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ORIGINAL RESEARCH

The Influence of Tourist Attraction Type on Product Price Perception and Neural Mechanism in Tourism Consumption: An ERP Study

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Background: Tourism consumption is a topic with heated debates in tourism research, and pricing tourism products is a crucial task for tourism managers. Different types of tourist attractions offer different experiences to tourists, which affect their price perceptions and purchase decisions.

Methods: This study combined questionnaires and event-related potentials (ERPs) measures to explore the magnitude of psychological conflict and the degree of emotional arousal that consumers experience when faced with different prices of goods in different scenic types.

Results: The questionnaire results showed that attraction type influenced consumers' price perceptions and that consumers were willing to pay higher prices for products in attractions. The ERP results implied that in the early stage of cognition, attraction type did not affect consumers' perceptual processing, while price information attracted consumers' cognitive attention. In the late stage of cognition, attraction type, and price information jointly influenced consumers' decision-making, and consumers tended to accept high prices of products in entertainment attractions and cultural attractions, but consumers were more sensitive to the price of products in cultural attractions and less tolerant to price increases.

Conclusion: The study elucidated how price information influenced consumers' purchase decisions of tourism products at different stages of the dual-process theory, which can assist tourism managers in devising different pricing strategies and positioning strategies based on the attributes of attractions, to enhance product sales and revenues. This would further the vision of the World Tourism Organization (UNWTO) of "tourism fostering economic development".

Keywords: tourist attractions, price perception, neuromarketing, event-related potentials, P2, LPP

Introduction

The examination of tourism consumption has emerged as a prominent subject in contemporary tourism research,[1] and the significance of pricing in the majority of consumption processes cannot be overstated, as it serves as a decisive factor in purchase decisions made by consumers.[2] Within the realm of tourism consumption, pricing assumes a pivotal role in terms of gaining a competitive edge. However, the complexity and intangibility of tourism products/services pose additional difficulties for pricing. The specific reasons are that consumers use inaccurate reference prices for tourism products; the price of tourism products/services is seen as an indicator of quality and service level, but the value of service is not solely determined by its monetary cost and is related to other factors that affect the perceived value of service, such as purchase motivation.[3]

Previous studies have found that consumers base their purchase decisions not on the actual price of the product, but on its perceived price, which is the price expectation that consumers form after integrating various factors. Consumer behavior depends on their price expectations and the degree to which the actual price violates these expectations.[4] The

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difference between consumers' price expectations and the actual price affects their purchase decisions.[5] In tourism consumption, the actual price of the product, the reference price, and the experience and emotion in the attraction jointly determine consumers' perceived price, which in turn affects their purchase decisions. The current research on the influencing factors of consumers' price perception mainly focuses on emotional factors, situational factors, price evaluation factors, that is, horizontal, vertical, and internal comparison of prices, and perceived value factors. Price perception is influenced by pricing and service satisfaction.[6] Bigne et al found that tourists with higher satisfaction with their experience in tourism are less sensitive to prices.[7] Research has demonstrated that the reference price utilized by consumers is contingent upon the specific situation in which they find themselves.[5] Consumers tend to rely on situational factors as opposed to the previous prices of products when forming perceptions of prices.[8] Given that various tourist attractions provide distinct experiences to travelers,[9] consumers' perceptions of price may be influenced by the type of attraction in question. However, the previous research on price perception of tourism products has not taken into account the types of tourist attractions. It is inadequate to simply evaluate consumers' acceptance of product prices in tourism consumption. Instead, pricing should be based on the characteristics of different types of tourist attractions, matching prices with the types of attractions. Only by simultaneously considering price information and the impact of the type of tourist attraction on consumers can product pricing be more aligned with the reality. Therefore, this study treats the types of tourist attractions and price information as variables to explore consumers' perception and acceptance differences of different price levels within different types of tourist attractions. Moreover, price is one of the most important product attributes, and consumers' perceived price expectations greatly influence purchase behavior. The pricing of tourism products is a crucial task in tourism management.[10] Pricing of tourism products is also a complex phenomenon that requires consideration of not only the characteristics of the products themselves but also the emotional and subconscious states of consumers at the time of purchase.[11] Although previous studies have revealed the importance of consumers' perception of product prices in tourism consumption, there is a lack of attention to the micro-level, which refers to tourists' cognition and emotional changes regarding different price levels. This makes it difficult to explain the micro psychological process of consumers' acceptance of product prices. In fact, consumers' understanding of prices is largely subjective, and both unconscious processes and cognitive processes play a significant role in influencing purchase intentions.[12]

To address the aforementioned practical and theoretical considerations, this study integrates the theory of perceived value and the dual-process theory to examine how the types of tourist attractions and product price information collectively impact the micro psychological process of consumer purchase decisions in the tourism context. According to the theory of perceived value, consumers' purchase decisions are influenced not only by the price of products or services but also by their comprehensive evaluation of perceived benefits, quality, satisfaction, and costs. Consumers who feel that they get more value than they pay for will have a more favorable impression of the product and a higher intention to buy or use it.[13] The perceived value of a product is a significant influencing factor in price perception, representing the balance between perceived benefits and sacrifices associated with the product.[14] Consumers' perception of the price of tourist attraction products is closely related to their perceived value of the products. The types of tourist attractions may influence consumers' perceived value of the attraction products, subsequently impacting their perception of the price. The dual-process theory proposes that cognitive processes can be classified into two types: System 1, which involves unconscious and automatic processing, and System 2, which involves conscious and controlled processing.[15] Previous research on price perception has mainly focused on conscious processing controlled by consumers, often overlooking their automatic and unconscious processing. The application of neuroscientific methods to price perception holds great promise in elucidating the cognitive processes underlying consumers' purchase decisions influenced by price.[16]

In this study, advanced techniques from neuromarketing are utilized to extensively explore the micro psychological process by which the types of tourist attractions impact consumers' perception of product prices and purchase decisions. Neuromarketing refers to the study that utilizes neuroscience methods to examine consumer behavior, investigate the neural mechanisms underlying consumer decision-making, identify the true drivers of consumer behavior, and develop effective marketing strategies that align with consumers' cognitive and emotional processes.[17] Event-Related Potentials (ERPs) are a widely used research method in the field of neuromarketing, which is based on electroencephalogram (EEG) technology. This technique has the ability to effectively capture underlying emotions and preferences during the

consumer decision-making process.[18] Pricing and price adjustment will cause activation of the nervous system in cognition and emotion. Most existing studies have examined consumers' purchase intention and behavior of tourism products, while neglecting the unconscious processing involved in their tourism shopping decisions. Therefore, based on the theory of perceived value and the dual-process theory, the approach can help provide a more comprehensive understanding of consumers' decision-making processes and shed light on the underlying cognitive and emotional factors that influence their price perception and acceptance. The combination of questionnaire surveys and ERP measures allows for a more thorough investigation of the magnitude of psychological conflict and the degree of emotional arousal that consumers experience when faced with different prices of products in different types of attractions, in order to infer consumers' price acceptance and their psychological processes. This study is pioneering, because previous tourism consumption research has not delved into consumers' unconscious processes, nor has it considered the impact of attraction type on premium acceptance. The purpose of this study is to explore how product price levels in different types of attractions affect information processing and subsequent purchase decisions in our brains. By evaluating consumers' price perception in different types of attractions, the study investigates purchase decisions in tourism consumption. This measurement can explore the influence of price information on consumers' purchase decisions at different stages of the dual-process theory, thus providing a theoretical basis for pricing tourism products. Furthermore, this study can aid tourism managers in accurately forecasting consumer behavior, and developing effective pricing and positioning strategies based on the unique characteristics of various consumer types and attractions. This can help meet tourists' needs, enhance their travel experiences, boost attraction revenues, and align with the vision of the World Tourism Organization (UNWTO) in promoting economic development through tourism.

Literature Review

Price Perception

Consumers base their purchase decisions not on the actual price of the product, but on its perceived price, which is the price expectation that consumers form after integrating various factors. Consumer behavior depends on their price expectations and the degree to which the actual price violates these expectations.[4] The current research on the influencing factors of consumers' price perception mainly focuses on emotional factors, situational factors, price evaluation factors, that is, horizontal, vertical, and internal comparison of prices, and perceived value factors. Among them, price evaluation factors are the most common. Previous studies have found that tourists compare the actual service price and the reference price to form a price evaluation.[19] Internal reference price (IRP) and external reference price (ERP) have a greater impact on tourism and accommodation price evaluation. Information availability and perceived diagnosticity are the key mechanisms that lead to the difference in the impact of IRP and ERP on travelers' price evaluation.[20] There is more and more research on emotion in tourism consumption, and most of them focuses on affective emotion.[1] Emotions play a crucial role in shaping consumers' perceptions of prices. Positive emotions can have a significant impact on driving consumer behavior, whereas negative emotions like anger, shame, and guilt can undermine their purchasing intentions.[21] In addition, some researchers have paid attention to more personalized fields, such as the influence of product category or consumer personality characteristics on price perception, in which personal experience also plays an important role. Different consumers have different perceptions of the same price under the same conditions.[22] Price perception is influenced by pricing and service satisfaction.[6] Bigne et al found that tourists with higher satisfaction with their experience in tourism are less sensitive to prices.[7] Perceived value is also an important influencing factor of price perception, which refers to the balance between perceived benefits and sacrifices from products.[14] It is the exchange between what consumers get (eg, quality level, happiness, well-being) and what they give up (eg, store service, product price, queuing, and other emotional feelings) when they buy, use, or consume products.[12]

Tourist Attraction Type

Hyoungeun Moon refined the travel experience and proposed that tourist attractions can increase tourists' perceived value of the destination, and create a good impression and loyalty by providing enjoyment, relaxation, and escape from reality. Tourists' perception is influenced by factors related to tourists and tourist attractions themselves.[23] Tourists are more

likely to pay a higher price for admission to tourist attractions that have a positive image.[24] Segmenting tourists' travel motivation and determining the relationship between market segments, price perception and willingness to pay can better improve pricing strategies for different types of attractions.[3] Attraction type affects tourists' satisfaction. Service level is the most important factor affecting tourists' satisfaction with natural scenery and modern cultural attractions, while transportation is the key factor affecting tourists' satisfaction with natural scenic attractions. Food greatly affects tourists' satisfaction with modern cultural attractions.[25] Attraction type also affects tourism efficiency. Historical and cultural attractions have the best tourism efficiency, while urban parks, ancient villages, red tourism, and other types of attractions have higher overall tourism efficiency. The low efficiency of various types of tourist attractions is primarily influenced by technical efficiency. Among the different types of attractions, urban parks, religious and cultural sites, geological relics, and red tourism exhibit better scale efficiency.[26] Since different types of tourist attractions offer different experiences to tourists, consumers' price perception may also be affected by different types of attractions.[9] It has been observed that the situation plays a significant role in shaping consumers' perception of prices. Prior research has demonstrated that consumers' reference prices are often influenced by situational factors.[5] Consumers tend to rely more on situational factors rather than historical prices of products when perceiving prices.[8]

Dual-Process Theory

Brakel et al proposed that human cognitive processing encompasses two systems. System 1 is fast, unconscious, and automatic processing. System 2 is controlled and conscious processing. Automatic processing is not limited by cognitive resources, while conscious controlled processing is limited by cognitive resources.[15] System 1 is heuristic processing, which can be fast, intuitive, and does not consume too much cognitive resources. System 2 is analytical processing, which is slow, rule-based, and relies on working memory capacity. The most significant difference between these two systems in terms of development is that system 1 has a longer evolutionary history. It is a cognitive system shared by humans and animals. It usually reacts through instinctive behaviors. These behaviors are programmed responses formed by evolution and learning. Therefore, its processing is related to the associative learning process of the nervous system. On the other hand, system 2 has a shorter evolutionary history and is a unique processing system for humans. One of the primary advantages of System 2 thinking is its ability to engage in abstract and hypothetical thinking, which is not a feature of System 1 thinking. Heuristic processing is based on intuition to make judgments, which may be based on experience, memory, etc. Due to cognitive limitations and external influences, individuals use heuristic strategies to make decisions, which follow the "satisficing principle". System 1 processes faster and can quickly assimilate information with existing knowledge structures. It is a subconscious implicit decision system that is easily influenced by stereotypes and other situational factors during its processing.[27] Analytical processing, on the other hand, is based on probabilistic estimation rules and principles. Individuals make decisions through conscious cognitive analysis and rule formulation, following the "optimality principle". System 2 relies on the acquisition and application of cognitive abilities. It is mainly constrained by rules such as mathematical statistics and logic in the decision-making process. It processes slower and pays more attention to the internal structure of the problem. It is not easily influenced by external situational factors. The two cognitive processing systems cooperate to determine the decision outcome and compete with each other during the decision process.[28] Based on the dual-process theory, Ma et al proposed two main stages of neural cognitive process through EEG research: an early processing stage reflected by the P2 component, and a late cognitive stage reflected by the P3 component.[29]

Neuromarketing and Price Study

Neuromarketing is the use of neuroscience methods to study consumer behavior, explore the neural mechanisms of consumer decision-making, identify the real driving forces behind consumer behavior, and generate appropriate marketing strategies.[17] It actually emerged with the development of several major basic disciplines that support marketing theory in recent years. Its concept was first proposed by Ale Semidts and was called "the study of brain mechanisms".[30] Among them, the major breakthroughs in cognitive science and neuroscience play a major role. Specifically, it refers to researchers using neurophysiological tools to conduct market research on price, brand, product, etc.[31] With the development of behavioral decision-making and cognitive science, marketing theory can borrow many psychological concepts

to explain consumer behavior, such as implicit memory, automatic information processing, subconscious, etc. From the perspective of neuromarketing, pricing, and price adjustment will cause activation of the nervous system in cognition and emotion.

Many researchers have applied neuromarketing methods to the study of price levels. Before making a purchase decision, excessively high prices cause a decrease in the N400 component and an increase in the LPP component.[32] Price framing also affects consumers' purchase decisions.[33] Ma et al used EEG technology to study how to price framing affects the purchase of bundled products, proving that different price framing methods are processed differently and revealing the neural correlates of the price framing effect.[34] Price plays a role in promotional activities in the form of discounts.[35] High-priced products with discounts induce higher P300 amplitude and lower LPP amplitude than low-priced products with discounts, proving that high-priced products with discounts affect higher cognitive load.[36] Price discounts can better motivate consumers to buy. Gift promotions induce significant differences in P2, N200, and P3 amplitudes compared to price discounts, reflecting that consumers perceive increased risk and decreased decision confidence when encountering gift promotions.[37] Consumers' emotions during purchase also affect product price perception. Winning-induced emotions are more positive than losing-induced emotions. When winning continuously at high prices, consumers induce P2 and LPP components.[38] When consumers consider personal preferences, product attribute evaluation is a cognitive process that modulates attention in the posterior parietal and occipital regions.[39] Knutson et al used functional magnetic resonance imaging technology to explore the neural circuitry mechanisms of price and preference in the purchase decision process.[40] Corporate social responsibility behavior affects consumers' purchase decisions to some extent, causing consumers to be willing to pay higher prices,[41] which can reduce the neural mechanism of consumers' price sensitivity and activate the anterior cingulate cortex region related to empathy.[42] Price deception has a negative impact on purchase decisions and activates brain regions related to expected loss.[43] When actual prices violate price expectations, FRN and P300 waveforms can effectively predict consumers' subsequent purchase decisions.[4] Consumers' willingness to pay for specific products and services is significantly correlated with gamma band frontal lobe asymmetry.[44] The medial orbital frontal cortex and dorsal lateral prefrontal cortex in the brain are also related to consumers' willingness to pay.[45] Positive purchase decisions increase neural activity in the frontal pole region and are closely related to the orbital frontal cortex and ventral medial prefrontal cortex that regulate subjective value calculation.[35] Some scholars also use neuromarketing examples to explore how tourists view price and pricing issues.[11]

This study combines behavioral and event-related potentials (ERPs) measures to investigate the magnitude of psychological conflict and the degree of emotional arousal that consumers experience when faced with different prices. The P2 component and LPP component are the two most commonly concerned ERP components in neuromarketing price research.[18,34,37,38,43,46,47] The P2 component is an event-related potential (ERP) component related to attention and decision-making, which usually occurs 170–250 milliseconds after stimulus presentation. It may be related to attention and visual processing and reflects the early judgment of the perceptual process. The P2 component is mainly distributed in the frontal and central brain regions.[48,49] Studies have shown that the P2 component involves risk-related cognitive processing, caused by attentional resources. It shows a larger amplitude when cognitive conflict is larger and can reflect consumers' decision risk in purchase decisions. It reflects the degree of recognition of decision problems by decision-makers[50] and is positively correlated with expectation conflict. The notion of expectation conflict pertains to the discordance between information related to a product and the psychological anticipation of such information by consumers.[51,52] In this study, price information that meets expectations can reduce consumers' perceived risk and reduce expectation conflict. Therefore, hypothesis 1 is as follows:

H1. The larger the difference between the actual price and the expected price, the more it will cause consumers' attention and emotional changes, and induce a larger P2 amplitude.

The LPP component usually peaks at about 600 ms after stimulus onset, mainly distributed in the posterior scalp, and is the largest ERP component in the central parietal region.[53] Some recent neuromarketing studies have shown that LPP can reflect the cognitive process of late evaluation categorization in consumer purchase decision-making.[54] Before consumers make purchase decisions, the late cognitive stage participates in evaluation categorization, and more positive

evaluations induce larger LPP amplitude.[43,54,55] The LPP component is related to emotional arousal and is sensitive to motivational emotional arousal. It reflects consumers' potential motivation.[56,57] In this study, appropriate scenario cues and reasonable price information will meet consumers' price expectations for products, thus facilitating purchase decisions. Therefore, hypothesis 2 is as follows:

H2. Appropriate purchase scenarios and reasonable price information will be evaluated more positively, thus generating purchase motivation, leading to stronger LPP amplitude induced by reasonable pricing conditions than unreasonable pricing conditions in tourist attractions.

Methodology

Participants

ERP experiment is to superimpose and average the EEG data of multiple decisions by subjects. Previous studies have demonstrated that the sample size needed for EEG experiments is typically greater than 11 subjects.[54] Seventeen participants were recruited from the database of the Center for Psychology and Behavior Research at Jianghan University. One participant was excluded due to excessive artifacts in the electroencephalogram recordings. Sixteen participants (20.19±1.32 years old, 8 females) were recruited from the database of the Center for Psychology and Behavior Research at Jianghan University. They had normal intelligence, normal vision or corrected vision, no brain or scalp damage, and were all right-handed. Participants had travel and shopping experience and were familiar with the general retail prices of supermarket products. Written informed consent was obtained from all participants before the experiment. This study was approved by the Ethics Committee of Jianghan University.

Materials

According to the classification criteria of tourist attraction types in the "2019–2020 China Tourist Attraction Development Report", we divided tourist attraction types into sightseeing attractions and entertainment attractions. Sightseeing attraction scenarios refer to attractions that predominantly feature natural landscapes and cultural heritage, while entertainment attraction scenarios pertain to attractions that primarily focus on recreational activities and entertainment. Through a questionnaire survey of 20 shopping scene pictures, we screened out three pictures that were daily supermarket scenes, sightseeing attraction scenes, and entertainment attraction scenes. The category recognition rate was 100% for all of them, and there was no obvious place name hint. Then we used a product familiarity questionnaire to survey 60 supermarket food pictures and selected 30 products with higher familiarity and a better understanding of the original price. In order to reduce the impact of large price differences or product category differences on price perception, the product prices in this experiment were all within 10 yuan. After determining the product pictures, we continued to conduct a questionnaire survey on the prices of these 30 products to understand their general price level in consumers' minds and use this as the basis for pricing in the experiment. According to the half price, original price, double price, and five times price of the products, we made price pictures. After removing the same prices, there were a total of 18 price pictures. The original price refers to the price in a general supermarket, and the half price, double price, and five times price are based on this price. See Figure 1 for an example of the experimental stimulus.

The survey on the willingness to purchase tourist attraction products selected the previously chosen products and scene images. Different scene images were presented to determine consumers' perception of the shopping scenario for the products. The shopping scenario corresponding to each scene was initiated. The survey presented the products along with their prices, based on Item of Biswas (2015)'s willingness to purchase scale,[58] with appropriate modifications. Specifically, the question asked, "The price of this product is six Chinese yuan. Are you willing to accept this price and continue with the purchase?" The price amount was relative to the price image in Figure 1. Subsequently, consumers' willingness to purchase was measured using a five-point scoring scale, followed by the participants providing their personal basic information. The survey questionnaires under different scenarios adopted the same structure and items to reflect the scientific nature of the questionnaire results as much as possible.

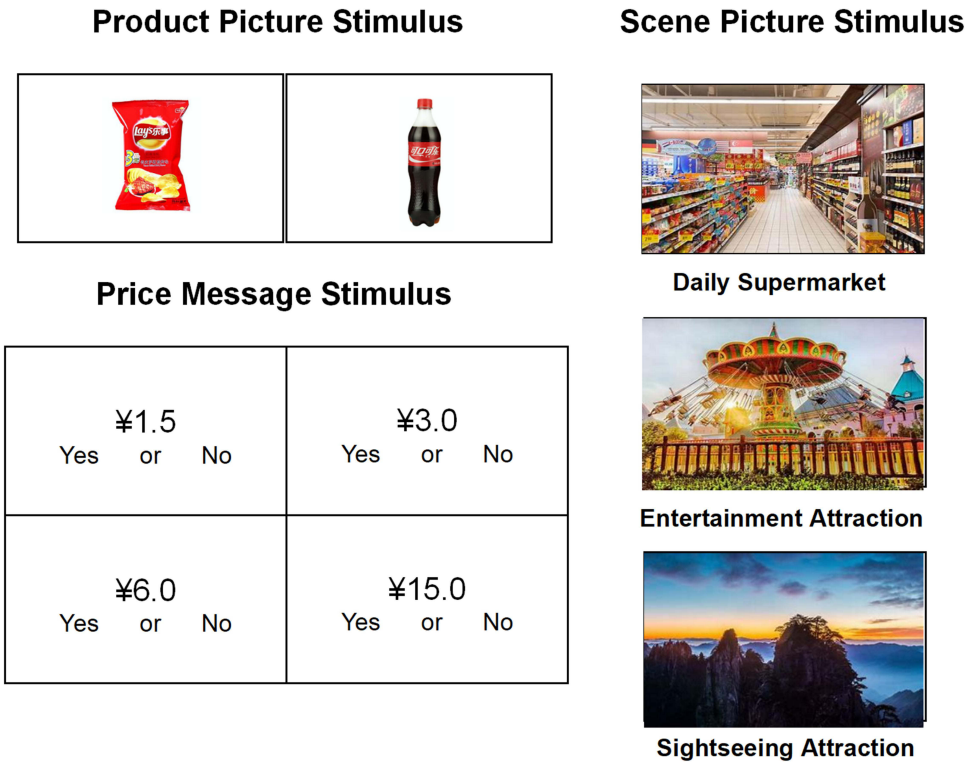

Figure 1 Examples of the experimental stimuli.

Procedures

The experiment was run on E-prime 2.0 software package, and the whole experimental process consisted of 720 trials. Participants sat comfortably in a light-dimmed, sound-attenuated electric screen room, 100 cm away from the computer screen, with a viewing angle of 2.6 °×2.4 °. The experiment was designed as a 3 (scene) x 4 (price) between-subject experimental design, where the scenes were divided into three categories: daily supermarket, sightseeing attraction, and entertainment attraction, and the prices were divided into four levels: 0.5 times, 1 time, 2 times, and 5 times. Before the experiment, the participants were briefly informed of the differences between the scenarios, presented with scene pictures and asked to fill out a survey questionnaire on their purchase intention of tourist attractions products. Then, using a priming paradigm, the participants were immersed in the situations and started the ERP experiment. The participants used the keyboard to make choices. The formal experiment was divided into three groups, each group had 240 trials, and after completing one group of experiments, they rested for 3 minutes before proceeding to the next group. Each participant had 10 practice trials before the formal experiment to familiarize themselves with the task. As shown in Figure 2, after each trial started, a scene picture appeared for scene priming, which lasted for 5000 ms, followed by a 500 ms fixation point, then a 1500 ms product picture, and finally a 1500 ms price information. The participant's task was to

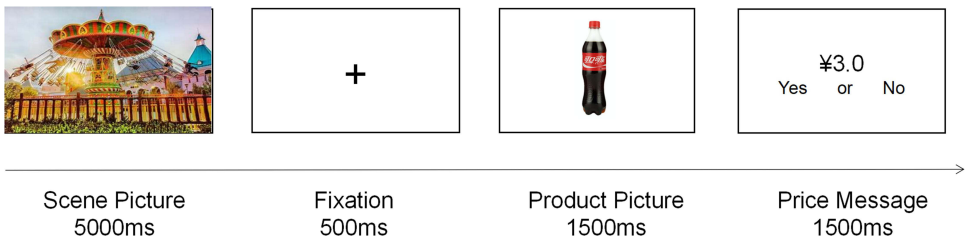

Figure 2 A trial of the experimental process. The researchers showed the participants a scene picture, followed by a product information, and finally a price information. They recorded their choices when the price information was presented.

make an "acceptable" or "unacceptable" button response when the price information appeared, with key "1" for "acceptable" and key "3" for "unacceptable". The specific experimental procedure is shown in Figure 2.

Data Acquisition and Analysis

EEG data was recorded using a Brain actiCHamp amplifier (Brain Products GmbH, Munich, Germany) and a cap containing 64 Ag/AgCl electrodes with a sampling rate of 500 Hz. The impedance between the scalp and the electrodes at each electrode site should be less than 10 kΩ. Bilateral mastoids were used as reference electrodes, and an electrode was placed under the right eye socket to record a vertical electrooculogram (VEOG). ERPs were analyzed by BrainVision Analyzer 2.1 (Brain Products GmbH, Munich, Germany), and the offline filtering bandpass range was 0.5–40Hz. By applying independent component analysis, data with artifacts such as blinking, eye movement, electromyography, etc. can be semi-automatically excluded. Subsequently, the data under different conditions were superimposed and averaged. The P2 component appeared in the frontal and central brain regions, and this study selected (F1, Fz, F2, C1, Cz, C2) 6 electrodes for analysis,[58] using a 3 (scene: daily supermarket, sightseeing attraction, entertainment attraction) × 4 (price: 0.5 times, 1 time, 2 times, 5 times) ×6 (electrode: F1, Fz, F2, C1, Cz, C2) analysis of variance. The LPP component appeared in the central and parietal brain regions,[59] and this study selected (C1, CZ, C2, P1, Pz, P2) 6 electrodes for analysis. A 3 (scene: daily supermarket, sightseeing attraction, entertainment attraction) ×4 (price: 0.5 times, 1 time, 2 times, 5 times) ×6 (electrode: C1, CZ, C2, P1, Pz, P2) analysis of variance was used.

Results

Questionnaire results

The questionnaire data are shown in Figure 3. The repeated measures analysis of variance of purchase intention showed that the main effects of price factor ($F(3, 48) = 110.003$, $p = 0.000 < 0.05$, $\eta_p^2 = 0.873$) and scene factor ($F(2, 32) = 30.608$, $p = 0.000 < 0.05$, $\eta_p^2 = 0.657$) were significant, and the interaction effect was significant ($F(6, 86) = 30.608$, $p = 0.000 < 0.05$, $\eta_p^2 = 0.781$). The paired comparison results for the scene factors indicated that the willingness to purchase

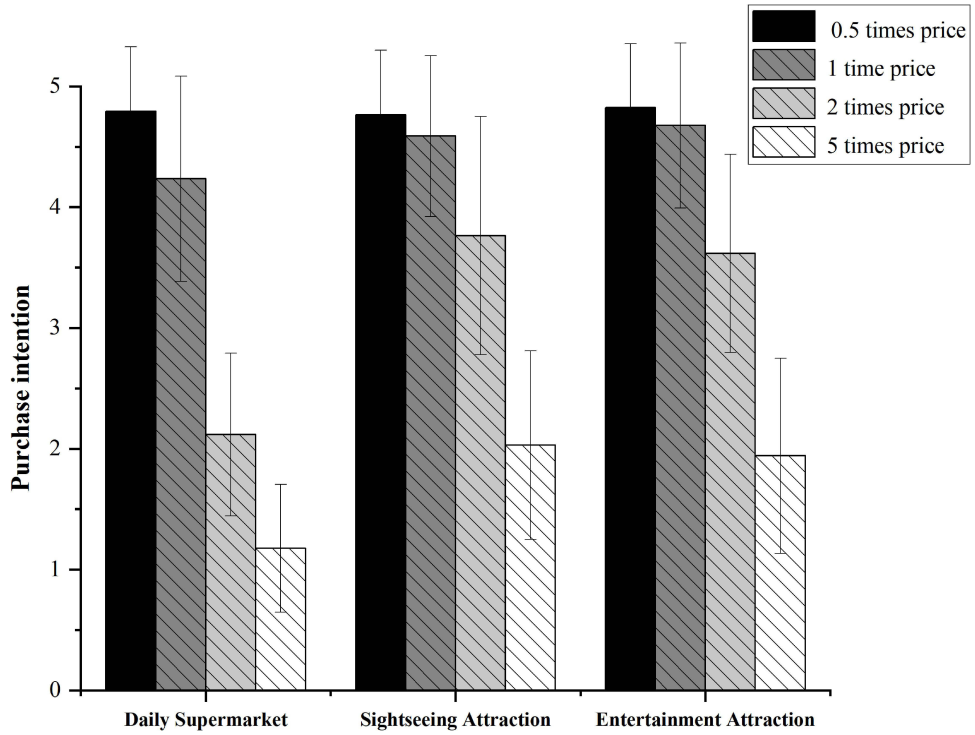

Figure 3 Purchase intentions of participants.

at entertainment attractions (M=3.765, SD=0.110, p<0.001) and sightseeing attractions (M=3.787, SE=0.129) were significantly higher than at regular supermarkets (M=3.081, SD=0.086, p<0.001). However, there was no significant difference in consumers' willingness to purchase between entertainment attractions (M=3.765, SD=0.110, p<0.001) and sightseeing attractions (M=3.787, SE=0.129).

The simple effect test results of the price factor showed that in any scene, the participants' purchase intention for low-priced products was significantly higher than that for high-priced products, except in the entertainment attraction where the purchase intention for half-priced products (M = 4.824, SD = 0.128) was not significantly higher than that for original-priced products (M = 4.676, SD = 0.166, $p = 0.096$).

The simple effect test results of the scene factor showed that there was no significant difference in consumers' purchase intention for products with 0.5 times the price in various scenes, and they all showed a high purchase intention. When the product was at the original price, the entertainment attraction (M = 4.676, SD = 0.166) had a significantly higher purchase intention than the daily supermarket (M = 4.235, SD = 0.206, $p = 0.011 < 0.05$). However, there was no significant difference in consumers' purchase intention between the entertainment attraction (M = 4.676, SD = 0.166) and the sightseeing attraction (M = 4.588, SD = 0.162). When the product price was twice the original price, consumers' purchase intention in the entertainment attraction (M = 3.618, SD = 0.199, $p < 0.001$) and the sightseeing attraction (M = 3.765, SD = 0.239, $p < 0.001$) was significantly higher than that in the daily supermarket (M = 2.118, SD = 0.163), while there was no significant difference in consumers' purchase intention between the entertainment attraction (M = 3.618, SD = 0.199) and the sightseeing attraction (M = 3.765, SD = 0.239). When the product price was five times the original price, consumers' purchase intention showed a similar situation to that of twice the price, and the purchase intention in the entertainment attraction (M = 1.941, SD = 0.196, $p = 0.001$) and the sightseeing attraction (M = 2.029, SD = 0.189, $p < 0.001$) was significantly higher than that in the daily supermarket (M = 1.176, SD = 0.128), while there was no significant difference in consumers' purchase intention between the entertainment attraction (M = 1.941, SD = 0.196) and the sightseeing attraction (M = 2.029, SD = 0.189).

ERP Results

The participants' EEG superimposed average graphs induced by different prices in the three types of attractions are shown in the Figure 4. This study selected a time window of 170250 ms for the P2 component. In order to further analyze the amplitude differences under 12 conditions, R language was used to perform a 3 (scene) × 4 (price level) × 6 (electrode) repeated measures analysis of variance on the P2 component of 6 electrode points. The results showed that the main effect of price condition on the P2 component was significant ($F(2.57, 38.53) = 6.191$, $p = 0.002 < 0.05$, $\eta_p^2 = 0.292$); the main effect of scene condition was not significant ($F(1.72, 25.76) = 2.175$, $p = 0.131$, $\eta_p^2 = 0.127$); the main effect of electrode condition was not significant ($F(5, 11) = 0.503$, $p = 0.768$, $\eta_p^2 = 0.186$) and there was no interaction among the conditions. The P2 amplitude induced by the 5 times price level (2.763±2.235μV) was the largest, followed by the 0.5 times price level (2.561±2.219μV), the 2 times price level (2.421±2.082μV), and finally the 1 time price level (2.119±2.062μV).

The LPP waveforms induced by different prices in the three types of scenes are shown in the figure. This study selected a time window of 600–700 ms for the LPP component. In order to further analyze the amplitude differences under six conditions, R language was used to perform a 3 (scene) × 4 (price level) × 6 (electrode) repeated measures analysis of variance on the LPP component of 6 electrode points. The results showed that the main effect of the electrode on the LPP component was significant ($F(5, 11) = 4.560$, $p = 0.017 < 0.05$, $\eta_p^2 = 0.675$), the main effect of scene condition was not significant ($F(1.93, 28.97) = 2.491$, $p = 0.102$, $\eta_p^2 = 0.142$), the main effect of price condition was significant ($F(2.26, 33.91) = 5.819$, $p = 0.002 < 0.05$, $\eta_p^2 = 0.279$), the interaction effect of electrode condition and price condition on LPP amplitude was significant ($F(15, 1) = 427.551$, $p = 0.038 < 0.05$, $\eta_p^2 = 1.000$), and the interaction effect of scene condition and price condition on LPP amplitude was significant ($F(4.18, 62.64) = 2.820$, $p = 0.030 < 0.05$, $\eta_p^2 = 0.158$).

The simple effect analysis of price condition controlling for scene condition showed that: in the entertainment attraction, the LPP amplitude induced by the 5 times price level (1.934±0.371μV) was higher than that by the 1 time price level (0.781±0.244μV, $p = 0.002 < 0.05$); the LPP amplitude induced by the 5 times price level (1.934±0.371μV)

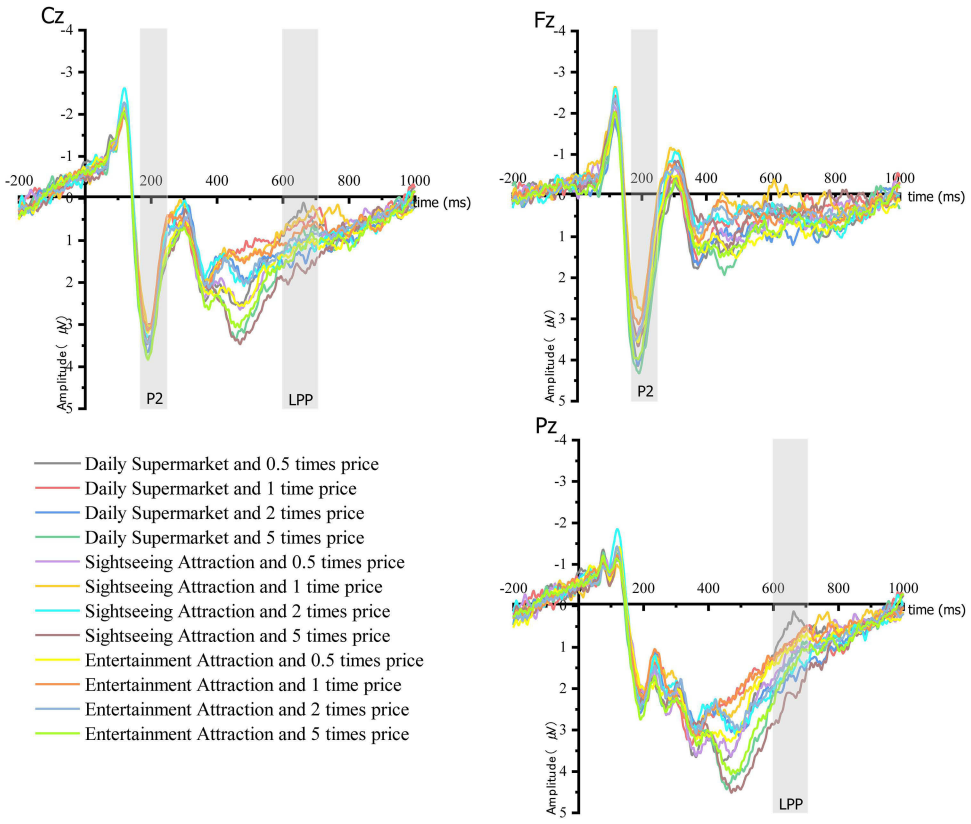

Figure 4 The grand average ERP induced by different prices in various scenarios.

was higher than that by the 0.5 times price level (1.256±0.244μV, $p = 0.022 < 0.05$); the LPP amplitude induced by the 2 times price level (1.334±0.218μV) was significantly higher than that by the 1 time price level (0.781±0.244μV, $p = 0.019 < 0.05$). In the sightseeing attraction, the LPP amplitude induced by the 5 times price level (1.496±0.307μV) was higher than that by the 1 time price level (0.945±0.234μV, $p = 0.007 < 0.05$), while there was no significant difference among other price levels. The simple effect analysis of scene condition controlling for price condition showed that under the 5 times price condition, the LPP amplitude induced by the entertainment attraction (1.934±0.371μV) was higher than that by the daily supermarket (1.203±0.384μV, $p = 0.010 < 0.05$), and also significantly higher than that by the sightseeing attraction (1.496±0.307μV, $p = 0.024 < 0.05$).

Discussion

This study investigated how different scenes and price levels affect consumers' price perceptions and their neural foundations. The questionnaire results indicated that consumers had a much higher willingness to buy products with increased prices in scenic areas than in daily supermarkets, demonstrating that scenario factors influenced consumers' price perceptions and that consumers tolerated higher premium prices for goods in scenic areas. In contrast to sightseeing and entertainment attractions, participants were less inclined to buy products at original prices in daily supermarkets. Since the goods sold in scenic spots were generally higher than the original prices, consumers exhibited a higher willingness to buy when they encountered original-priced goods in tourist attractions than in daily supermarkets. In any scenario, participants' willingness to buy declined progressively as the price rose. This revealed that people were very sensitive to prices and price increases could severely diminish consumers' willingness to buy.[60]

Early Automatic Perception Phase

Based on dual processing theory, the P2 component reflected the early stages of cognition, which was regarded as an ERP component indicating attention allocation and selection, which emerged around 200 ms after stimulus presentation and

was sensitive to both physical properties and semantic information of the stimulus, influenced by attention and emotion. In the domain of neuromarketing, the P2 component has been deemed as an important measure of early evaluation and emotional processing of products or advertisements by consumers. It is triggered by attentional resources and displays greater amplitude when the cognitive conflict is higher, indicating the decision risk that consumers face while making purchase decisions. Studies have shown that P2 component can reflect consumers' cognitive and emotional responses to different pricing strategies,[51] and is useful for predicting their purchase intentions.[60]

In the current study, the price level was found to have a significant main effect. We speculated that the presence of different prices of products would deviate severely from consumers' expected price information, greatly arousing consumers' attention and emotional changes.[52] When the price level was high (eg, 5 times), consumers might experience more intense negative emotions (eg, surprise, anger, disappointment, etc.), resulting in an increased P2 amplitude, indicating that the substantial price increase of products deviated seriously from consumers' expectations of price information in their purchase decisions, causing significant cognitive conflict,[16] confirming hypothesis 1. When the price level was low (eg, 0.5 times), consumers might experience more intense positive emotions (eg, excitement, satisfaction, joy, etc.), also resulting in an increased P2 amplitude. Product marketing, in order to obtain greater profits on the basis of maintaining costs, rarely carries out large price reductions, which is common sense for consumers, and a 0.5 times price reduction is large, especially for products in tourist attractions, further violating common sense, inconsistent with participants' expectations, causing significant cognitive conflict. The presentation of original price products elicited a smaller P2 component, proving that original price products conformed to consumers' expectations, occupying less attentional resources, and consumers might experience weaker or neutral emotions, resulting in a reduced P2 amplitude. This indicated that consumers' sensitivity to price was nonlinear and might be influenced by reference effects or anchoring effects.[61] On the other hand, scene conditions did not have a significant effect on the P2 component, possibly indicating that in the early stage of cognition, scene conditions did not have too much impact on consumers' higher-level perceptual processing, or that consumers' attention was firmly attracted by price factors in the early stage of cognition and could not produce obvious perceptual differences for different scenes. Therefore, tourist attractions can also influence consumers' perception and evaluation of prices by setting references or anchors, thereby increasing tourists' willingness to buy or satisfaction.

Late Perception Phase

Based on dual processing theory, the LPP component is related to the cognitive processes of evaluation and categorization in the late stage of cognition. Relevant studies in neuromarketing suggest that the LPP component is related to the cognitive process of evaluative categorization involved in purchase decisions, that is, participants participate in evaluation and categorization in the late cognitive processing stage before making purchase decisions.[54,55] At the same time, the LPP component is closely related to emotional arousal and is more sensitive to motivational emotions. It can reflect consumers' potential motives.[56,57] The LPP amplitude is a neural indicator that reflects emotional responses. It has a close relationship with consumers' willingness to buy and behavior. In general, a larger LPP amplitude indicates a stronger emotional response of consumers towards products, thereby increasing the likelihood of generating purchase behavior. Conversely, a smaller LPP amplitude indicates a weaker emotional response towards products, which may lead to a higher probability of abandoning purchase behavior.[43]

In this study, participants formed expectations of product prices under different scenarios based on product prices and scene cues. During the experiment, the scene and price stimuli presented by the experiment were automatically compared with participants' psychological expectations. The interaction effect of scene condition and price condition showed that in entertainment attractions, the LPP amplitude induced by 5 times price level was higher than 1 time and 0.5 times price levels; 2 times price level induced higher LPP amplitude than 1 time price level. Participants were more willing to accept high-priced products in entertainment attractions, which was consistent with the questionnaire results. The reason was that long-term advertising propaganda in entertainment attractions made participants have higher price expectations for products in entertainment attractions, making consumers more willing to accept high-priced products, confirming hypothesis 2. According to the theory of perceived value, consumers take into account both the actual value and the psychological value of a product. In different types of tourist attractions, the provided services and experiences differ,

resulting in variations in consumers' perceived value of the products. In entertainment attractions, where the primary focus is on entertainment services, consumers tend to place relatively less importance on the actual value of the products. They prioritize the psychological value of the products, such as the happiness and satisfaction they can provide. Consumers pay more attention to experience and emotional value in entertainment attractions. The products in entertainment attractions are often closely related to their brands and have high collection value and emotional value. Therefore, consumers are more willing to pay higher prices for them.[62] Buying high-priced products can provide consumers with more unique and memorable experiences and commemorative value. In this case, the price may become a secondary factor. Consumers are more willing to pay high prices for some unique products or special services. Therefore, consumers are more willing to pay higher prices for them.[63] At the same time, in entertainment attractions, consumers usually relax their vigilance and have relatively low sensitivity to prices. Consumers are more easily attracted by the exquisite packaging and unique design of high-priced products, thereby increasing their purchase motivation.

However, when the products in entertainment attractions were at original prices, they did not match consumers' price expectations, resulting in cognitive conflict and reducing the purchase motivation for original price products. The LPP component induced by the original price condition was lower than 5 times and 2 times price conditions. This may involve the "middle option bias" phenomenon. Middle option bias refers to the tendency of people to choose the middle option between two extremes rather than the extreme options when making decisions.[64] In entertainment attractions, 2 times price products may be in the "middle" of the price range, so they are more likely to be chosen by consumers. It can be analyzed that it is difficult for merchants to gain a competitive advantage by lowering prices in entertainment attractions. This result contradicts Ofir C's study, which believes that consumers are more accepting of lower-priced products, but this study did not consider scene factors.[65]

In sightseeing attractions, the LPP amplitude induced by 5 times price level was higher than 1 time price level, while there were no significant differences among other price levels. This indicates that in sightseeing places, high-priced products also have strong purchase motivation and emotional value. This may be because sightseeing places are usually where individuals go to experience culture and history, so individuals are more willing to pay a price for high-value cultural experiences. In sightseeing attractions, consumers usually buy products as part of their travel experience. Buying high-priced products can enhance their travel experience and make them feel more luxurious and special. Consumers usually buy products in sightseeing attractions to give to friends and relatives or to commemorate. Some consumers are more willing to spend higher prices to buy a unique gift, making the gift more valuable. In addition, the products in sightseeing attractions are often one-time consumables, and consumers may ignore the price when buying.

Under the 5 times price condition, the LPP amplitude induced by the entertainment attraction was higher than the daily supermarket and the sightseeing attraction. In tourist attractions, consumers' tolerance for price increases of products was enhanced. However, compared with entertainment attractions, consumers were more sensitive to the price perception of products in sightseeing attractions and had a lower tolerance for price increases. A possible reason is that in entertainment attractions such as Disneyland, which focus on entertainment and themes, it is easier to bring pleasant and relaxed emotional experiences to tourists. Products in entertainment attractions are usually more closely connected with consumers' emotions. Consumers consider more their own emotional needs and values when making purchase decisions. The purchase decision of products in entertainment attractions is more emotional rather than purely based on price and practicality. Products are usually related to people's leisure and entertainment and have higher emotional value. Therefore, consumers are more willing to pay high prices for them. Products in entertainment attractions usually have a certain degree of scarcity, such as limited-edition products, souvenirs, etc. The uniqueness and scarcity of these products can increase consumers' purchase motivation.[62] In addition, products in entertainment attractions are often closely related to their brands and have high collection value. Therefore, consumers are more willing to pay higher prices for them.

In contrast, tourists in sightseeing attractions mainly experience natural scenery and cultural landscapes.[25] The products in sightseeing attractions have lower emotional value and consumers have weaker purchase motivation. At the same time, the products in sightseeing attractions are more common and practical, and purchase decisions consider more factors such as price and utility, which also weaken consumers' purchase motivation. The products in sightseeing attractions may be more ordinary and traditional, lacking uniqueness and brand value support. Therefore, when the

product price increases to 5 times, consumers' purchase motivation for products in sightseeing attraction may decrease, because they think that these products are not worth paying higher prices. Hyoungeun Moon's study showed that tourists' perception of price affects their impression of scenic spots.[9] Therefore, too high prices may be detrimental to the establishment of a good image of scenic spots, which affects tourist loyalty. To optimize revenue, it is recommended that sightseeing attractions aim to minimize product price increases and prioritize enhancing tourists' goodwill. On the other hand, entertainment attractions could consider increasing prices as a viable strategy to expand their income. Consumers in entertainment attractions are insensitive to product prices and can accept a high level of premium. The relaxed and pleasant play experience in entertainment attractions can effectively reduce the negative impact of the product price increase and make it easier to accept and buy high-priced products.

Consumers' purchase motivation is more influenced by emotional and psychological factors than by rational thinking and economic considerations. Consumers' purchase behavior in tourist attractions is often influenced by various factors, including brand value, product uniqueness, type of tourist attraction, etc. Different types of scenic spots have different product pricing strategies and positioning, which have different effects on consumers' purchase decisions. From the perspective of perceived value theory, this study takes the type of tourist attractions and price information as variables to explore the differences in consumers' perceptions and acceptance of different levels of prices of goods within different types of attractions filling a research gap in the field of tourism consumption. Perceived value theory emphasizes consumers' comprehensive assessment of products or services in their purchase decisions, including perceptions of benefits and costs. In this study, consumers' higher acceptance of premium prices for scenic goods implied that they had higher perceived value for higher-priced goods, which may be perceived as providing a richer, more interesting and enjoyable travel experience. In addition, combined with dual processing theory, this study also delved into how scenic spot type affects the micro-psychological processes of consumers' price perceptions of goods and purchase decisions. The results of the study show that tourist attraction type and price information influence consumers' decision making at different stages. In the early cognitive stage, tourist attraction type has less influence on consumers' perceptual processing, while price information draws consumers' cognitive attention at this stage. In the late cognitive stage, tourist attraction type and price information jointly influenced consumers' decision making. Consumers are more likely to accept high-priced goods in entertainment attractions and in sightseeing attractions, but are more sensitive to the perceived price of goods in sightseeing attractions and less tolerant to the increase of goods. Therefore, tourist attractions can attract consumers' attention and purchase desire by providing unique, high-quality goods and services and focusing on providing consumers with unique travel experiences and feelings. This study has important practical implications for scenic spot managers, who can develop different commodity pricing strategies and positioning strategies according to the characteristics of scenic spots to meet consumer demand and improve commodity sales and scenic spot revenue, which promotes the development of tourism economy. In addition, this study also provides a better development path for the concept of "tourism for economic development" advocated by the World Tourism Organization (UNWTO).

Theoretical Implication

This study offers empirical support for the theoretical proposition that tourism scenic spot type influences product price perception in tourism consumption. Previous studies have investigated the role of product price perception in tourism, but none have considered its interaction with scenic spot type. This study expands the application of the theory of perceived value and the dual-process theory in the field of tourism consumption, and examines the neural mechanisms underlying consumers' purchase intention and emotional response under different scenarios and price conditions. It reveals that consumers' price sensitivity is not linear, but may be affected by reference or anchoring effects. The study also contributes a novel perspective to understanding consumer behavior and decision making, extends the research frontier of tourism consumption, and enlarges the application range of neuromarketing. Furthermore, this study enhances our understanding of the differences between various types of tourism attractions, thereby facilitating a more in-depth exploration of the neural and psychological mechanisms underlying consumers' purchase decisions. As a result, this can lead to a more comprehensive understanding of consumer behavior and preferences in the tourism industry.

Managerial Implication

The results of this study can help tourism scenic spot marketers to better formulate pricing strategies and promotional strategies. Tourism scenic spots can develop different marketing strategies and advertising designs according to consumers' nonlinear sensitivity to price and different scene types and price levels, to stimulate tourists' purchase willingness. For example, in entertainment attractions, they can use high-priced products and strong stimulating language to attract consumers' attention and interest; in sightseeing attractions, they can use unique cultural elements to arouse consumers' purchase willingness. Tourism scenic spots can also influence consumers' perception and evaluation of price by setting reference points or anchors, thereby increasing their purchase willingness or satisfaction. Consumers can evaluate the value, quality, suitability, etc. of products according to different scene types and price levels, better control their consumption behavior and decision-making, avoid being overly influenced by price factors, and buy products or services that meet their real needs.

Limitations and Directions for Future Research

However, we need to acknowledge some limitations of this study. First, we only studied sightseeing and entertainment attractions, while the types of tourist attractions can be further subdivided into natural scenery, leisure, and entertainment, historical and cultural, industrial integration, and other types. Therefore, future research should expand the scope of tourist attraction types. In addition to sightseeing and entertainment attractions, we can also study other types such as historical and cultural, and industrial integration scenic spots. Second, all our subjects were college students. Because college students usually have higher education levels and travel experience, we need to consider the differences in education level and travel preferences among different groups (such as men and women, young and old). Therefore, future research should go beyond the student group and use a wider range of participant samples to explore the neural mechanisms of different groups participating in tourism consumption decision-making. Finally, we used the event-related potential research method, and the simulated tourism scenic spot purchase scenario was different from real life. Therefore, the performance of participants under experimental conditions may differ from that in real situations. Future research can use more methods, such as on-site interviews in scenic spots, to obtain higher external validity and provide more rich reference information for scenic spot managers to formulate reasonable product prices.

Conclusion

In summary, this study attempted to explore the effects of tourist attraction type and product price level on consumer purchase decisions and their neural basis. It proved that scene factors affect consumers' price perception. In the early stage of cognition, scene conditions did not have much impact on consumers' perceptual processing, while price conditions greatly aroused consumers' cognitive attention. When the price level was high (such as 5 times), consumers might feel stronger negative emotions (such as surprise, anger, disappointment, etc.), resulting in increased P2 amplitude. When the price level was low (such as 0.5 times), consumers might feel stronger positive emotions (such as excitement, satisfaction, joy, etc.), also resulting in increased P2 amplitude. This indicates that consumers' sensitivity to price is nonlinear and may be influenced by the reference effect or anchoring effect. In the late stage of cognition, scene factors and price factors jointly affect consumer decisions. In entertainment attractions, consumers are more willing to accept high-priced products; in sightseeing attractions, high-priced products also have strong purchase motivation and emotional value. Compared with entertainment attractions, consumers are more sensitive to the price perception of products in sightseeing attractions and have a lower tolerance for price increases. Different types of scenic spots have different product pricing strategies and positioning, which have different effects on consumers' purchase decisions. Therefore, scenic spots should formulate different product pricing strategies and positioning strategies according to different types of consumers and scenic spot characteristics, to meet consumers' needs and increase product sales and scenic spot income.

Data Sharing Statement

Data available on request due to restrictions eg privacy or ethical. The data presented in this study are available on request from the corresponding author.

Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by Ethics Committee of Jianghan University (JY202209 2022.9.15). Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

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Disclosure

The authors declare no conflicts of interest in this work.

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