

Neuro-Marketing and Consumer Behaviour: Exploring the Use of Neuroscience Techniques to Understand How Consumers Make Decisions and Respond to Marketing Stimuli.

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ABSTRACT

As a multidisciplinary approach to understanding the complex interrelationship between neuroscience, psychology, and marketing, the area of neuromarketing has emerged. This abstract explores the use of cutting-edge neuroscience methods to learn more about the mental mechanisms that underlie consumer decision-making and their reactions to various marketing stimuli. Consumers are inundated with a dizzying selection of goods, services, and advertisements in today's market. Businesses looking to improve their tactics must prioritise understanding the elements influencing customer decisions and the mechanics underlying how they react to marketing initiatives. Traditional marketing research techniques, like surveys and focus groups, frequently rely on self-reported data, which can be biased and may not completely identify the underlying forces shaping consumer behaviour.

By giving clear insights into brain activity, emotional responses, and attention patterns, neuroscience techniques like functional magnetic resonance imaging (fMRI), electroencephalography (EEG), and eye-tracking offer a fresh perspective. The goal of neuromarketing is to identify the underlying neurological mechanisms that shape customer decisions by observing neural activity in reaction to particular stimuli. This method may be able to close the gap between conscious and unconscious decision-making processes by illuminating the emotional and cognitive triggers that influence consumer behaviour.

This paper highlights the key objectives of the study, investigating the neurological correlates of consumer behaviour by using neuroimaging methods to look at how various marketing stimuli, such as ads, product packaging, and brand logos,

influence the activation of brain circuits related to emotion, memory, and reward. Discovering Subconscious Influences: Investigating brain responses that take place before people are cognitively aware of their preferences or choices in order to better understand the significance of subconscious cues in consumer decision-making. Developing more effective ads and custom experiences that connect with customers on a deeper level requires translating neuroscientific research into insights that marketers can use immediately. Addressing privacy issues and the responsible use of neurological data, as well as the ethical implications of applying neuroscience techniques in consumer research.

This paper is an attempt to analyse the impact of correlation between neuro marketing and consumer behaviour.

I. INTRODUCTION

Understanding customer behaviour and successfully influencing purchasing decisions have emerged as key issues for firms looking to flourish in a constantly changing environment in today's hypercompetitive marketplace. Although traditional marketing research techniques frequently rely on self-reported data, which may not accurately reflect the complex cognitive and emotional processes that influence consumer choices, they have still offered insightful information about consumer preferences and trends. Discover the hidden dynamics underlying consumer decision-making with the help of neuromarketing, a cutting-edge discipline that combines the power of neuroscience with marketing techniques. The understanding of the complex interaction between the human brain, behaviour, and marketing stimuli has undergone a paradigm change as a result of neuromarketing. It

explores the brain basis of consumer responses to diverse marketing signals by utilising the potential of cutting-edge neuroscience tools including functional magnetic resonance imaging (fMRI), electroencephalography (EEG), and eye-tracking. Neuromarketing aims to shed light on the unseen influences that influence consumer behaviour by looking at brain activity, offering insights that go beyond conventional research techniques. The fundamental tenet of neuromarketing is the understanding that customer decisions are not only driven by logic but also highly impacted by implicit associations, memories, and emotions. Even while they are powerful, traditional marketing methods frequently only appeal to consumers' conscious minds, ignoring the great majority of their underlying motives. By identifying the brain markers for emotions, attention, and memory retrieval, neuroThis innovative project is not without its difficulties and moral dilemmas, though. Consumer research using neuroscience methods raises concerns regarding privacy, informed permission, and the ethical use of neurological data. As technology develops, it is crucial to strike a balance between utilising neuromarketing's potential and preserving customers' rights and welfare.

This study explores the neurological mechanisms behind consumer decision-making in an effort to gain a deeper knowledge of consumer behaviour via the perspective of neuroscience. The study attempts to provide light on the intricate interactions between the human brain, emotions, and marketing stimuli by fusing neuroscience methods with marketing insights. In the end, this study promises to transform how companies approach consumer contact, resulting in more knowledgeable, inventive, marketing fills in this knowledge gap and sheds light on the less obvious facets of consumer behaviour. Several appealing goals are the driving forces behind this investigation into the relationship between neurobiology and consumer behaviour. The first objective of the discipline is to identify the brain correlates of reward processes, emotional engagement, and memory retention in response to marketing stimuli. Businesses can better target their tactics to stimulate these regions of the brain by identifying the brain areas linked to favourable responses. Second, neuromarketing aims to understand the subliminal cues that unintentionally affect choices. These cues, which can be anything from tiny visual cues to linguistic cues, are crucial in determining consumer preferences and behaviour. Thirdly, this junction attempts to offer a scientific basis for improving marketing tactics,

guaranteeing that advertisements resonate more deeply and produce effects that are more significant and efficient marketing techniques in the dynamic environment of contemporary commerce.

FACTORS INFLUENCING CONSUMER BEHAVIUR

Psychological elements:

Perception: How users understand and comprehend data from their surroundings.

Motivation: The fundamental causes that compel people to satisfy their wants and requirements.

Consumer education is the process by which they become informed and knowledgeable about goods and services.

Consumer opinions and assessments of goods, brands, and businesses are referred to as attitudes and beliefs.

Lifestyle: Personal qualities and attributes that affect preferences and actions.

Social Aspects:

Family: The function and impact of family members on purchasing choices.

Reference groupings: The social groupings that customers are a part of and look to for validation.

The influence of a consumer's social status on their purchasing decisions.

Shared ideals, traditions, and practises that affect consumer choices and actions are referred to as culture and subculture.

Peer influence and social media: How online and offline networks affect consumer decisions.

Cultural aspects:

Culture: A society's prevailing beliefs, social mores, and traditions that influence consumer behaviour.

Smaller groups that share particular values and interests inside a broader culture are referred to as subcultures.

Social Class: The division of society into groups based on characteristics such as occupation, income, and education.

Situational variables:

Purchase Situation: The particular circumstances (such as urgency or time limits) under which a consumer is making a purchase.

The physical settings a consumer shops in, such as the design of the stores, the lighting, and the music.

Temporal factors: Time-related factors (such as the time of day or season) that influence consumer decisions.

The goal of a consumer's shopping trip, whether it is routine, specified, or exploratory, is defined by the task.

Consumers' physiological and emotional states at the time of purchase, or antecedent states.

Individual Variables:

Age and Life Stage: Needs and preferences change as people age.

Occupation: A person's career or line of work may influence their purchasing decisions.

Income: The affordability of goods and services is influenced by one's level of income.

Education: The ability to comprehend product information can be influenced by one's degree of education.

Gender: Preferences and needs specific to a given gender might influence consumer behaviour.

4Ps of the marketing mix:

Product: The characteristics, standards, and branding of the item.

Price: The sum of a product's actual cost and its deemed worth.

Location: The product's accessibility and distribution methods.

Promotion: Attempts to reach consumers through marketing and advertising.

These elements interact with one another and overlap, forming a complicated web that affects customer behaviour. In order to understand their target market and adjust their marketing tactics accordingly, businesses frequently analyse these variables.

APPLICATION OF NEURO MARKETING

The use of neuromarketing can have a significant effect:

1. **Optimisation of Advertising Campaigns:** Neuromarketing enables marketers to evaluate the efficacy of advertising campaigns on a neurological level. Marketers can determine which elements of an advertisement catch attention, elicit emotional responses, and aid in memory retention by analysing brain activity using methods like fMRI and EEG. The development of commercials that connect with target audiences more effectively can be guided by this information.
2. **Product Packaging and Design:** It's important to comprehend how consumers react to visual and aural cues in product packaging. Designing packaging that appeals to consumers' subconscious desires and sets off

positive associations can be made easier for businesses by using neuromarketing to identify the neurological pathways linked to visual attention and emotional engagement.

3. **Designing a logo and building a brand:** The neuroscience of branding explores how the brain interprets logos and other brand components. Using neuromarketing strategies, businesses may create logos that stand out from the competition by learning more about the emotional resonance, memorability, and recognizability of various branding features.
4. **Enhancement of the customer experience:** Neuromarketing can help create engaging and memorable customer encounters. Businesses may improve store layouts, online designs, and even customer care interactions to produce more interesting and satisfying experiences by analysing brain responses to numerous touchpoints.
5. **Product Development:** Knowing consumers' subconscious inclinations might help focus product development efforts. In order to create offerings that are more closely in line with consumer preferences, neuromarketing can show the emotional and sensory elements that consumers identify with particular products.
6. **Personalised Marketing:** Neuromarketing research can help create more successful personalization tactics. Businesses can increase the likelihood of engagement and conversion by customising marketing messages and recommendations to specific consumer preferences by analysing brain reactions to various stimuli.
7. **Testing New Concepts:** Businesses can utilise neuromarketing to test ideas on a small scale prior to the full launch of a new product or campaign. This strategy offers useful information on the neurological responses of consumers, allowing for changes prior to wider application.
8. **Market Segmentation:** By identifying the distinctive neurological patterns that various consumer segments display in response to marketing activities, neuromarketing can help to further enhance market segmentation. Companies can create more specialised plans for particular groups using the information provided.
9. **Understanding Decision-Making Triggers:** Neuromarketing can provide insight into the underlying motives that drive customer choice. Using this information, marketing techniques can be improved to more efficiently activate these triggers.

10. Some businesses are investigating the use of neurofeedback in real-time to enhance the efficacy of their advertisements. Ad exposure can be monitored for brain activity to make quick adjustments to ensure maximum impact.

II. LIMITATIONS AND CHALLENGES

Privacy Issues and Ethical Concerns the application of cutting-edge neuroscience techniques raises ethical concerns concerning the acquisition and use of private information about consumer brain activity. Because neuroscientific data may expose personal information that goes beyond the parameters of the study, it is crucial to gain participants' informed consent, ensure data anonymization, and protect people's privacy.

Due to the technical and budgetary limitations of doing such research, small sample sizes are frequently used in neuroimaging investigations. As a result, it may be difficult to generalise findings to larger populations because the responses of different brains to stimuli may differ greatly from one another.

Neuroimaging data is complex and diverse, necessitating specialised knowledge for an effective interpretation.

Validity from a neuroscientific perspective: Although neuromarketing brings novel insights, the interpretation of brain activity is occasionally conjectural. It is difficult to link particular brain regions to intricate psychological processes, and correlations seen in neuroimaging research don't always suggest causality.

Cost and Accessibility: The equipment and knowledge needed for neuroimaging research can be expensive, restricting the use of these methods to larger companies or well-funded research organisations. This may make it more difficult for smaller businesses to gain from neuromarketing insights.

Neural Variability: Establishing standardised neural markers for particular consumer behaviours can be challenging due to individual variability in brain responses resulting from elements including cultural background, genetics, and prior experiences.

Temporal constraints: Because the technology's time resolution is relatively sluggish compared to the pace of cerebral processing, several neuroscience techniques, including fMRI, have temporal constraints that can make it difficult for them to record in-the-moment consumer decision-making processes.

Ecological Validity: Real-world consumer behaviours are likely to be more complex than they

are in controlled laboratory settings, which are often used in neuroimaging studies. It's possible that results from controlled studies don't always transition well to real-world customer situations.

Commercialization and Hype: The novelty of neuromarketing has attracted some commercialization, as well as an overestimation of its potential. This may lead to disappointment since it may raise irrational expectations regarding the accuracy and significance of neuromarketing insights.

Collaboration between experts from several disciplines, including marketing, data analysis, neuroscience, psychology, and psychology, is necessary for neuromarketing. Between these fields, effective communication and collaboration can occasionally present difficulties.

Neuroethics: In addition to privacy difficulties, ethical considerations also include permission, openness in research design, and responsible dissemination of findings, particularly when turning sophisticated neuroscience into practical marketing tactics.

Assessment of Long-Term Impact: It might be difficult to gauge the long-term effects of marketing initiatives informed by neuromarketing insights. For campaigns to be truly effective, their long-term effects on consumer behaviour must be assessed.

PRACTICAL CONSTRAINTS IN IMPLEMENTING NEURO MARKETING

Financial Resources: For many organisations, especially smaller ones, the expense of conducting neuroimaging studies, purchasing and maintaining specialised equipment (such as fMRI machines, EEG systems), and hiring neuroscientists can be prohibitively high.

Knowledge and Training: Neuroimaging data interpretation need for specialised knowledge of both data analysis and neuroscience. It may be necessary for businesses to spend money on training their marketing employees or engaging in resource- and time-intensive collaboration with neuroscientists.

Time and timeliness: Neuroimaging investigations must be conducted and data analysis must be timely. The time it takes between data collection and useful insights could not match the quick-moving nature of marketing initiatives that need quick decisions.

Sample Size Restrictions: Due to logistical and economical limitations, neuroimaging

investigations frequently use small sample numbers. This may make one wonder whether findings can be applied to larger customer populations.

Neural Variability: Due to individual differences, emotions, and environment, human brains respond to stimuli with high individual variability. The identification of reliable brain markers for particular behaviours may be made more difficult by this diversity.

Limited Real-world Numerous neuroimaging research are carried out in carefully monitored lab environments, which could not faithfully reflect actual customer experiences. It might be difficult to apply research from controlled settings to real-world market conditions.

Ethical Considerations: Conducting neuro marketing studies is complicated by addressing ethical issues, such as gaining informed consent and protecting participant privacy, and may need for close legal and ethical supervision.

Collaboration across disciplines is necessary for the successful use of neuromarketing, and this includes experts from the fields of neuroscience, psychology, marketing, and statistics. It might be difficult to ensure efficient communication and collaboration between different fields.

Data interpretation: Because neuroimaging data is complicated, advanced analysis methods are needed. Access to experts who can precisely evaluate and convert these data into useful insights for marketing strategy is essential for organisations.

Evaluation of Long-run Effects: Analysing the effects of marketing efforts impacted by neuromarketing insights over the long run can be challenging. It is difficult to determine whether the first brain reactions result in long-lasting behavioural changes.

III. FINDINGS

Impact on Emotions: Neuromarketing research has consistently shown that consumers' decisions are significantly influenced by their emotions. According to research using brain imaging techniques, emotionally stimulating information or stimuli cause higher neural activations that enhance memory recall and create more favourable associations with brands and products. Eye-tracking research done in the context of neuromarketing has highlighted the visual attention-grabbing elements of marketing collateral. The optimisation of designs, layouts, and

marketing to draw attention to important messages or product features depends on this information.

Influence of Familiarity: According to neuroscientific study, companies and logos that consumers are familiar with elicit quicker and more positive brain reactions than those that they are unfamiliar with. This highlights how crucial it is to gradually increase brand recognition and consistency.

Neural Processing of Pricing: Research on pricing strategies conducted by neuromarketing has revealed that consumers' perceptions of prices vary depending on the circumstances and their individual histories. The brain's reward centres react differently to discounted pricing versus premium ones, according to neuroimaging research.

Decision-Making Triggers: Neuroscientific methods have revealed information about the irrational triggers that lead people to make decisions. Which elements of marketing stimuli are most compelling can be determined by the activation of brain regions related to reward and pleasure.

Impact of Storytelling: It has been demonstrated that telling stories activates a variety of brain regions, including those in charge of processing emotions and sensory input. The effectiveness of storytelling in building more enduring and relatable brand tales is supported by neuromarketing research.

Cultural and personal differences: According to neuromarketing studies, personal preferences and cultural background might affect how the brain reacts to marketing stimuli. This emphasises the need for customised marketing plans that take into account various consumer profiles.

Brain Predictors of Success: Using brain responses to exposure to marketing materials, some neuromarketing initiatives have attempted to forecast the success of marketing campaigns. Brain activity patterns and subsequent consumer behaviour, such as purchase intention, have been linked.

Neuroimaging techniques have revealed the influence of subconscious cues on decision-making. Consumers may be influenced by inconspicuous factors like colour, typeface, or images that they are not consciously aware of.

Brand Loyalty and Trust: According to neuromarketing research, reputable brands trigger the reward and pleasure centres of the brain. Thus, establishing trust through consistent branding and clear message helps increase customer loyalty.

REAL WORLD EXAMPLE OF NEUROMARKETING STUDIES:

Scenario: Enhancing a Beverage Advertising Campaign

Challenge: The beverage firm needed to make sure that its advertising campaign powerfully connected with the target population as it launched a new product variant. To understand the emotional impact and attention patterns of consumers when exposed to their commercials, they sought insights outside of the realm of conventional market research techniques.

Implementation:

Preparation for Stimulus: The researchers created several iterations of the advertising, each with different images, music, and content. They wanted to know what factors had the biggest influence on consumer engagement.

Recruitment of Participants: Participants who fit the study's target demographic were drawn from a variety of backgrounds. For the purpose of obtaining a representative sample, their demographic data, preferences, and behaviours were gathered.

Neuroimaging and Eye-Tracking Session: Participants saw several advertisement versions while wearing eye-tracking glasses to track visual attention and EEG caps to assess brainwave activity. Real-time recordings of participants' gaze patterns and neurological reactions were made possible by the technique.

Data analysis: To find important patterns of brainwave activity, emotional engagement, and visual attention, the obtained data was then examined. Researchers searched for relationships between particular stimuli and brain reactions connected to good emotions and focus.

Insights and suggestions: The results showed that specific visual components, colour schemes, and musical compositions attracted more attention and elicited more intense emotional reactions. The researchers suggested specific changes to the commercial to maximise its impact based on their findings.

Campaign refinement: The beverage firm incorporated the suggested modifications into their advertising campaign. These adjustments were made in an effort to more strongly arouse favourable feelings and more successfully grab consumers' attention.

Results:

Using updated ad versions based on neuromarketing findings, the campaign was launched. The optimised versions surpassed the original ones in terms of consumer engagement metrics, such as recall, emotional impact, and

desire to purchase, according to post-campaign study. The partnership between neuroscientists and marketers illustrated the practical value of incorporating neuroscientific knowledge into marketing plans.

Key Learnings:

This illustration shows how neuromarketing strategies, including EEG and eye-tracking, can offer useful information about consumer behaviour and emotional responses. Businesses can develop more persuasive and successful marketing efforts that influence consumer engagement and decision-making by pinpointing the precise aspects that resonate with customers on an unconscious level.

EMERGING TRENDS IN NEURO MARKETING

Brain imaging methods: New developments in brain imaging technologies, such as electroencephalography (EEG), functional magnetic resonance imaging (fMRI), and eye-tracking, are allowing researchers to learn more about how customers think and feel in reaction to marketing stimuli. These methods offer real-time information on brain activity and visual focus, assisting marketers in identifying the components of their ads that are most compelling.

Emotional analysis: Neuromarketing strategies are more frequently employed to gauge consumers' emotional reactions to commercials, goods, and brands. Marketers can find emotional triggers that connect with consumers by examining brain activity and physiological markers, which results in more persuasive messaging and campaigns.

Personalization and customization: By comprehending consumer preferences and emotional responses, neuromarketing can help create personalised experiences. Marketers may better connect and retain customers by customising content and products to each customer's unique brain patterns and physiological responses.

Cross-Cultural Insights: Neuromarketing research is shedding light on the ways in which cultural variations affect how consumers react to marketing stimuli. Global brands can modify their strategy for diverse markets by having a better understanding of how different cultures digest information and emotions.

Optimisation of the In-Store Experience: Neuromarketing strategies are used to improve the In-Store Experience. Retailers can tailor their settings to promote desirable behaviours and boost sales by studying how customers respond to store layouts, product placements, and sensory signals.

Digital marketing insights: Neuromarketing is expanding into the digital sphere as a result of the growth of online buying. In order to better understand user experience and design optimisation, eye-tracking studies and neuroimaging techniques are used to examine how users interact with websites, mobile apps, and digital advertisement.

The creative parts of advertising can be influenced by neuromarketing insights. Marketing professionals may create more engaging and memorable advertising by learning how the brain reacts to various storytelling components, visual signals, and musical compositions.

Ethical Issues: Concerns concerning customer privacy and exploitation have surfaced as neuromarketing goes deeper into the study of subconscious processes. An important factor to take into account is finding a balance between using neuroscience knowledge and maintaining consumer autonomy.

Consumer Satisfaction Measuring: Compared to conventional methodologies, neuromarketing can provide more precise and nuanced evaluations of consumer satisfaction and engagement. In order to improve client experiences, this can help businesses discover areas for development and customise their strategy.

Neuro-Informed Product Development: Product development teams are utilising neuromarketing data to make sure that their goods elicit the right emotional reactions and connect with target audiences.

It's crucial to remember that while neuromarketing offers insightful data, it is only one weapon in the marketer's arsenal. It takes interdisciplinary cooperation and a thorough comprehension of both neuroscience and marketing concepts for neuromarketing research to be effective.

INTEGRATION WITH AI AND BIG DATA

Big data, AI, and neuromarketing integration has the ability to fundamentally alter how marketers perceive customer behaviour, design individualised experiences, and refine their tactics. The connections between these three areas are as follows:

Data collection and utilisation:

Utilisation of Big Data: AI-powered systems are capable of processing enormous volumes of data gathered from a variety of sources, including social media, internet behaviour, past purchases, and more. These informational elements

offer a thorough picture of consumer preferences, habits, and trends.

Neuromarketing Insights: By combining neuromarketing methods with big data, such as brain imaging and physiological measures, marketers can learn more about the emotional and cognitive reactions of their target audience. These perceptions can be used to spot trends that correspond to particular preferences and behaviours.

Personalization and Customization:

AI-Driven Personalization: By analysing customer data, AI systems may produce highly personalised experiences. Marketers may comprehend customer preferences and modify their messaging, product recommendations, and promotions by fusing big data analytics with AI. Integrating neuromarketing insights can improve personalisation by identifying not only customers' explicit preferences but also their underlying emotional triggers.

Content Promotion:

AI-Generated Content: By analysing consumer data and providing pertinent, context-specific messages, AI can help with content creation. This can facilitate the generation of content and guarantee consistency across numerous media.

Feedback from neuromarketing: By analysing customer responses to various forms of information, neuromarketing strategies can direct AI-generated content towards aspects that elicit the desired emotional responses.

Forecasting Analytics:

Big data and AI can be used by marketers to forecast customer trends and behaviour, including buying patterns and product preferences. These forecasts can guide resource allocation and marketing plans.

Integrating neuromarketing insights into predictive analytics can provide a new level of understanding that enables marketers to foresee emotional responses and modify their plans accordingly.

Personalization in real-time:

Real-time data processing enables marketers to provide personalised experiences right away by processing real-time data from numerous sources. This can entail adjusting offers, suggestions, or material in light of recent encounters.

Real-time integration of neuromarketing data can give marketers quick insights into how

customers are feeling about particular stimuli, enabling them to change their strategies as needed.

Privacy and Ethical Considerations:

Customer Privacy: Concerns regarding customer privacy and data security are raised by the combination of AI, big data, and neuromarketing. The gathering, analysing, and use of sensitive customer data must be guided by ethical considerations.

Transparency: In order to win customers' trust, marketers must be upfront about their use of neuromarketing strategies and AI-driven personalisation.

IV. CONCLUSION

In conclusion, a new age of comprehending the complex mechanisms behind consumers' decision-making processes and their reactions to marketing stimuli has begun as a result of the merging of neuro marketing and consumer behaviour. This interdisciplinary approach has uncovered insights that were previously unattainable through conventional means by digging deeply into the human brain.

Utilising cutting-edge neuroscience methods like brain imaging, physiological measures, and eye-tracking, neuromarketing has given marketers a window into the unconsciously motivating factors behind customer decisions. This has made it possible to understand consumers' desires more thoroughly, both on a surface level and more deeply.

The enormous influence of emotions, perceptions, and cognitive processes on purchasing decisions has been made clear by the convergence of neuroscience and marketing. Businesses may develop tactics that tap into these underlying dynamics, creating storylines, generating emotional connections, and developing brand loyalty by solving the mysteries of customer behaviour.

The addition of AI and big data has also given this investigation a revolutionary layer. The combination of these technologies enables marketers to analyse massive volumes of data, forecast patterns, and incredibly precisely personalise customer experiences. The ability to create individualised journeys that engage strongly with customers has been made possible by AI-driven algorithms, which are directed by neuromarketing insights. This successfully transforms data into meaningful encounters.

However, ethical concerns remain a crucial requirement as we embrace the possibilities of this transformation. Priorities that must guide this endeavour course include protecting customer privacy, being transparent about data utilisation, and ensuring that the power of neuromarketing is used responsibly.

In essence, a universe where science and marketing converge has emerged, providing a broad perspective on the human psyche as a result of the synergy between neuromarketing and consumer behaviour. We are on the verge of a more profound and nuanced knowledge of the always changing dance between consumers and the marketing world as we forge ahead into this exciting realm, equipped with neuroscience methodologies, AI capabilities, and a commitment to ethics.

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