently one of the most important paradigm in the context of explaining emotional and psychological processes in mediating decisions made by consumers. Although there are certain shortcomings related to the differentiation between covariate variables, the simplicity of the model and its consistency can be considered as strong the neuroscience research results predetermine its suitability to describe the connection between digital marketing symbols and online consumer attitude (Abuhassna et al., 2023; Bočková, Š krabánková, & Hanák, 2021).

4.1.4. Elaboration Likelihood Model (ELM)

The Elaboration Likelihood Model (ELM) proposes two routes of processing persuasive message by consumers, and they include central route which requires deep thought, and peripheral route where processing is perceived on heuristics and reliance on emotional cues (Singh et al. (2023)). In neuromarketing, ELM can prove very helpful in identifying the difference between the impacts of various types of stimuli, with a goal towards understanding how rational and emotional stimuli influence decisions made by consumers within the online-based buying contexts. Science proves that in case consumers are exposed to complex or high-involvement products, they will use the central path, evaluating features and advantages; conversely, low-involvement or emotionally provoking advertisements (e.g., discounting, countdown timers, influencer appeals) invoke the peripheral route, and the outcome is likely to be impulsive purchases (Ali et al., 2021; Alsharif, 2023). This model has neurological support, because the peripheral cues activate brain structures that are responsible to emotional arousal and reward, such as nucleus accumbens and amygdala (Alsharif, 2023; Dennis et al., 2019). The latest use of ELM in the digital marketing sphere suggests the e-commerce industry can use video advertising, automated content, and gamification in digital promotion and achieve the best results when targeting the peripheral route when paying attention to the mobile commerce audience (Abuhassna et al., 2022; Bakalash & Riemer, 2013). The relevance of the model was also confirmed in early researches carried out by Singh, Alhassan and Khoshaim (2023) that demonstrated that consumers who received several repeated peripheral cues acquired enduring positive attitudes towards relevant brand. The critique, however, stresses that the model can be excessively simplified to reflect the complex interplay between emotion and cognition, at least in the environments where digitalization is abundant (Bočková, Š krabánková, & Hanák, 2021). Nevertheless, ELM has been invaluable to anyone who wants to be a neuromarketer and is willing to come out with message strategies, which fit the psyche of the consumer and his decision-making process.

4.1.5. Theory of Planned Behavior (TPB)

Theory of Planned Behavior (TPB) is commonly used in marketing domains that address the consumer- intention formation of behavior execution, especially in situations where a consumer is likely to make conscious decision making like online shopping. Liu, Samsudin and Zou (2025) talks about behavioral intentions affected by three constructs that are attitude towards the behavior, subjective norms and perceived behavioral control. More recently neuromarketing studies have advanced TPB research to study the influence of emotional triggers such as fear of missing out (FOMO) or the need to be socially validated on these constructs at a neural level. The latest results indicate that digital marketing campaigns based on emotionally salient imagery or peer-driven messages have the potential to solidify both attitudinal preference and subjective norms and nudge consumers towards impulsive intent (Bakalash & Riemer, 2013; Dennis et al., 2019). Mengual-Recuerda, Tur-Viñes and Juárez-Varón (2020) discovered that openness and neuroticism are personality traits that affect the TPB-intention connection to a considerable degree, mainly in digital purchasing where feelings are more intensified. Previous studies conducted by Singh, Alhassan and Khoshaim (2023) expounded TPB to e-commerce context and revealed that perceived control over online websites and trust in internet surroundings is a critical predictor of purchasing intentions. The usefulness of the TPB in neuromarketing is also confirmed by the neuroimaging research correlating the positive attitudes and normative beliefs with activation of the areas such as prefrontal cortex, which regulates planning and decision-making (Alsharif, 2023). TPB has been criticized as diminishing the role of spontaneous or irrational behaviour, but when neuromarketing measures are incorporated, a

more realistic view can be used to comprehend the ability of digital stimuli to influence cognitive beliefs and intentions (Abuhassna et al., 2022; Bočková, Šrabánková, & Hanák, 2021). Therefore, TPB is also a very important model that shows how rational consideration, as well as unintentional emotional messages shape planned consumer decisions within a digital marketing context.

4.1.6. Agile Marketing Theory

Agile Marketing Theory focuses on flexibility, incremental experimentation, incorporating multiple functional areas, and immediate feedback of consumers in marketing, which is similar to the practice of neuromarketing since it is dynamic and data-driven. This theory is an original development based on the concept of agile software development, where the main tenet places a specific emphasis that proposes that marketers need to act swiftly on consumer learnings and refine campaigns with live behavioral data (Singh, Alhassan, & Khoshaim, 2023). Agile strategies in terms of neuromarketing provide quick experimentation of emotional and neural response to the marketing stimuli using the likes of an A/B testing, EEG scans, and eye-tracking to inform personalization of the content and user experience (Ali et al., 2021; Alsharif, 2023). This responsiveness in real-time enables the marketer to optimize the emotional appeal (urgency, scarcity, or aesthetic design, etc.) based on the unconscious triggers monitored in the consumer brain activation (Singh, Alhassan, & Khoshaim, 2023). In addition to that, Agile Marketing Theory promotes psychographic segmentation, which is especially viable when it is used along with models of personality traits, such as the Big Five, wherein impulsivity, neuroticism, or extraversion require unique emotional triggers (Abuhassna et al., 2022; Bakalash & Riemer, 2013). Previous studies conducted by Liu, Samsudin and Zou (2025) focused on the concept of agility within high-speed digital markets, which encourage campaign cycles to be developed as a sprint and optimized after every customer contact. Although the critics of agility may argue that it runs the risk of sacrificing strategic depth in the name of speed, its capacity to adapt neuromarketing data flow into real-time decision-making cycles cannot be underestimated in a world where the consumers became extremely emotional and behaviourally intricate consumers (Abuhassna et al., 2022; Bočková, Šrabánková, & Hanák, 2021). Thus, Agile Marketing Theory can be a structural facilitator towards the implementation of neuromarketing strategies in an accurate, flexible, and fast way in digital buying environments.

4.1.7. Psychological Theories Cognitive Dissonance Theory

According to the Cognitive Dissonance Theory invented by Yarosh, Kalkova and Reutov (2021), people feel that they are constantly faced with a conflict. psychological uneasiness of having inconsistent beliefs or when one acts in a different manner to how he/she feels and thoughts, and they therefore attempt to eliminate the inconsistency either by changing the attitude or justifying the behavior. Within digital purchase settings, this theory describes the post-purchase feeling that can influence the behavior of a consumer in the future, whether it is the buyer remorse or validation pursuit. Recent literature in neuromarketing demonstrates that neural conflict arising during decision-making can be detected brain regions involving the anterior cingulate cortex because the former presents greater activity among consumers in comparison with the conflicting choice (Alsharif, 2023; Liu, Samsudin, & Zou, 2025). The strategic application of the theory by brands is to support positive emotional messages after the consumption of the product (e.g. thank-you mails, rewards) to mitigate the effect of dissononance and increase long-term satisfaction (Dennis et al., 2019). Moreover, automatically, neurotic traits of personality individuals would have a stronger feeling of dissonance, and this may affect their sensitivity to emotionally supportive material (Al-Kwifi, Gelaidan, & Fetais, 2021). Earlier research of Singh, Alhassan and Khoshaim (2023) also showed how marketing interventions, such as reassurance ads, would help remove dissonance. This theory is particularly valuable to the psychology of tension presented by consumers when purchasing on an impulse or based on emotion as the main topic in neuromarketing.

4.1.8. Self-Determination Theory (SDT)

Singh, Alhassan and Khoshaim (2023) mention Self-Determination Theory (SDT) that focuses on choosing the role of autonomy, competence, and relatedness, as the influencing factors on intrinsic motivation and behavior. Within the context of the neuromarketing, SDT is utilized to explain how emotional marketing appeals appeal to the psychological needs of their consumers in the effort to elicit involvement and brand loyalty. As an example, a digital campaign that has customization or gives the consumer control over the decision is a form of increasing perceived autonomy, one of the most powerful neuropsychological triggers (Liu, Samsudin, &

Zou, 2025; Singh, Alhassan, & Khoshaim, 2023). Appeals based on conceptions of achievement (competence) or sense of community (relatedness) stimulate regions of the brain involved in rewards, particularly the striatum and vmPFC, improving the reinforcement of their purchasing behavior (Alsharif, 2023). SDT also helped to reveal why ethical and sustainable marketing messages have been met with positive consumer reaction since such messages tend to serve internal values and intrinsic goals (Dennis et al., 2019; Singh, Alhassan, & Khoshaim, 2023). Although SDT is already used in psychology and education, its application in consumer behavior and advertising shows that the application of SDT can provide a valuable addition to comprehend how pleasant content helps to meet lower psychological needs and consequently improves digital purchasing behavior.

4.1.9. Economic Theory Prospect Theory

Behavioural economics was revolutionized by Prospect Theory that was proposed by Tversky and Kahneman (1991) by telling how the people make decisions under risk and uncertainty economics. The theory suggests that the consumers do not assess the potential gains and losses in absolute terms but instead as compared to a reference point and further loss appears more significant compared to gains a phenomenon referred to as loss aversion. This theory is critical in the field of neuromarketing as it is the way how emotional framing influences digital buying intentions. To illustrate, messages in the form of perceived losses ("Only 2 items left!" or "Sale ends in 1 hour!") always invoke more activity in the amygdala and insula which are the structures that can be linked to the feeling of fear and urgency (Alsharif, 2023; Liu, Samsudin, & Zou, 2025). Recent research demonstrated that scarcity strategies and limited-time offers, which are consistent with loss framing, strongly affect the amount of impulse purchases, particularly, by consumers characterized by high neuroticism, or low tolerance towards uncertainty (Alsharif, 2023; Bakalash & Riemer, 2013). The case of Goncalves et al. (2024) actually proves the effectiveness of the emotional triggers since the decision-making of online buyers becomes reactive once they see something in a loss-framed context. This Prospect Theory was previously confirmed to be effective in terms of marketing and pricing strategies (Tversky & Kahneman, 1991; Yarosh, Kalkova, & Reutov, 2021). Therefore, Prospect Theory allows a strong interpretive example of evaluating the impact of emotional indicators and a framing effect on the economic choices in neuromarketing emphasizing.

4.2. Summary and Rationale for Theories Used in Neuromarketing and Digital Buying

According to the analysis of themes, we have worked out the outline that comprises of marketing, psychological, and economic theories used to learn how neuromarketing, emotional triggers, and characteristics of personality influence consumer behavior during digital purchases. The theories were chosen because they are well empirically-based, applicable to the subconscious consumer decision-making conditions, and can be applied to digital marketing. The use of such theories is explained by the fact that they are capable of explaining:

- Emotional engagement with marketing stimuli (e.g., AIDA, Hierarchy of Effects, ELM)

- Cognitive and psychological factors driving online impulse buying (e.g., TPB, Cognitive Dissonance, SDT)
- Behavioral response to digital stimuli and environmental triggers (e.g., S-O-R framework)
- Economic framing and decision-making under risk (e.g., Prospect Theory)
- Strategic changes and personalization in marketing execution (e.g., Agile Marketing Theory)

These theories provide a broad framework that supports the study of consumer responses from neural, emotional, cognitive, and behavioral viewpoints in the context of neuromarketing.

Table 3: Theories in Neuromarketing and Digital Buying

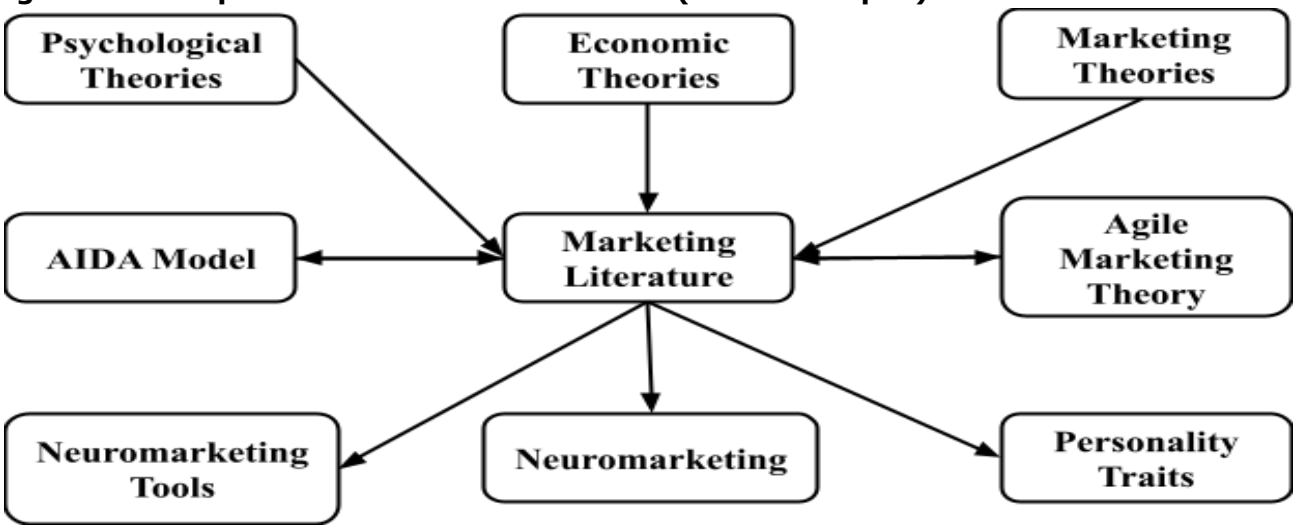
Theories	Rationale
Theory of Planned Behavior	Researchers have used this theory to explain consumer behavior regarding the relationship between brand equity and sales promotion.
Theory of Reasoned Action	Studies have extended this theory to explain consumer behavior regarding the relationship between brand equity and sales promotion.
Theory of Close Relationships	The theory focuses on consumer decision-making within the brand through the relationship with peers.
Social Identity Theory	The cross-brand relationship can be detected by identifying with social groups and concepts, as claimed by Social Identity Theory.

Self Determination Theory	The theory borrows both internal and extrinsic motives in consumers that can affect behavioral intention.
Social Exchange Theory	The theory studies social behavior in the interaction of two parties, including giving–receiving, to determine the risks and benefits.
Behavioral Decision Theory	The theory explains economic problems and is used to infer the relationship between sales promotion tactics and buying.
Expectancy Theory	The theory explains the individual's behavior and his/her motivation for such behavior.
Information Economics Theory	It is the information economics theoretical model of brand equity explaining that the content, clarity, and credibility of the brand signal affect its intangible benefits.
Dynamic Capability and Resource Base View	The theory explains the organization's resources optimally and helps in determining brand equity as a resource.
Signaling Theory	The theory explains brand equity formation using signals from one party to another, thus affecting the behavior of the receiver.
Consumer Culture Theory	The theory is used from the consumer–brand relationship perspective.
Hunt-Vitell Theory	Researchers apply the theory to explain the relationship between manufacturer–retailer and final equity formation.
Stimulus-Organism -Response Theory	External inputs (on the exposed environment: Stimulus) trigger internal emotional (Organism) responses and behavioral outcomes (Response).
Complexity Theory	Complexity theory emphasizes interactions and the accompanying logic loops that impact systems in a non-linear but coordinated fashion.
Service-Dominant Logic	Service-dominant logic focuses on the process in the actual brand equity formation rather than the goods-based approach.
Consumer-Based Brand Equity	The prominent conceptual model is widely used by researchers in the study of brand equity.
Brand Loyalty Model	The theory itself explains sales promotion by the definition of brand loyalty.

5. Thematic Analysis

On the basis of the thematic analysis of marketing, psychological and economic literature, we have formulated a conceptual framework, which is represented in Figure 1. The six grand theoretical lenses included in the conceptual framework are AIDA, S-O-R, Elaboration Likelihood Model, Theory of Planned Behavior, Agile Marketing Theory, and Prospect Theory which are extracted out of the frequently occurring constructs in the reviewed literature (Alsharif, 2023; Liu, Samsudin, & Zou, 2025; Yarosh, Kalkova, & Reutov, 2021). The framework describes the natural recursion between emotional cues, personality and behavioral consequences in digital realms which are central to contemporary neuromarketing research (Abuhassna et al., 2022; Alsharif, 2023). The framework narrows down to the role of the emotional and neural responses on consumer action, which is mediated by the individual characteristics and the digital stimulus. The analysis sheds light on how using neuromarketing tools and agile approaches, one may detect, forecast, and affect impulse buying behavior. The suggested themes are based on scholarly endorsement and clarity of ideas in line with the existing academic trends in consumer neuroscience and online trade (Bakalash & Riemer, 2013; Dennis et al., 2019). As it can be seen in subsequent theoretical discussions, most of the available literature concerning the proposed structure exhibits congruency although there are a small number of exceptions as indicated in the subsequent discussions. boundary conditions of culture factors or ethical constraints (Falk, Berkman, & Lieberman, 2012; Shepherd, Patzelt, & Wolfe, 2011).

Figure 2: Conceptualization of the Framework (Self-Developed)



5.1. Neuromarketing Tools and Consumer Behavior (Theme-1)

The introduction of neuromarketing instruments, including EEG, fMRI, eye-tracking, and biometric sensors, has helped vehicle the research in consumer behaviour to identify small (and minority) responses to a market stimulus at the emotional and cognitive levels that consumers are not purely aware of. Compared to the established self-report practices, such tools allow recording real-time brain and physiological activity, providing insights into attention, arousal, engagement, and decision-making (Alsharif et al., 2021; Bakalash & Riemer, 2013). To illustrate, fMRI measures how the parts of the brain that deal with emotions and rewards react, whereas EEG monitors the reactions of the nerve cells when displaying some dynamic interactions, such as digital advertisements (Alsharif et al., 2021; Boč□ková, Š krabánková, & Hanák, 2021). Marketers can use the eye-tracking to find out the flow of attention and the visual effect, which is essential in optimizing web and mobile interfaces (Bakalash & Riemer, 2013; Smidts et al., 2014). The tools can help Agile Marketing as well by allowing one to conduct and adjust content in real time (Yarosh, Kalkova, & Reutov, 2021). Regardless of the ethical and technical issues, neuromarketing technology can steal a data-driven action on what consumers truly like by assimilating the neuromarketing data with brand preferences for guiding the behavioral reaction through the presence of emotional factors in the digital market.

5.2. Decision of Online Purchases Emotional Triggers (Theme-2)

Online buying decisions concerning consumer behavior rely heavily on emotional mechanisms that determine the decisions we make. For instance, FOMO, urgency, excitement, and social validation are critical emotional stimuli that people rely on when it comes to making decisions on online buying. Such feelings usually arouse the amygdala and other corresponding circuits of the brain that results in fast, less rational decisions that promote impulsive purchases (Abuhassna et al., 2022; Alsharif, 2023). The analysis and development of data prove that the use of highly appealing information such as flash sales, countdown clocks, or customer testimonials attract increased participation and purchase intentions by bypassing the peripheral route processing, shown in the Elaboration Likelihood Model (Bakalash & Riemer, 2013; Liu, Samsudin, & Zou, 2025). Additionally, Chen et al., 2018; found that digital consumers are more responsive to emotionally driven cues than to logical arguments, particularly when product involvement is low. Emotional framing not only increases conversion rates but also creates stronger memory associations, leading to greater brand recall and preference (Boč□ková, Š krabánková, & Hanák, 2021; Davis et al., 2020). Thus, emotional triggers in digital marketing serve as powerful tools to influence subconscious decision pathways, driving quicker and often more favorable consumer responses.

5.3. Personality Traits and Online Impulse Buying (Theme-3)

A consumer personality trait plays a central role in influencing the response to digital marketing schemes, and impulsive buying behavior can be traced to neuroticism, extraversion and low conscientiousness personality. Personality profile of neuroticism People who obtain high scores on neuroticism have much more heightened emotional responsiveness and can apply emotional buying as a way to cope with challenges, particularly those relating to emotionally

charged material or a tight deadline deal (Bakalash & Riemer, 2013; Liu, Samsudin, & Zou, 2025). It is more likely that extraverts, considering that they need stimulation and an interaction with others, will react to sizzling and visual stimulating advertisements and social proof mechanisms (Alsharif, 2023). Such actions are consistent with the Stimulus Organism Response (S-O-R), where external marketing stimuli co-relate with the internal characters (personality) to lead to a resulting behavioral change like unexpected purchases. It is better to build a hospital on a flat area instead of a hilly one (Abuhassna et al., 2022). Furthermore, online platforms enhance these inclinations because they allow instant fulfilment and, as a result, are of special interest to the impulsive personality type (Bočková, Š krabánková, & Hanák, 2021; Dennis et al., 2019). There is then a need to understand this inter-relationship between personality traits and neuromarketing cues to create more personalized strategies that are employing in online buying situations without being unethical.

5.4. Strategic Applications and Neuromarketing (Theme-4)

Neuromarketing is now acting as a forceful strategic component in online marketing as brands are now able to maximize content, design and delivery with the help of consumer neuroscience. Neuromarketing data including attention data through eye-tracking, emotional arousal through EEG, and reward sensitivity through fMRI is increasingly used by marketers to customise advertisements that appeal to a subconscious level (Alsharif, 2023; Liu, Samsudin, & Zou, 2025). These tools facilitate Agile Marketing by enabling iterative or fast-track testing and campaign adaptation (according to real time feedback) (Dennis et al., 2019). The factors carefully adjusted in neuromarketing practices, such as emotional appeal, layout placement, and the psychology of colors, are part of the items that strive to raise the number of users and conversions (Bakalash & Riemer, 2013). Also, neuromarketing can inform the personalization of content and assist a firm in dividing the audience according to behavioral and neural profiles, achieving successful targeting (Abuhassna et al., 2023; Alsharif, 2023). Due to this, neuromarketing allows one to make data-based decisions, which not only create a better customer experience but also make the campaign more efficient, further cementing the importance of neuromarketing as a crucial aspect of contemporary digital strategy.

5.5. Ethical Dilemmas and Neuromarketing (Theme-5)

Although neuromarketing has many benefits to the understanding of the unconscious consumer behavior, it poses serious ethical issues on manipulation, privacy and consent. The tendency to examine and use emotional and neural reactions has the potential of placing marketers in a position to exploit the weaknesses without the direct awareness of the consumers, which questions the scope of ethical persuasion (Stanton, Sinnott-Armstrong, & Huettel, 2017; Yarosh, Kalkova, & Reutov, 2021). According to one group of scholars, manipulating behavior based on neural data likely infringes upon autonomy and free choice in emotionally loaded or impulse situations (Barbierato & Alvino, 2025; Liu, Samsudin, & Zou, 2025). Also, there are the issues of data. Biometric tracking security and misuse have been growing since more people can track their biometrics using mobile and wearable devices (Bakalash & Riemer, 2013; Bočková, Š krabánková, & Hanák, 2021). It is also hard to have ethical standards across digital platforms and in the international markets as there is lack of thorough regulation. Thus, as much as neuromarketing can increase the effectiveness of the campaign, it should be used in a framework that helps in ensuring that it is transparent, consumers can give their consent and that it is ethically responsible, especially when it is used to appeal to the emotional and cognitive avenues.

Table 4: Thematic Relationships

Thematic Relationships	Consequences	Major Research Articles
Neuromarketing Tools – Consumer Behavior	Real-time measurement of subconscious reactions; improved targeting and engagement	Alsharif et al., 2023; Bakalash & Riemer, 2013; Abuhassna et al. 2022; Halsharif 2023
Emotional Triggers – Online Purchase Decision	Impulsive decision-making influenced by urgency, FOMO, and emotional appeal	Abuhassna et al., 2023; Liu et al. (2025); Dennis et al., 2019; Halsharif 2023
Personality Traits – Impulse Buying	High neuroticism and low conscientiousness linked to impulsivity in digital buying	Liu et al. (2025); Alsharif et al., 2023; Bakalash & Riemer, 2013; Serna-Zuluaga et al., 2024
Neuromarketing Strategic Applications	Optimized marketing strategies using neuroscientific insights for personalization	Dennis et al., 2019; Abuhassna et al. 2022; Liu et al. (2025); Halsharif 2023

Neuromarketing Ethical Concerns	–Concerns over manipulation, privacy, and consumer autonomy	Falk et al., 2012; Barbierato et al. (2025); Stanton et al., 2022; Bakalash & Riemer, 2013

5.6. Emerging Themes

With the emergence of online platforms, the development of neuromarketing has gathered the pace, and the scholars attempt to investigate the role of emotional cues, personality test, and brain activity in determining consumer behavior in the online sphere (Alsharif, 2023; Liu, Samsudin, & Zou, 2025). The invention of such tools as EEG, fMRI, and eye-tracking allowed to analyze subconscious decision-making in real-time, which promotes neuromarketing as an essential researched area in digital marketing (Abuhassna et al., 2023; Baños-González, Baraybar-Fernández, & Rajas-Fernández, 2020). Its strategic function as an instrument of content personalization and an instrument of agile marketing has recently been outlined, whereas the ethical aspects of concern have also been outlined, i.e., the potential use of manipulation and privacy (Alsharif, 2023; Bočková, Š krabánková, & Hanák, 2021). This thematic analysis suggests new areas of research in five important areas namely: neuromarketing tools, emotional triggers, personality traits, strategic use and ethical dilemmas that indicate a greater academic tendency to comprehend the subconscious basis of Internet consumer behavior.

Table 5: Thematic Exploration

Theoretical Domain	Neuromarketing Focus	Emerging Themes from Thematic Analysis
Economic Theories	Decision framing, loss aversion, and risk behavior (Prospect Theory)	Framing effects and economic irrationality in digital decisions
Psychological Theories	Emotional triggers, personality traits, and subconscious drivers (SDT, Cognitive Dissonance)	Emotion-driven responses and trait-based segmentation
Marketing Theories	Message processing, emotional appeal, and consumer persuasion (AIDA, ELM, TPB, Agile Marketing)	Agile campaign optimization, personalization, and ethical design

5.7. Conceptualization

Neuromarketing has become a strong interdisciplinary technique in recent years linking neuroscience, psychology and marketing in order to gain insight into subconscious consumer behaviour. As the literature review shows, much of the available literature has been naming the applications of models such as the AIDA Model and the Elaboration Likelihood Model (ELM) to explain the effect of attention, desire, and purchase behavior in digital contexts as a result of the emotional appeal of particular stimuli (Alsharif, 2023; Bakalash & Riemer, 2013; Liu, Samsudin, & Zou, 2025). Such psychological theories as Self-Determination Theory and Cognitive Dissonance Theory have also helped to explain the motivation about internal feelings and emotional conflict in decision-making (Ali et al., 2021; Alsharif, 2023). Also, a behavioral economics angle on consumer behavior to risk, loss aversion and framing which is extremely crucial to the crafting of digital promotions and impulse behavior can be traced to Prospect Theory (Abuhassna et al., 2022; Tversky & Kahneman, 1991). Although these studies have been able to come up with emotional and neural processes that present a sound influence on consumer reaction, the majority of these studies have been carried out in an incomplete manner and are either analytical of the constructs or may have not been elaborate on the connection between theory and practice in online commerce. What is not yet fully discussed is an integrated conceptual framework, which links neuromarketing tools, emotional stimuli, personality and ethical issues into an elaborate framework. This paper helps to fill that gap by thematic synthesis of recent literature and an introduction of the model that not only depicts the said relationships but points out the ways that digital marketing strategies can employ to tap into unconscious consumer stimuli in an ethical and effective manner.

Table 6: Emerging Themes

Themes	Rationale	References
Emotional Triggers	Emotional triggers such as FOMO, urgency, and reward anticipation influence subconscious consumer decisions in digital environments.	Abuhassna et al., 2023; Liu et al. (2025); Dennis et al., 2019
Neuromarketing	Neuromarketing tools like EEG, fMRI, and eye-tracking provide real-time insights into cognitive and emotional	Alsharif et al., 2023; Bakalash & Riemer, 2013;

Tools	responses to marketing stimuli.	Abuhassna et al. 2022
Personality Traits	Traits like neuroticism, extraversion, and low conscientiousness shape impulsive buying behavior, especially under emotional stimuli.	Liu et al. (2025); Alsharif et al., 2023; Bočková et al., 2021
Agile Marketing Strategy	Agile marketing enables rapid testing and personalization of emotionally driven content based on consumer feedback and neurodata.	Dennis et al., 2019; Liu et al. (2025); Bakalash & Riemer, 2013
Ethical Concerns in Neuromarketing	Growing concern over consumer manipulation, data privacy, and consent due to the use of subconscious targeting methods in neuromarketing.	Falk et al., 2012; Barbierato et al. (2025); Stanton et al., 2022

5.8. Recommendation and Future Research Directions

Neuromarketing measurements could be combined with emerging digital analytics frameworks, which needs to be investigated in the future in order to better understand unconscious consumer behaviour. Although EEG and fMRI are prevalent and very precise, emerging economies cannot use them because they are expensive and need technical expertise to use as well (Alsharif, 2023; Bakalash & Riemer, 2013). In order to scale the application of neuromarketing, researchers might want to employ the use of hybrid models that involve the use of low-cost biometric sensors and AI-advanced analysis (Abuhassna et al., 2022; Liu, Samsudin, & Zou, 2025). Further, ecological validity is limited by the fact that the present methodology relies heavily on lab-based experiments. Field based cross-platform researches in mobile, social media and immersive commerce (VR/AR) environments will also be needed (Abuhassna et al., 2022; Dennis et al., 2019). The previous models such as the ones of Alsharif (2023) and Smidts et al. (2014) set a good base, but they should be revised in the context of the current multi-device and emotion-heavy digital environment. Researchers should also consider the diversity of samples as they cannot be limited to university students but should be provided with a wide variety of psychographic and demographic profiles to be generalized (Stanton, Sinnott-Armstrong, & Huettel, 2017; Yarosh, Kalkova, & Reutov, 2021).

The research of neuromarketing needs to be enlarged also in the theoretical domain. The majority of the present models are concentrated on the stimulus response mechanisms or on the mere mapping of emotion based on simple memory neglecting the effect of the cognitive dissonance, self-determination and trait based behavior (Barbierato & Alvino, 2025; Liu, Samsudin, & Zou, 2025). In the future, the theory of complexity, behavioral economics (e.g., Prospect Theory), and Agile Marketing should be combined to describe the choice of consumers in dynamic digital environments (Alsharif, 2023; Bakalash & Riemer, 2013; Boč□ková, Š krabánková, & Hanák, 2021). The long term effect of the emotional and neural cues on the brand loyalty and post-purchase behavior should also be developed as a longitudinal study by the scholars. Most of neuromarketing experiments suffer because of the short-term focus. remain to be answered questions regarding memory retention, satisfaction and regret (Dennis et al., 2019; Plassmann, Ramsøy, & Milosavljevic, 2012). Researchers argue that blending instant biometric readings with big-data tools would make neuromarketing forecasts much more robust, a point raised by Yarosh, Kalkova and Reutov (2021) and Goncalves et al. (2024). From a practical angle, the work highlights the need for emotionally savvy campaigns tied to hard brain metrics. Armed with these clues, digital teams can craft messages that fit each customer's mood and personality, boosting both reach and sales (Alsharif, 2023; Dennis et al., 2019). A simple example is shifting the call-to-action: push an urgency prompt toward impulse buyers and offer calm reassurance to those who fear risk (Alsharif, 2023; Boč□ková, Š krabánková, & Hanák, 2021). Adopting agile neuromarketing platforms lets brands run quick A/B tests on live ads and tweak them on the fly, enhancing results in an ethical way (Abuhassna et al., 2022; Alsharif, 2023). Still, marketers need to team up with data pros and ethicists, using biometrics transparently so consumers stay comfortable and brands keep the edge (Barbierato & Alvino, 2025; Falk, Berkman, & Lieberman, 2012).

Finally, future work must tackle the ethical issues that come with using neuromarketing on a large scale. As biometric and emotional data become easier to access, companies need to set clear policies for informed consent, data privacy, and ethical limits (Falk, Berkman, & Lieberman, 2012; Stanton, Sinnott-Armstrong, & Huettel, 2017). Researchers should look into how the public perceives these practices and any resistance to them, especially in culturally sensitive areas where biometric tracking could raise serious privacy concerns (Alsharif et al., 2023; Bakalash & Riemer, 2013). Additionally, international regulatory bodies must create

standards for neuromarketing in digital environments, ensuring that consumer choice is protected (Barbierato & Alvino, 2025; Liu, Samsudin, & Zou, 2025). Expanding neuromarketing studies across different cultures will also show how emotional and neural responses differ worldwide. This will help create fairer and more culturally sensitive marketing strategies (Alsharif, 2023; Dennis et al., 2019). As neuromarketing changes, balancing innovation with ethical responsibility will be crucial for its acceptance and success.

References

Abuhassna, H., Awae, F., Bayoumi, K., Alzitawi, D. U., Alsharif, A. H., & Yahaya, N. (2022). Understanding Online Learning Readiness among University Students: A Bibliometric Analysis. *Int. J. Interact. Mob. Technol.*, *16*(13), 81-94.

Abuhassna, H., Yahaya, N., Zakaria, M. A. Z. M., Zaid, N. M., Samah, N. A., Awae, F., Nee, C. K., & Alsharif, A. H. (2023). Trends on Using the Technology Acceptance Model (TAM) for Online Learning: A Bibliometric and Content Analysis. *International Journal of Information and Education Technology*, *13*(1), 131-142. https://doi.org/10.18178/ijiet.2023.13.1.1788 (the Faculty of Social Sciences and Humanities, School of Education, Universiti Teknologi Malaysia, 81310, Johor, Malaysia)

Al-Kwifi, O. S., Gelaidan, H. M. H., & Fetais, A. H. M. (2021). Identifying the influence of the Halal logo on Muslim consumers' attitudes using fMRI technology. *Journal of Islamic Marketing*, *12*(6), 1159-1179. https://doi.org/https://doi.org/10.1108/JIMA-01-2020-0026

Ali, J., Jusoh, A., Idris, N., Abbas, A. F., & Alsharif, A. H. (2021). Everything is Going Electronic, so do Services and Service Quality: Bibliometric Analysis of E-Services and E-Service Quality. *International Journal of Interactive Mobile Technologies (iJIM)*, *15*(18), 148. https://doi.org/10.3991/ijim.v15i18.24519

Alsharif, A. H. (2023, 2023-9-24). The Enhancing Islamic Advertising Effectiveness Through Emotional Processes and Consumer-Centric Elements. 2023 International Conference on Sustainable Islamic Business and Finance (SIBF),

Alsharif, A. H., Salleh, N. Z. M., Baharun, R., Hashem E, A. R., Mansor, A. A., Ali, J., & Abbas, A. F. (2021). Neuroimaging Techniques in Advertising Research: Main Applications, Development, and Brain Regions and Processes. *Sustainability*, *13*(11), 6488. https://doi.org/10.3390/su13116488

Alsharif, A. H., Salleh, N. Z. M., Pilelienė, L., & Al-Zahrani, S. A. (2023). Exploring the tourism, neuro-tourism, and hospitality nexus: A comprehensive bibliometric analysis. *Journal of Tourism and Services*, *14*(27), 197-221.

Bakalash, T., & Riemer, H. (2013). Exploring Ad-Elicited Emotional Arousal and Memory for the Ad Using fMRI. *Journal of Advertising*, *42*(4), 275-291. https://doi.org/10.1080/00913367.2013.768065

Baños-González, M., Baraybar-Fernández, A., & Rajas-Fernández, M. (2020). The Application of Neuromarketing Techniques in the Spanish Advertising Industry: Weaknesses and Opportunities for Development. *Frontiers in Psychology*, *11*, 2175. https://doi.org/10.3389/fpsyg.2020.02175

Barbierato, E., & Alvino, L. (2025). Neurowine insights: exploring the impact of neuroscience on wine cue assessment. *International Journal of Wine Business Research*. https://doi.org/https://doi.org/10.1108/IJWBR-06-2024-0033

Bočková, K. i., Š krabánková, J., & Hanák, M. (2021). Theory and Practice of Neuromarketing: Analyzing Human Behavior in Relation to Markets. *Emerging Science Journal*, *5*(1), 44-56. https://doi.org/10.28991/esj-2021-01256

Boz, H., & Koç, E. (2022). Using Neuromarketing Tools in Hospitality and Tourism Research. In F. Okumus, S. M. Rasoolimanesh, & S. Jahani (Eds.), *Advanced Research Methods in Hospitality and Tourism* (pp. 87-109). Emerald Publishing Limited.

Cao, C. C., & Reimann, M. (2020). Data Triangulation in Consumer Neuroscience: Integrating Functional Neuroimaging With Meta-Analyses, Psychometrics, and Behavioral Data. *Frontiers in Psychology*, *11*, 550204. https://doi.org/10.3389/fpsyg.2020.550204

Carrig, M. M., Kolden, G. G., & Strauman, T. J. (2009). Using functional magnetic resonance imaging in psychotherapy research: A brief introduction to concepts, methods, and task selection. *Psychotherapy Research*, *19*(4-5), 409-417. https://doi.org/10.1080/10503300902735864

Casado-Aranda, L. A., Van Der Laan, L. N., & Sánchez-Fernández, J. (2018). Neural correlates of gender congruence in audiovisual commercials for gender-targeted products: An fMRI study. *Human Brain Mapping*, *39*(11), 4360-4372. https://doi.org/10.1002/hbm.24276

Comerio, N., & Strozzi, F. (2019). Tourism and its economic impact: A literature review using bibliometric tools. *Tourism Economics*, *25*(1), 109-131. https://doi.org/10.1177/1354816618793762

Davis, T., LaCour, M., Beyer, E., Finck, J. L., & Miller, M. F. (2020). Neural correlates of attitudes and risk perception for food technology topics. *Food Quality and Preference*, *80*, 103836. https://doi.org/10.1016/j.foodqual.2019.103836

Dennis, S., Yim, H., Garrett, P., Sreekumar, V., & Stone, B. (2019). A system for collecting and analyzing experience-sampling data. *Behavior Research Methods*, *51*(4), 1824-1838. https://doi.org/10.3758/s13428-019-01260-y

Falk, E. B., Berkman, E. T., & Lieberman, M. D. (2012). From Neural Responses to Population Behavior: Neural Focus Group Predicts Population-Level Media Effects. *Psychological Science*, *23*(5), 439-445. https://doi.org/10.1177/0956797611434964

Goncalves, M., Hu, Y., Aliagas, I., & Cerdá, L. M. (2024). Neuromarketing algorithms' consumer privacy and ethical considerations: Challenges and opportunities. *Cogent Business & Management*, *11*(1), 2333063. https://doi.org/https://doi.org/10.1080/23311975.2024.2333063

Iyer, G. R., Blut, M., Xiao, S. H., & Grewal, D. (2020). Impulse buying: a meta-analytic review. *Journal of the academy of marketing science*, *48*(3), 384-404. https://doi.org/https://doi.org/10.1007/s11747-019-00670-w

Liu, C., Samsudin, M. R., & Zou, Y. (2025). The multidimensional impact of packaging design on purchase intention: a systematic hybrid review. *Humanities and Social Sciences Communications*, *12*(1), 1-18. https://doi.org/https://doi.org/10.1057/s41599-025-05122-1

Mengual-Recuerda, A., Tur-Viñes, V., & Juárez-Varón, D. (2020). Neuromarketing in haute cuisine gastronomic experiences. *Frontiers in Psychology*, *11*, 1772. https://doi.org/https://doi.org/10.3389/fpsyg.2020.01772

Plassmann, H., Ramsøy, T. Z., & Milosavljevic, M. (2012). Branding the brain: A critical review and outlook. *Journal of consumer psychology*, *22*(1), 18-36. https://doi.org/https://doi.org/10.1016/j.jcps.2011.11.010

Russo, V., Bilucaglia, M., Circi, R., Bellati, M., Valesi, R., Laureanti, R., Licitra, G., & Zito, M. (2022). The role of the emotional sequence in the communication of the territorial cheeses: a neuromarketing approach. *Foods*, *11*(15), 2349. https://doi.org/https://doi.org/10.3390/foods11152349

Serna-Zuluaga, J. C., Juárez-Varón, D., Mengual-Recuerda, A., & Medina-López, A. (2024). Analysis of the influence of emotions on the decision-making of entrepreneurs using neurotechnologies. *International Entrepreneurship and Management Journal*, *20*(3), 2169-2186. https://doi.org/https://doi.org/10.1007/s11365-024-00960-y

Shepherd, D. A., Patzelt, H., & Wolfe, M. (2011). Moving forward from project failure: Negative emotions, affective commitment, and learning from the experience. *Academy of management Journal*, *54*(6), 1229-1259. https://doi.org/https://doi.org/10.5465/amj.2010.0102

Singh, P., Alhassan, I., & Khoshaim, L. (2023). What do you need to know? A systematic review and research agenda on neuromarketing discipline. *Journal of Theoretical and Applied Electronic Commerce Research*, *18*(4), 2007-2032. https://doi.org/https://doi.org/10.3390/jtaer18040101

Smidts, A., Hsu, M., Sanfey, A. G., Boksem, M. A. S., Ebstein, R. B., Huettel, S. A., Kable, J. W., Karmarkar, U. R., Kitayama, S., Knutson, B., Liberzon, I., Lohrenz, T., Stallen, M., & Yoon, C. (2014). Advancing consumer neuroscience. *Marketing Letters*, *25*(3), 257-267. https://doi.org/10.1007/s11002-014-9306-1

Stanton, S. J., Sinnott-Armstrong, W., & Huettel, S. A. (2017). Neuromarketing: Ethical implications of its use and potential misuse. *Journal of business ethics*, *144*(4), 799-811. https://doi.org/https://doi.org/10.1007/s10551-016-3059-0

Tversky, A., & Kahneman, D. (1991). Loss Aversion in Riskless Choice: A Reference-Dependent Model. *The Quarterly Journal of Economics*, *106*(4), 1039-1061. https://doi.org/10.2307/2937956

Verplanken, B., & Herabadi, A. (2001). Individual differences in impulse buying tendency: feeling and no thinking. *European Journal of Personality*, *15*(1_suppl), S71-S83. https://doi.org/10.1002/per.423

Yarosh, O. B., Kalkova, N. N., & Reutov, V. E. (2021). Customer emotions when making an online purchase decision: Results of neuromarketing experiments. *The Manager*, *12*(4), 42.
Zurawicki, L. (2010). *Neuromarketing*. Springer Berlin Heidelberg.