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ORIGINAL RESEARCH

Consumers' Implicit Motivation Of Purchasing Luxury Brands: An EEG Study

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Purpose: This study aims to explore consumers' implicit motivations for purchasing luxury brands based on the functional theories of attitudes by using event-related potentials (ERPs).

Methods: Brand authenticity and logo prominence were used to modulate the social-adjustive function and value-expressive function, respectively. Twenty right-handed healthy female undergraduates and graduates participated in an experiment that has a 2 brand authenticity (genuine/counterfeit) × 2 brand prominence (prominent logo/no logo) design. In the experiment, participators browsed different luxury handbags with different brand authenticity and logo prominence, and then reported their purchase intentions on a five-point scale. Meanwhile, EEGs were recorded from the subjects throughout the experiment. In the analysis process, three ERP components, which can, respectively, reflect the cognitive conflict (N200), emotional conflict (N400) and motivational emotional arousal (LPP) during the evaluation of marketing-related stimuli, were mainly focused.

Results: For counterfeit brands, the no logo condition elicited significant larger N200 amplitude, marginally significant larger N400 amplitude and significant smaller LPP amplitude than the prominent logo condition. However, for genuine brands, this modulation effect of logo prominence cannot be found. These results imply that consumers' implicit social motivations for purchasing luxury brands come from the satisfaction of at least one social goal. When one goal cannot be satisfied, consumers will more expect the satisfaction of another one. If this expectation is violated, it seems to be unexpected and unacceptable. Thus, greater anticipation conflict (N200) and emotion conflict (N400) will be induced, and the purchase motivation (LPP) cannot be aroused.

Conclusion: Consumers' preferences for luxury brands are based on the satisfaction of their social goals. These social goals always coexist and perform as compensation with each other. The dissatisfaction of one social goal would promote their expectation of the satisfaction of another social goal.

Keywords: functional theories of attitudes, brand prominence, brand authenticity, motivation, ERPs, N200, N400, LPP

Introduction

Currently, due to the development of emerging economies (e.g., China, India, and Russia), people's demand for luxury goods in these emerging economies is continually increasing,[1–3] which substantially expands the global market for luxury goods.[1] As a result, luxury brands are not restricted to only a select few but are also used by the masses nowadays.[4] Thus, understanding the motivations that drive consumers' purchases of luxury brands becomes an important topic for researchers and managers.

However, different from other goods in which functional utility is a large concern, luxury goods are products that people use to show prestige and status.[5] Therefore,

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consumers' purchases of luxury brands may largely differ from other products. Researchers have developed a series of theories to explain consumers' motivations toward luxury brands, such as the functional theories of attitudes. Until now, a number of studies have explored consumers' motivations toward luxury brands under the framework of these functional theories of attitudes and revealed some features of consumers' implicit social motivations.[6–9] However, little has been published regarding the cognitive process that can suggest how these attitude functions influence consumers' purchases and how the interactions of different functions modulate consumers' motivations (since an individual always concerns about more than one function of luxury brands).

The current study employs electroencephalogram (EEG) recordings that have high temporal accuracy to assess people's neural bases during the processing of luxury brand information and the interacting social motivations aroused by different social goals in purchasing luxury brands.[7,10] There are some advantages in studying the current problem on the brain level. First, sometimes consumers' responses do not reflect their actual thoughts. They are likely to be subject to self-deception and social desirability biases when they are making decisions, especially those with moral consequences, such as purchasing counterfeit luxury products.[11] Second, sometimes consumers are unable to articulate why he/she exhibits a specific behavior[11–13] or are unaware of their own thoughts and feelings.[10,14,15] Moreover, past researchers have devoted significant efforts to investigating the brain responses of marketing stimuli. They suggested that brain responses could be eventually translated into more indexes, which would help marketing professionals better understand the motives underlying consumer behaviors.[10,11,16,17] Thus, it is of great significance to investigate the neural processes of purchasing luxury brands. This can provide a window into the consumers' implicit motivations and serve as a complement to or explanation of self-reported results.[16,17]

In the following content, we first review the functional theories of attitudes, including its concept, features, and relationships with motivations and luxury brand consumption. Second, we discuss how brand prominence and brand authenticity can modulate the social-adjustive and value-expressive functions, respectively, in luxury purchases, and then develop the main and behavioral hypotheses in the current study. Third, we review the evidence of relationships between motivations and brain activity detected by event-related potentials (ERPs) under the domain of marketing. We also review implications of three ERP components that are primarily investigated in previous consumer neuroscience studies. We further discuss how these ERP components reflect consumers' cognitive processing, which form consumers' motivations toward a certain kind of product or brand. It allows us to develop hypotheses on whether and how the cognitive process and interaction of two attitudinal functions are reflected in early and late ERP components. Fourth, we present our materials and methods, including participants, experiment procedures, EEG recordings, data analysis, and statistical procedures, and report the results. Finally, we conclude the key findings, discuss the theoretical and practical implications, present the limitations, and discuss future research.

Theory And Hypothesis Development

Functional Theories Of Attitudes, Motivation, And Luxury Brand Consumption

Functional theories of attitudes suggest that attitudes can serve important social functions, such as allowing self-expression (a value-expressive function) and facilitating self-presentation (a social-adjustive function).[18–20] Considering that attitudes are underlying variables that can modulate motivations,[18,20,21] former researchers have applied functional theories of attitudes to explain consumer behaviors and proven their applicability.[20,22]

Meanwhile, several authors have applied "functional theories of attitudes" to study consumers' social motivations for purchasing luxury products.[23–25] According to the functional theories of attitudes, the different social goals that consumers want to achieve through luxury consumption allow consumers to express themselves (a value-expressive function) and/or to present themselves (a social-adjustive function) in front of others.[26] It implies that when consumers hold a value-expressive attitude towards a luxury product, they are motivated to consume it as a form of self-expression[27] and communicate their self-identity to others.[22] Meanwhile, consumers are more responsive to messages promoting intrinsic aspects of products, such as quality or reliability.[6] On the other hand, when consumers have a social-adjustive attitude towards a luxury product, they are motivated to consume it to gain approval in social situations.[25] Meanwhile, consumers will respond more favorably to image or product form appeals, since such appeals are consistent with their social goal of projecting a particular image in social settings.[27]

However, the cognitive process that suggests how these two attitude functions influence consumers' purchase behaviors is still unclear. On the other hand, studies have also suggested that consumers' attitudes toward luxury brands serve both a value-expressive function and a social-adjustive function.[6] In other words, consumers' self-presentation and self-expression-related goals are both likely to be salient in purchasing luxury goods. And consumers are concerned with both the image the product presents and the intrinsic aspects of products (e.g., quality and material). However, the interaction effect between a value-expressive function and a social-adjustive function in luxury brand consumption is also unclear.

Functional Theories Of Attitudes, Logo Prominence, And Brand Authenticity

Some features of luxury brands imply highly disparate social motivations and are supposed to modulate value-expressive and social-adjustive functions, such as brand authenticity and brand prominence.[6] Previous studies have suggested that counterfeit luxury goods are low-priced and often lower quality replicas of genuine luxury products.[28] With respect to counterfeit luxury brands, it seems that consumers' attitudes mainly serve a social-adjustive function rather than a value-expressive function, since a value-expressive function focuses more on product quality while the social-adjustive function focuses more on the product image or form.[6] Therefore, the genuine luxury brand can better serve the value-expressive function than the counterfeit luxury brand, while these two can similarly serve the social-adjustive function. Therefore, brand authenticity can modulate the value-expressive function of luxury brands. In regard to the brand prominence, previous studies have confirmed the extent to which a luxury brand can fulfill a consumer's social-adjustive goals depends on brand prominence since the social aspirations associated with a luxury brand reside in its emblem or logo.[29] Specifically, a prominent logo will better fulfill consumers' self-expression-related goals than an inconspicuous one. Therefore, brand prominence can modulate the social-adjustive function of luxury brands.

Thus, we can use brand prominence and brand authenticity to modulate the respective social-adjustive and value-expressive functions in luxury purchases. Specifically, by investigating consumers' different attitudes towards genuine or counterfeit luxury brands (both with conspicuous or inconspicuous logos) on the brain level, we can discover the interaction effect between the value-expressive function and the social-adjustive function and its related cognitive process.

The Main And Behavioral Hypotheses

Consumers' attitudes toward luxury brands seem to serve both a value-expressive function and a social-adjustive function.[6] However, consumers' pursuit for value-expressive and social-adjustive social goals seems to vary across genuine and counterfeit luxury goods. For counterfeit luxury goods, consumers' attitudes seem to mainly serve a social-adjustive function rather than a value-expressive function, since a value-expressive function focuses more on product quality and counterfeit luxury goods are low-priced and often lower quality replicas of genuine luxury products.[28] It means that the value-expressive social goal will not be satisfied by counterfeit luxury goods, and the satisfaction of the social-adjustive goal is the main pursuit of consumers in purchasing counterfeit luxury brand goods.[4,28] Furthermore, since luxury and exclusivity often exist in the brand, the conspicuousness of a brand is a particularly important determinant of the social-adjustive function.[30] Therefore, the brand logo the counterfeit bears is of great importance because "the decision to buy a counterfeit product mainly represents a brand decision".[31] Specifically, when the brand is inconspicuous, consumers' attitudes toward it are going to be less able to serve a social-adjustive function. As a result, the social attitude function based on counterfeit consumption is likely to be minimal. Based on the above discussion, for counterfeit luxury brands, we suspect that consumers' social-adjustive social goal would be salient and consumers would express higher purchase intentions for prominent logo products than non-prominent logo products.

For genuine luxury brands, market data have indicated that representative luxury brands (e.g., Gucci and Louis Vuitton) offer products with various levels of brand prominence and the sales of these products do not vary too much.[30] This is because that consumers do not require prominent brand markings to judge the value of a luxury product. They can recognize luxury products from the subtle design features of each of the manufacturers and accurately judge their relative prices.[30] This indicates that for genuine luxury brands, consumers' value-expressive social goal seems to be satisfied and the satisfaction of the social-adjustive social goal seems to be dispensable. Thus, we suspect that consumers' preferences for different levels of logo prominent goods may not vary too much.

Thus, we develop the main and behavioral hypotheses:

H-main: Consumers' social-adjustive and value-expressive functions coexist and perform as compensation with each other during luxury brand purchases.

H1: For counterfeit luxury products, brand prominence will have a positive influence on consumers' purchase intentions.

H2: For genuine luxury products, brand prominence will not have a significant influence on consumers' purchase intentions.

Motivation, Consumption, And ERPs

ERPs offer high temporal resolution, which makes them a valuable technique to illuminate individual's cognitive processes across multiple domains, particularly those underlying emotions, attitudes, and motivations.[32–36] For the marketing-related domain, lots of studies have employed electroencephalogram methods to detect consumers' brain responses in order to understand consumers' attitudes toward brands, products and other marketing-related stimuli.[10,36–39] A pioneer study conducted found that the similarity and coherence between the brand name and product name in brand extensions can be reflected in the amplitude deflection of the P300 component.[40] Thus, it is suggested that the P300 may potentially be an endogenous neural index that can measure consumers' attitudes toward brand extensions in marketing research.[40] Thus, it may also be possible for us to employ ERPs to investigate consumers' different attitudes for genuine or counterfeit luxury brands with conspicuous or inconspicuous logos.

In the consumer neuroscience domain, previous studies employed the S1-S2 paradigm to investigate the interaction effect between two factors. S1-S2 paradigm is also called as prime-probe paradigm, it measures whether S1 stimuli (prime stimuli) is suitable to S2 stimuli (probe stimuli). Ma and his colleagues used S1-S2 paradigm to measure whether extension products (S2 stimuli) is suitable for original brands (S1 stimuli).[41] These studies have found that N200 and N400 can reflect anticipated and emotional conflicts. These can be caused by the deviation between exposed and expected information and the deviation between exposed and acceptable information, respectively.[32,37,42,43] On the other hand, late positive potential (LPP) is sensitive to motivational emotions and can be a direct index of the significance of consumers' motivations in decision making.[37,44–46] We also intend to employ the S1-S2 paradigm in the current study. Thus, we propose that these three ERP components (N200, N400, and LPP) will probably appear in the current study.

ERP Hypotheses

Previous studies on consumer neuroscience have consistently found that the amplitude of N200 is positively correlated with anticipated conflict, which refers to the deviation between exposed and expected product-related information in consumption decisions.[40,47–49] In other words, the larger the difference between exposed and expected information, the greater the amplitude of N200 will be. As discussed in the former section, consumers are more likely to prefer a conspicuous logo rather than an inconspicuous one to fulfill their self-presentation goals in the context of counterfeit luxury brands. When they are informed that the presented luxury product is counterfeit, the conspicuous logo product is what consumers expect or want. Therefore, we speculate that a conspicuous logo will cause smaller cognitive conflict and elicit smaller N200 amplitude compared to an inconspicuous one when consumers are exposed to counterfeit luxury goods. On the other hand, the prominent logo seems not to be as necessary in the context of genuine luxury brands as the genuine product has already satisfied the value-expressive function (discussed in the former section). When participants are informed that the presented luxury product is a genuine one in advance, they do not care much about the logo conspicuousness. Thus, we speculate that brand prominence will not have a significant influence on the cognitive conflict and N200 amplitude when consumers are exposed to genuine luxury goods.

N400 is a negative-going deflection that peaks at approximately 400 ms post-stimulus onset.[50] The N400 has often been considered as a reflection of the conflicts related to semantic meaning.[50–52] Nevertheless, more recent studies have begun to report that N400 can also reflect some other (non-semantic) conflicts,[37,53–55] such as emotional conflict.[32,56] In the consumer neuroscience studies, researchers have found that the N400 is sensitive to the deviation between exposed and acceptable information,[37,42,43] and it can reflect the emotional conflict.[32,56] In other words, the more acceptable the exposed information, the smaller the emotional conflict and the amplitude of N400 will be.[32,36,37,42] In the current study, in the counterfeit luxury brand condition, the prominent logo condition can satisfy consumer's social-adjustive goals while the non-logo condition cannot satisfy both social goals. In other words, the prominent logo is more acceptable under the condition of counterfeit luxury brands. Thus, we speculate that a

prominent logo will cause smaller emotional conflict and elicit smaller N400 amplitude compared to an inconspicuous one when consumers are exposed to counterfeit luxury goods. On the other hand, genuine luxury goods with conspicuous or inconspicuous logos are both acceptable, as discussed in the former section. Thus, we assume that brand prominence will not influence emotional conflicts or N400 amplitude when consumers are exposed to genuine luxury goods.

Late positive potential (LPP) is an ERP component that typically peaks at approximately 600 ms after the presentation of a stimulus, and it is mainly distributed over the posterior scalp.[57] Considerable studies have suggested that LPP is largely connected with emotional arousals.[44,58,59] High arousal stimuli of facial expressions,[58] emotional texts,[59] and affective pictures[44] will elicit greater amplitudes of LPP. Thus, LPP is believed to be sensitive to motivational emotional arousals and is likely to reflect the motivations underlying consumer behaviors.[44–46] For example, Pozharliev Rumen et al[10] investigated consumer brain activities underpinning passive viewing of luxury versus basic branded products when participants were alone or with another person. They found that dissimilar brain responses occurred in the "Together" but not the "Alone" condition for the LPP amplitude, which was higher for luxury than for basic branded products in the "Together" condition. Their results suggest that LPP amplitude reflects increased attention allocation and motivational significance that can be enhanced by the presence of another person when viewing the luxury branded products.[10] In the current study, when participants are exposed to counterfeit luxury goods, a conspicuous logo rather than an inconspicuous one matches consumers' motivations to fulfill the social goals of self-presentation. Thus, we assume that a prominent logo will cause greater motivational emotional arousal that will be reflected by larger LPP amplitude in the context of counterfeit luxury goods. On the other hand, genuine luxury goods with either conspicuous or inconspicuous logos can fulfill consumers' value-expressive goals, and the desire for a conspicuous logo is reduced in the context of genuine luxury goods (see detailed discussion in the former section). Therefore, we speculate that brand prominence will not have a significant influence on the motivational emotional arousal or LPP amplitude when consumers are exposed to genuine luxury goods.

Therefore, we develop the ERP hypotheses:

H3: Brand prominence will have significant effects on consumers' cognitive conflict, emotional conflict and motivational emotional arousal during their evaluation of counterfeit luxury goods.

H3a: For counterfeit luxury goods, inconspicuous logos will elicit larger cognitive conflict that will be reflected in a more negative N200 amplitude than prominent ones.

H3b: For counterfeit luxury goods, inconspicuous logos will elicit larger emotional conflict that will be reflected in a more negative N400 amplitude than prominent ones.

H3c: For counterfeit luxury goods, prominent logos will have a positive influence on motivational emotional arousal that will be reflected in a larger LPP amplitude than prominent ones.

H4: Brand prominence will not have significant effects on consumers' cognitive conflict, emotional conflict and motivational emotional arousal during their evaluation of genuine luxury goods.

H4a: For genuine luxury goods, brand prominence will not have a significant influence on N200 amplitude.

H4b: For genuine luxury goods, brand prominence will not have a significant influence on N400 amplitude.

H4c: For genuine luxury goods, brand prominence will not have a significant influence on LPP amplitude.

As previously discussed, N200, N400, and LPP can, respectively, reflect the cognitive conflict, emotional conflict, and motivational emotional arousal during the evaluation of marketing-related stimuli according to the timeline of cognitive process. The analysis of these components will contribute to our understanding of consumers' social motivations in purchasing luxury brands and serve as a complement to self-reports studies.[16,17]

Methods

Participants

In the current study, 20 right-handed healthy female undergraduates and graduates were recruited as participants from Ningbo University under simple random sampling method, through social software WeChat or QQ in the Internet. They ranged in age from 18 to 24 years old (M = 21.60, SD = 2.06). They were all native Chinese speakers without any history of neurological disorders or mental diseases. Their vision was normal or corrected-to-normal before the experiment started. We enrolled the university students as participants and no questionnaire was conducted before the experiment since the

previous studies regarding luxury brand consumption also employed students as participants.[6,10]

Materials

The experiment consisted of 160 stimuli, which consisted of 40 different Louis Vuitton (LV) handbag pictures with 2 kinds of brand prominence (prominent logo vs no logo) × 2 kinds of brand authenticity (genuine vs counterfeit). The stimuli contained 40 different Louis Vuitton (LV) handbag pictures with 2 kinds of brand prominence (prominent logo vs no logo) and 2 kinds of brand authenticity (genuine vs counterfeit). Thus, each handbag picture was present four times: genuine brand with a prominent logo, genuine brand without a logo, counterfeit brand with a prominent logo, and counterfeit brand without a logo. This resulted in 40 stimuli for each condition. Each picture was shown on a white background and its size was a consistent 270×360 pixel. Like a previous study,[6] the stimuli for prominent brand conditions were actual LV handbags downloaded from the official webpage of Louis Vuitton (http://www.louisvuitton.cn/zhs-cn) and edited using Photoshop 7.0 (Adobe Systems Incorporated, San Jose, California, USA). The no logo condition stimuli were created from the same image which was digitally altered to have no discernible logo. All the stimuli were randomly and evenly divided into four blocks in the formal experiment. We chose handbags as the product since "handbags are the engine that drives luxury brands"[60] and handbags are widely consumed by female population.[6] The chosen handbag brand is Louis Vuitton since it is one of the most widely known and most frequently mentioned favorite luxury brands among female participants.[6] We also informed the participants that the counterfeit product is highly similar to the original brand product, which means most of the consumer cannot identify between the original brand product and the highly similar counterfeit product.

Procedure

Participants were asked to sit in a sound-attenuated room. There was a computer-controlled monitor approximately 100 cm away from the participant, on which the stimuli were centrally presented. A keypad was provided to the participants to report their purchase intention for the current product through a five-point scale. Before the formal experiment started, each participant received a brochure introducing the task, procedure, and announcements regarding the current experiment.

As shown in Figure 1, each trial began with a fixated cross against a black background for 400–600 ms, which was followed by a blank screen lasting for 500 ms. Afterwards, words about brand authenticity appeared for 1500 ms. After a 600–800 ms blank screen, the picture of a handbag appeared for 4000 ms. Then, the participants were asked to rate on their purchase intention for the current product. The stimuli and recorded triggers were presented using the E-Prime 2.0 software package (Psychology Software Tools, Pittsburgh, PA, USA). Participants were asked to minimize blinks, eye movements, and muscle movement during the experiment. The formal experiment started after 10 practice trials.

After the experiment, the participants were asked to complete a questionnaire in which their personal information and attitudinal functions toward luxury brands were collected. Participants' attitudinal functions toward luxury goods were assessed on five-point Likert scales adapted from previous related studies.[6,25] A four-item measure of the value-expressive function (i.e., "Luxury brands reflect the kind of person I see myself to be"; "Luxury brands help me communicate my self-identity"; "Luxury brands help me express myself"; "Luxury brands help me define myself") and a four-item measure of the social-adjustive function (i.e., "Luxury brands are a symbol of social status"; "Luxury brands help me fit into important social situations"; "I like to be seen wearing luxury brands"; "I enjoy it when people know I am wearing a luxury brand") were included. The values of Cronbach's α, average variance extracted (AVE), and composite reliability (CR) for the value-expressive function scale were 0.886, 0.749, and 0.923, respectively. Meanwhile, the values of Cronbach's α, AVE, and CR for the social-adjustive function scale were 0.785, 0.621, and 0.862, respectively. Additionally, the correlation between the value-expressive function and the social-adjustive function was significant ($r = 0.739$, $p < 0.001$) and the square of the coefficient value was 0.549, which was less than the AVE values of the value-expressive function (AVE = 0.749) and the social-adjustive function (AVE = 0.621). All these meant that the two variables were properly measured.

Behavioral Data Recording And Analysis

For the behavioral data of participants' purchase intentions of luxury brands, we calculated the average purchase intention for all four conditions (counterfeit brand with prominent logo, counterfeit brand without logo, genuine brand with prominent logo, and genuine brand without

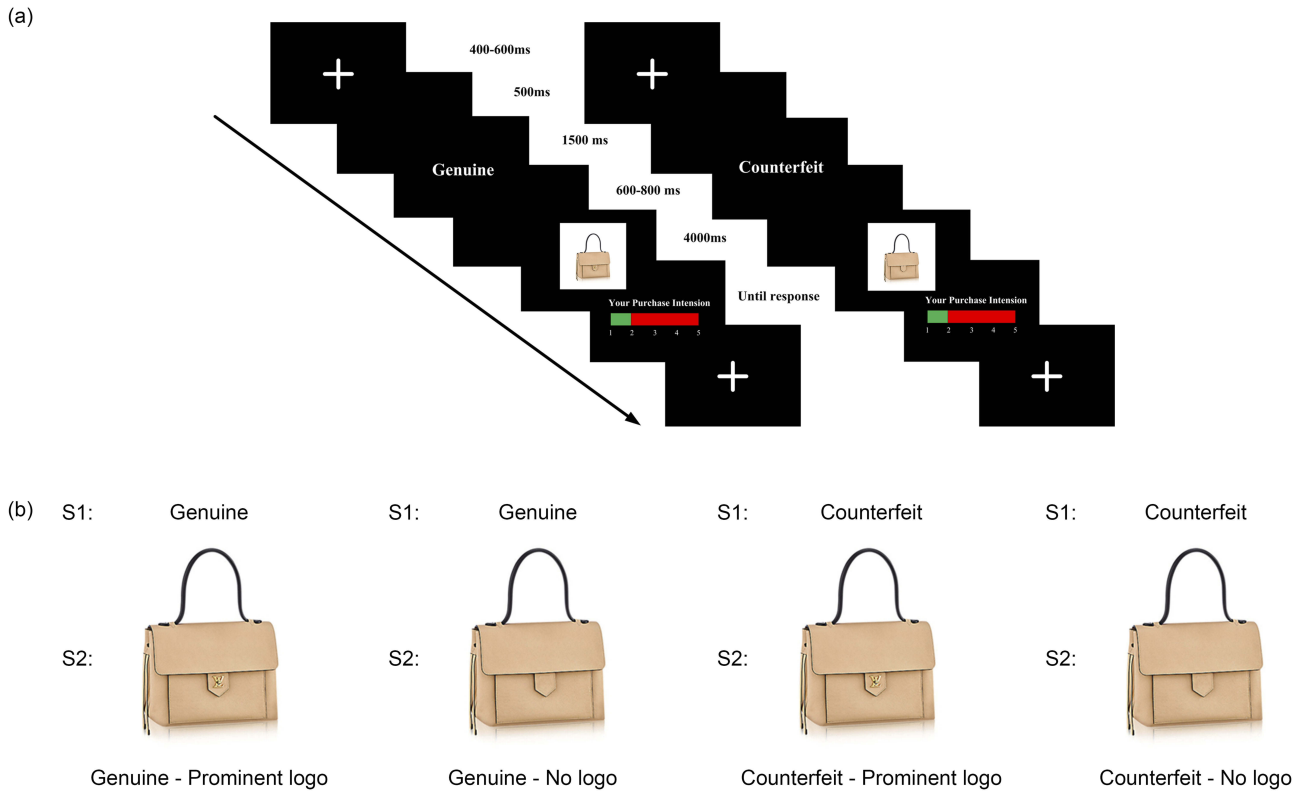

Figure 1 Experimental procedure: (**A**) Experimental task: Participants were instructed to report their purchase intentions toward different handbags with different brand authenticity on a five-point scale. EEGs were recorded from the subjects throughout the experiment. (**B**) The example of prominent logo and no logo handbag pictures used in the study.

logo). A 2 brand authenticity (genuine/counterfeit) × 2 brand prominence (prominent logo/no logo) ANOVA analysis was conducted for purchase intentions. If there was an interaction effect between the two factors, a simple effect analysis was conducted. The Greenhouse–Geisser correction[61] was applied for violations of the sphericity assumptions in appropriate parts of the ANOVA (uncorrected *df*s were reported with ε and the corrected p-values). In addition, Bonferroni method was performed for multiple comparisons in this study.

For the questionnaire analysis, we first calculated the average of the four items for the two attitudes. Then, Spearman correlations between the two attitudinal functions toward luxury goods (attitudinal functions and purchase intentions) were conducted.

EEG Recording And Analysis

EEG data were recorded with a cap containing 64 Ag/AgCl electrodes and a Neuroscan Synamp2 Amplifier (Curry7, Neurosoft Labs, Inc.) during the whole experiment with a sample rate of 1000 Hz. A cephalic (forehead) location was used as ground and the left mastoid was used for reference. Data were off-line transferred to the average of the left and right mastoid references. The electrooculogram (EOG) was recorded from electrodes placed at 10 mm from the lateral canthi of both eyes (horizontal EOG) and above and below the left eye (vertical EOG). EOG artifacts were off-line corrected for all subjects. The experiment started when the electrode impedances were reduced to below 5 kΩ.

EEG recordings were digitally filtered with a low-pass filter at 30 Hz (24 dB/Octave). EOG artifacts were corrected using the method proposed by Semlitsch et al.[62] It was segmented for the epoch from 200 ms before the onset of the target appearing on the video monitor to 800 ms after this onset, with the first 200 ms pre-targets as a baseline. Trails containing amplifier clipping, bursts of electromyographic activity, or peak-to-peak deflections exceeding ±100μV were excluded. The EEG recordings over each recording site for every participant were separately averaged within the four conditions (genuine-prominent logo, genuine-no logo, counterfeit-prominent logo, and counterfeit-no logo). After data pre-processing, the mean number of trails contained for further analysis was more than 34 trails each condition

($M_{genuine\text{-}prominent\ logo}$ = 35.100, S.E. = 0.920; $M_{genuine\text{-}no\ logo}$ = 34.700, S.E. = 1.154; $M_{counterfeit\ -prominent\ logo}$ = 35.650, S.E. = 0.941; $M_{counterfeit\ -no\ logo}$ = 35.200, S.E. = 0.911).

According to the previous studies, three ERP components were analyzed in the current study, which were N200, N400, and LPP, respectively. To analyze the mean amplitude of N200, we chose the time window of 260–360 ms after the onset based on visual observations and the guidelines proposed by Picton et al.[63] We included nine electrodes (F1, Fz, F2, FC1, FCz, FC2, C1, Cz, and C2) in the frontal-central area into the statistical analysis. A 2 brand authenticity (genuine/counterfeit) × 2 brand prominence (prominent logo/no logo) × 9 (electrodes) ANOVA was conducted for the N200 analysis. Similarly, the N400 component was analyzed within 430–560 ms after the stimulus onset, which included nine electrodes (C1, Cz, C2, CP1, CPz, CP2, P1, Pz, and P2) in the whole brain area.[64] The 2 brand authenticity (genuine/counterfeit) × 2 brand prominence (prominent logo/no logo) × 9 (electrodes) ANOVA analysis was conducted for the N400 amplitude. The LPP component was analyzed within 580–680 ms after the stimulus onset, which included six electrodes (CP1, CPz, CP2, P1, Pz, and P2) in the whole brain area.[65,66] The 2 brand authenticity (genuine/counterfeit) × 2 brand prominence (prominent logo/no logo) × 6 (electrodes) ANOVA analysis was conducted for the LPP amplitude. If there was interaction effect among the three factors, a simple effect analysis was conducted. The Greenhouse-Geisser correction[61] was applied for violations of the sphericity assumption in the appropriate parts of the ANOVA (uncorrected *df*s were reported with ε and the corrected p-values). Finally, Spearman correlations between each condition's LPP amplitude at Pz and the two attitudinal functions toward luxury goods were separately conducted.

Results

Questionnaire And Behavioral Results

The mean score of the two social functions (the value-expressive function and the social-adjustive function) were M_{value} = 3.300 and M_{social} = 3.025, respectively. The correlation between the two functions was significant (r = 0.739, $p < 0.001$). Thus, the front half of H-main that consumers' social-adjustive and value-expressive functions coexist during luxury brand purchases is supported.

Behavioral data are shown in Figure 2. A 2 brand authenticity (genuine/counterfeit) × 2 brand prominence (prominent logo/no logo) ANOVA analysis was conducted for reaction times. It showed a significant main effect for brand authenticity [F (1, 19) = 6.393, $p = 0.020$, $\eta^2 = 0.252$], showing that genuine brands (Mean = 1037.97 ms, S.E. = 58.28) had a longer reaction time than counterfeit brands (Mean = 903.56 ms, S.E. = 60.13). However, the main effect of brand prominence [F (1, 19) < 1, $p > 0.1$] and the interaction effect of these two factors [F (1, 19) < 1, $p > 0.1$] were not significant. Similarly, a 2 brand authenticity (genuine/counterfeit) × 2 brand prominence (prominent logo/no logo) ANOVA analysis was also conducted for purchase intentions, which also showed a significant main effect for brand authenticity [F (1, 19) = 8.939, $p = 0.008$, $\eta^2 = 0.320$]. Genuine brands (Mean = 2.620, S.E. = 0.193) aroused larger purchase intentions than counterfeit brands (Mean = 2.054, S.E. = 0.120). However, the main effect of brand prominence [F (1, 19) = 1.122, $p > 0.1$] and the interaction effect of these two factors [F (1, 19) = 2.263, $p > 0.1$] were not significant. These results support H2 that brand prominence will not have a significant influence on purchase intention toward genuine luxury brand, but do not support H1 that brand prominence will have a significant influence on purchase intention toward counterfeit luxury brand.

The questionnaire result indicated that social-adjustive and value-expressive functions coexisted during luxury brand purchases; thus, the front part of H-main is supported. However, the behavioral results showed that brand prominence did not have a significant influence on consumers' purchase intentions towards either counterfeit or genuine luxury brands. Thus, the latter half of H-main, which assumes that consumers' social-adjustive and value-expressive functions perform as compensation with each other during luxury brand purchases, is not supported from the behavioral perspective.

To explain why H1 is not supported, we tested the relationships between purchase intentions and the two attitudinal functions. We found that there was no significant correlation between purchase intentions and the two attitudinal functions, especially for the counterfeit condition. The results are summarized in Table 1.

ERP Results

N200 Analysis

The three-way 2 brand authenticity (genuine/counterfeit) × 2 brand prominence (logo/no logo) × 9 (F1, Fz, F2, FC1, FCz, FC2, C1, Cz, and C2) ANOVA analysis was conducted for N200 in the time window from 260 to 360 ms. The results are shown in Figure 3 and Table 3. There was no significant main effect of brand authenticity [F (1, 19) < 1, *p*

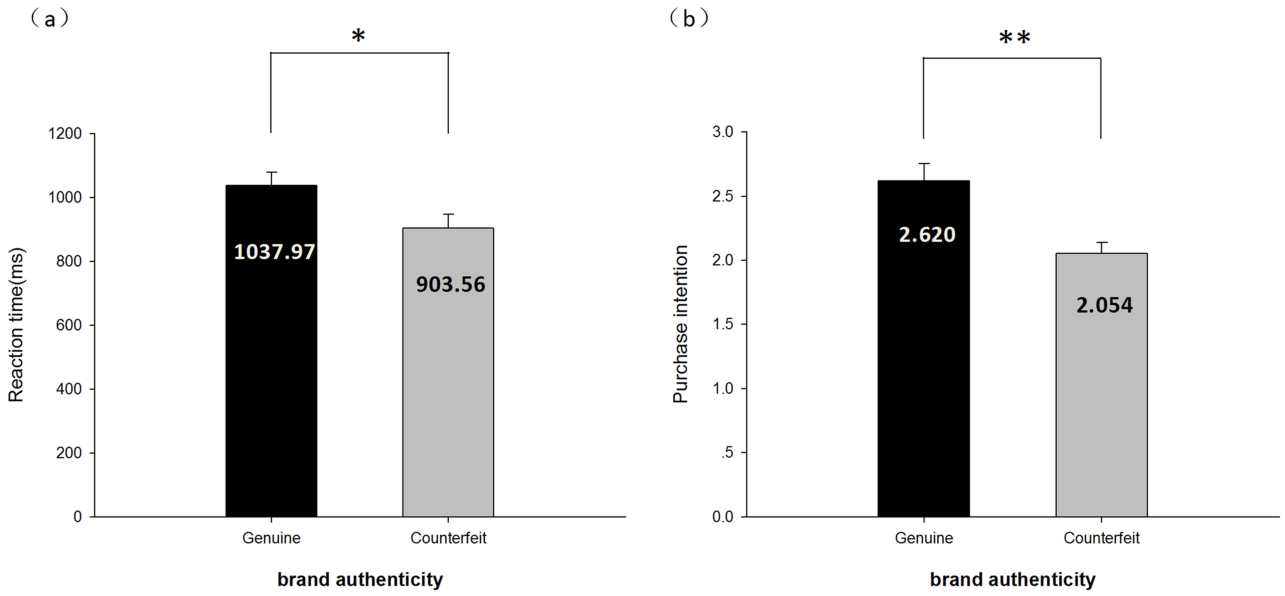

Figure 2 Behavioral results of reaction times and purchasing intentions: (**A**) reaction time (genuine luxury brand vs counterfeit luxury brand); (**B**) purchase intentions (genuine luxury brand vs counterfeit luxury brand); the black bar represents genuine luxury brand, whereas the gray bar represents the counterfeit luxury brand.
Note: *p < 0.05; **p < 0.01.

Table 1 Correlations Between The Four Conditions' Purchase Intentions And The Two Attitudinal Functions

	Genuine-Logo	Genuine-No Logo	Counterfeit-Logo	Counterfeit-No Logo
Value-expressive	p = 0.076 R^2 = 0.406	p = 0.143 R^2 = 0.340	p = 0.743 R^2 = 0.078	p = 0.670 R^2 = 0.102
Social-adjustive	p = 0.279 R^2 = 0.254	p = 0.427 R^2 = 0.188	p = 0.790 R^2 = −0.064	p = 0.916 R^2 = −0.025

> 0.1] or brand prominence [F (1, 19) < 1, p > 0.1], but the interaction effect between brand authenticity and brand prominence was significant [F (1, 19) = 5.690, p = 0.028, η^2 = 0.230]. Thus, we conducted a simple effect analysis to evaluate the significant interactive effects of brand authenticity and brand prominence. Under the genuine condition, there was no significant difference [F (1, 19) <1, p >0.1] between the prominent logo and no logo treatments. However, under the counterfeit condition, the difference between the prominent logo and no logo treatments was significant [F (1, 19) = 4.615, p = 0.045, η^2 = 0.195], which suggested that the no logo treatment (M = 3.571 μV, S.E. = 0.716) elicited significantly larger N200 amplitude than the prominent logo treatment (M = 4.563 μV, S.E. = 0.711). Topographic maps showed that N200 was evoked in frontal-to-central areas, as showed in Figure 3C. These results support our predictions that an inconspicuous logo will elicit larger N200 amplitude when consumers are exposed to counterfeit luxury goods (H3a), but it will not have a significant influence on N200 amplitude when consumers are exposed to genuine luxury goods (H4a).

N400 Analysis

As shown in Figure 4 and Table 3, the three-way 2 brand authenticity (genuine/counterfeit) × 2 brand prominence (logo/no logo) × 9 (C1, Cz, C2, CP1, CPz, CP2, P1, Pz, and P2) ANOVA analysis for N400 in the time window from 430 to 560 ms produced no significant main effect of brand authenticity [F (1, 19) = 2.8594, p > 0.1] or brand prominence [F (1, 19) < 1, p > 0.1]. Moreover, an interactive effect for brand authenticity and brand prominence was observed [F (1, 19) = 4.8651, p = 0.040, η^2 = 0.204]. Therefore, a simple effect analysis was conducted. There was no significant effect for brand prominence [F (1, 19) < 1, p > 0.1] when the brand authenticity was fixed as genuine condition. Thus, H4b, which assumes that brand prominence will not have a significant influence on N400 amplitude when consumers are exposed to genuine luxury goods, is supported. However, the

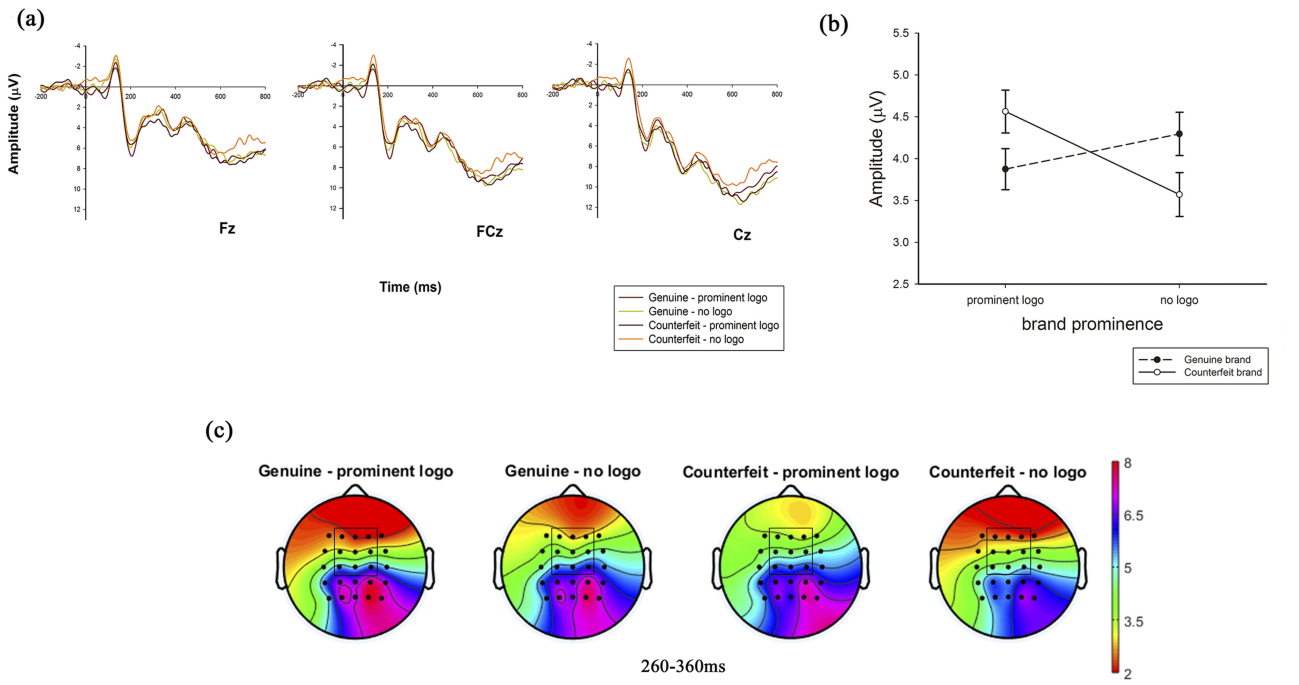

Figure 3 N200 condition effect. N200 waveforms were averaged from the 20 subjects, and we pooled the data from F1, Fz, F2, FC1, FCz, FC2, C1, Cz, and C2 electrodes. (**A**) Grand-averaged ERP waveforms in the frontal regions with three electrodes (Fz, FCz, and Cz); (**B**) Line chart of the mean and standard error of the N200 amplitude across the 2 (prominent logo vs no logo) by 2 (genuine brand vs counterfeit brand) conditions. (**C**) Topographic maps of four conditions for N200 amplitude. The N200 comparison of the four conditions (genuine brand with a prominent logo, genuine brand without a logo, counterfeit brand with a prominent logo, and counterfeit brand without a logo).

difference between the prominent logo and no logo treatments was marginally significant, when the brand authenticity was fixed as counterfeit condition [F (1, 19) = 3.936, p = 0.062, η^2 = 0.172]. Topographic maps showed that N400 was evoked in central-to-parietal areas, as showed in Figure 4C. This result suggested that there was a tendency that the no logo treatment (M = 6.803 μV, S.E. = 1.000) would elicit a larger N400 amplitude than the prominent logo treatment (M = 8.000 μV, S.E. = 0.843). Thus, H3b, which assumes that inconspicuous logos will elicit larger N400 amplitude than prominent ones when consumers are exposed to counterfeit luxury goods, is partly supported.

LPP Analysis

To analyze the LPP amplitude, we conducted a 2 brand authenticity (genuine/counterfeit) × 2 brand prominence (logo/no logo) × 6 (CP1, CPz, CP2, P1, Pz, and P2) ANOVA analysis in the time window from 580 to 680 ms. Figure 5 and Table 3 show the result of analysis. Brand authenticity and brand prominence had an obvious interactive effect [F (1, 19) = 5.700, p = 0.028, η2 = 0.231]. But there was no significant main effect of brand authenticity [F (1, 19) = 3.659, p = 0.071] or brand prominence [F (1, 19) < 1, p > 0.1]. A simple effect analysis was applied to determine the significantly interactive effect of brand authenticity and brand prominence. Under the genuine condition, the effect of brand prominence was not significant [F (1, 19) =1.481, p > 0.1]. While for the counterfeit condition, the LPP mean amplitude elicited by no logo treatment (M = 7.038 μV, S.E. = 1.102) was significantly smaller than the prominent logo treatment (M = 8.543 μV, S.E.= 0.954). Topographic maps showed that LPP was evoked in central-to-parietal areas, as showed in Figure 5C. The results support our predictions that brand prominence will have a negative influence on LPP amplitude when consumers are exposed to counterfeit luxury goods (H3c), but will not have an influence on LPP amplitude when consumers are exposed to genuine luxury goods (H4c).

Furthermore, we also conducted the Spearman correlation between each condition's LPP amplitude at Pz and the two separate attitudinal functions toward luxury goods. The results are summarized in Table 2. The results showed that each condition of LPP amplitude was negatively correlated with the two functions.

The ERP results indicated that the no logo condition elicited significant larger N200 amplitude (H3a), marginally significant larger N400 amplitude (H3b) and significant smaller LPP amplitude (H3c) than that of the logo prominent condition for counterfeit luxury products. Thus,

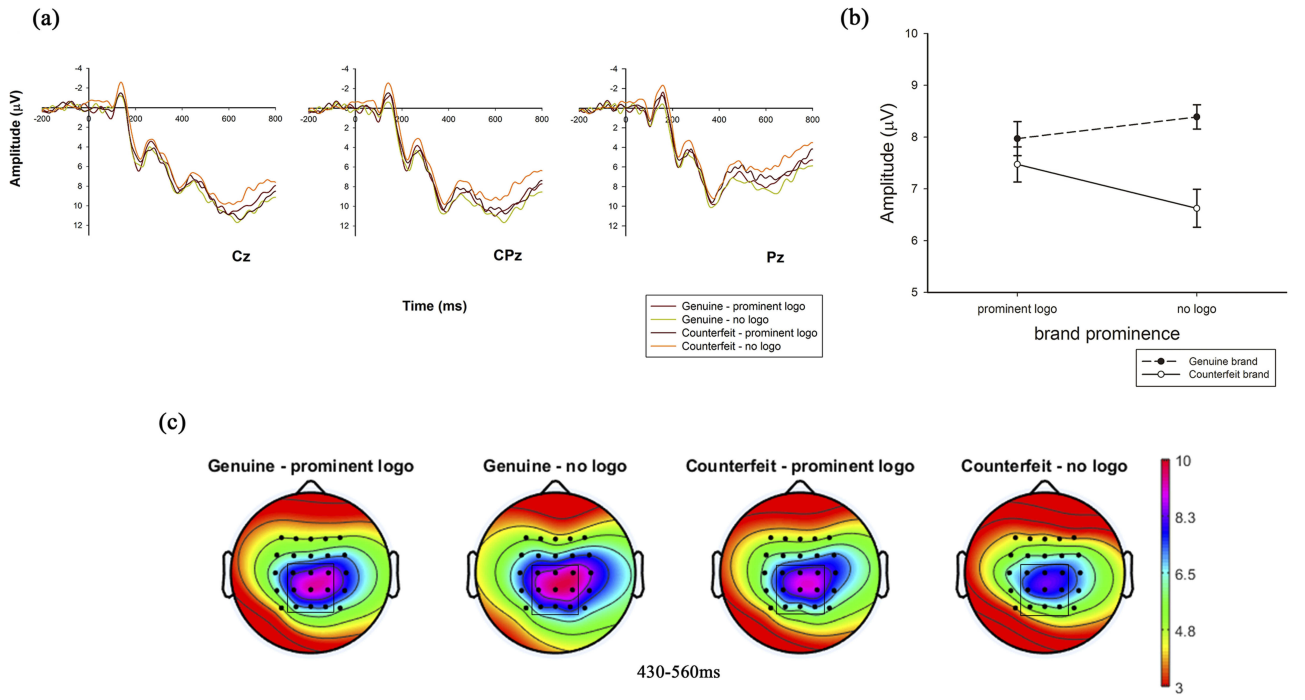

Figure 4 N400 condition effect. N400 waveforms were averaged from the 20 subjects, and we pooled the data from C1, Cz, C2, CP1, CPz, CP2, P1, Pz, and P2 electrodes. (**A**) Grand-averaged ERP waveforms in the posterior regions with three electrodes (Cz, CPz, and Pz); (**B**) Line chart of the mean and standard error of the N400 amplitude across the 2 (prominent logo vs no logo) by 2 (genuine brand vs counterfeit brand) conditions. (**C**) Topographic maps of four conditions for N400 amplitude. The N400 comparison of the four conditions (genuine brand with a prominent logo, genuine brand without a logo, counterfeit brand with a prominent logo, and counterfeit brand without a logo).

H3, which assumes the significant effects of brand prominence on consumers' cognitive conflict, emotional conflict, and motivational emotional arousal during their evaluation of counterfeit luxury goods, is approximately supported. Meanwhile, ERP results also showed that there was no significant difference of N200 (H4a), N400 (H4b), and LPP (H4c) amplitudes across the no logo/logo prominent conditions for genuine luxury goods. Thus, H4, which assumes that brand prominence will not have significant effects on consumers' cognitive conflict, emotional conflict, and motivational emotional arousal during their evaluation of genuine luxury goods, is supported. In general, the latter half of H-main, which assumes that consumers' social-adjustive and value-expressive functions perform as compensation with each other during luxury brand purchases, is approximately supported from the cognitive perspective.

Discussion

In the present study, we explored the cognitive processing and consumers' interacting social motivations of purchasing luxury brands based on the functional theories of attitudes by using event-related potentials. Since consumers' value-expressive functions can be modulated by logo prominence and their social-adjustive functions can be modulated by brand authenticity,[6] we investigated consumers' preferences and social motivations when they were exposed to counterfeit or genuine luxury products with or without prominent logos. Specifically, considering the moral consequences associated with counterfeit luxury consumption and the risk that participants may not report their true thoughts and preference, despite self-reported purchase intentions, the method of ERPs was also involved, which can provide a window into participants' brain activity and reveal their cognitive processing with respect to certain products. In this way, we could infer how the implicit social motivations of luxury brands were formed through consumers' cognitive processing.

Before further analysis, we first tested the correlation between the value-expressive function and the social-adjustive function. We found they are positively related. This result supports the research basis that the two attitudinal functions coexist and may have interaction effects.

For the brain level, the current ERP results showed that, for the counterfeit luxury products, the no logo condition elicited significant larger N200 amplitude, marginally

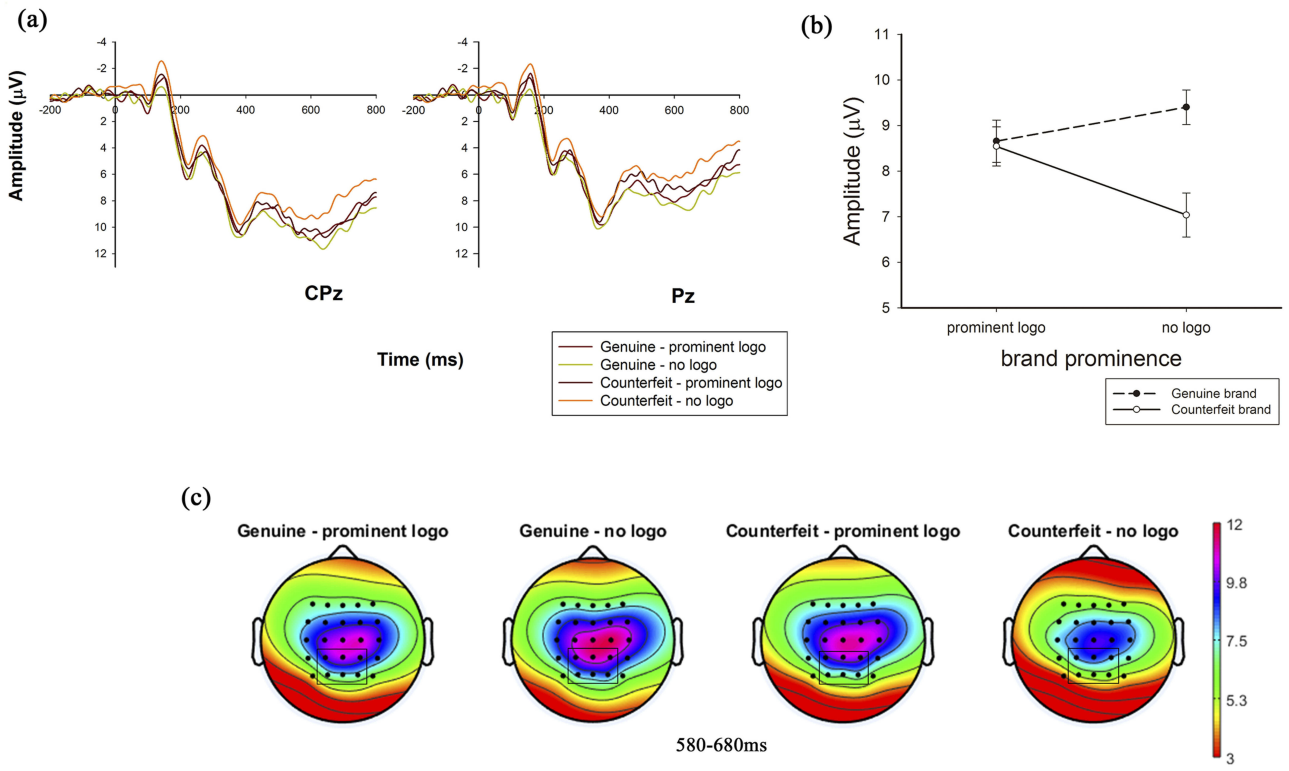

Figure 5 LPP condition effect. LPP waveforms were averaged from the 20 subjects, and we pooled the data from CP1, CPz, CP2, P1, Pz, and P2 electrodes. (**A**) Grand-averaged ERP waveforms in the posterior regions with two electrodes (CPz and Pz); (**B**) Line chart of the mean and standard error of the LPP amplitude across the 2 (prominent logo vs no logo) by 2 (genuine brand vs counterfeit brand) conditions. (**C**) Topographic maps of four conditions for LPP amplitude. The N400 comparison of the four conditions (genuine brand with a prominent logo, genuine brand without a logo, counterfeit brand with a prominent logo, and counterfeit brand without a logo).

Table 2 Correlations Between The Four Conditions' LPP Amplitude And The Two Attitudinal Functions

	Genuine-Logo	Genuine-No Logo	Counterfeit-Logo	Counterfeit-No Logo
Value-expressive	p = 0.003** R^2 = −0.630	p = 0.009** R^2 = −0.568	p = 0.007** R^2 = −0.582	p = 0.009** R^2 = −0.571
Social-adjustive	p = 0.004** R^2 = −0.621	p = 0.018* R^2 = −0.524	p = 0.050* R^2 = −0.439	p = 0.030* R^2 = −0.487

Note: *p < 0.05; **p < 0.01.

significant larger N400 amplitude, and significant smaller LPP amplitude than that of the logo prominent condition. However, these effects were not found in the genuine luxury products. As reviewed in the theory and hypotheses development section, a considerable number of consumer neuroscience studies has consistently found that N200 is related to anticipation conflict, which refers to the deviation between exposed and expected product-related information in consumption decisions.[40,47–49,67] Therefore, the current N200 result supports that consumers expect to see a conspicuous logo rather than an inconspicuous one when they are exposed to counterfeit luxury goods. However, no significant anticipation was presented when participants were exposed to genuine products. The following N400 component has been proven to be sensitive to emotional conflict, as we reviewed earlier in the paper.[37,42,43] Therefore, the current result indicated that a prominent logo seemed to be more acceptable than an inconspicuous one when the luxury good was counterfeit. Regarding the LPP component, past studies have found that it is connected with motivational emotional arousals.[44–46] The results of the current study showed that the increased amplitude of LPP was elicited in the prominent logo condition, which suggested that prominent logos aroused larger motivations

Table 3 Results Of ANOVA And Simple Effect Analysis Of N200, N400, And LPP

	ANOVA			Simple Effect Analysis	
	Brand Authenticity	**Brand Prominence**	**Brand Authenticity And Brand Prominence**	**Condition**	**Result**
N200	$F(1, 19) < 1$ $p > 0.1$	$F(1, 19) < 1$ $p > 0.1$	$F(1, 19) = 5.690$ $p = 0.028$* $\eta^2 = 0.230$	Genuine - prominent logo vs Genuine - no logo	$p > 0.1$ $F(1, 19) < 1$
				Counterfeit - prominent logo vs Counterfeit - no logo	$F(1, 19) = 4.615$, $p = 0.045$* $\eta 2 = 0.195$
N400	$F(1, 19) = 2.8594$ $p > 0.1$	$F(1, 19) < 1$ $p > 0.1$	$F(1, 19) = 4.8651$ $p = 0.040$* $\eta^2 = 0.204$	Genuine - prominent logo vs Genuine - no logo	$F(1, 19) < 1$, $p > 0.1$
				Counterfeit - prominent logo vs Counterfeit - no logo	$F(1, 19) = 3.936$ $p = 0.062$ $\eta^2 = 0.172$
LPP	$F(1, 19) = 3.659$ $p = 0.071$	$F(1, 19) < 1$ $p > 0.1$	$F(1, 19) = 5.700$ $p = 0.028$* $\eta^2 = 0.231$	Genuine - prominent logo vs Genuine - no logo Counterfeit - prominent logo vs Counterfeit - no logo	$F(1, 19) = 1.481$ $p > 0.1$ $F(1, 19) = 4.873$ $p = 0.040$* $\eta^2 = 0.204$

Note: *$p < 0.05$.

than inconspicuous ones in the context of counterfeit luxury brands.

In brief, in the current study, participants were given the clue of brand authenticity in the first stimuli, which was either genuine or counterfeit. Then, they were shown the second stimuli, which was the picture of luxury brand with either conspicuous or inconspicuous logo. Therefore, the current ERP results showed that when the clue of brand authenticity was given in the first stimuli, participants anticipated the logo prominence which would appear in the second stimuli. When the clue reminded participants that the following product would be a genuine one, the value-expressive function was satisfied. Therefore, regardless of whether the logo was prominent or not, their motivations toward the current product were informed. However, when the clue reminded participants that the following luxury brand would be counterfeit, the value-expressive function could not be satisfied. Therefore, they would seek the satisfaction of another function (i.e., social-adjustive function). As a result, they would expect the following product to have a more prominent logo in order to satisfy the social-adjustive function. When the real product was a non-logo one, it violated participants' anticipation and a larger N200 amplitude was induced in the early stage (approximately 200 ms) after the picture of the luxury product was shown. Later, when either of the two social goals was not satisfied, the presented product seemed to be not acceptable for the participants. This resulted in larger emotional conflicts (marginally significant larger N400 amplitude at approximately 400 ms) and weaker motivational emotional arousal (smaller LPP amplitude at approximately 600 ms).

Interestingly but not surprisingly, the behavioral hypothesis, which assumes that brand prominence will have a positive influence on consumers' purchase intentions for counterfeit luxury goods (i.e., H1), is not supported. The purchase intentions can only be influenced by authenticity of the luxury brand. Furthermore, we separately analyzed the correlations between purchase intentions under four conditions and two attitudinal functions. The results showed that they have no significant correlation. However, we found the two attitudinal functions were negatively correlated with LPP amplitude in each condition. These results mean that the attitudinal functions cannot be reflected in the consumers' purchase intentions while it can reflect the motivational significance (reflected in the LPP amplitude). The higher score of attitudinal functions indicates that consumers are more concerned on the function. When this function cannot be satisfied, the more they concern with the function, the lower motivation it will induce. We suspect that the main reason for the insignificance between attitudinal functions and purchase intentions

seems to be that the behavioral purchase intentions deviate from participants' actual thoughts. There are three reasons for this. First, the self-reported questionnaire regarding attitudinal functions has been proven to be reliable and valid in previous studies,[68–73] and this four-item questionnaire has a good internal consistency as we reported. Second, market data support that counterfeiters choose to copy luxury bags that display the brand more prominently than the ones they do not copy.[8] Lastly, former studies have augured that participants' responses that have moral consequences are likely to be subject to self-deception and social desirability biases in research.[11] Previous studies about luxury brands showed that counterfeit product consumption is related to moral risk.[31] Therefore, we suspected that in the current behavioral results, participants were more likely to give "corrected" responses to meet social desirability. They probably did not give their true preferences and showed lower behavioral intentions toward counterfeit luxury brands.

Theoretical And Practical Implications

For theory, this study provides experimental evidence of interacted social motivations toward luxury brands. While one study has analyzed consumers' desire for brand prominence in counterfeit luxury consumption,[6] no previous studies (to our best knowledge) have clearly explained its cognitive processing. According to the current study, we explain it as the "compensation theory of attitudes", which suggests that the social-adjustive function and the value-expressive function toward luxury brands coexist and have an interaction effect with each other. When one function is satisfied in advance, consumers' initial motivations toward the luxury brand can be formed. Thus, they will not be so eager to pursue the satisfaction of another social goal. However, when one function cannot be satisfied, the satisfaction of another attitudinal function becomes a crucial factor that will influence consumers' motivations. The violation of their anticipation would lead to an emotional conflict and result in decreased motivations toward the luxury brand.

This study also has practical implications. First, our results indicate that consumers' social-adjustive and value-expressive functions coexist perform as compensation with each other during luxury brand purchases. Therefore, luxury brand managers and marketers should pay attention to both self-expression and self-presentation social goals of consumers when they are designing, advertising and selling their luxury goods. If one type of social goals cannot be satisfied, targeted efforts should be made to satisfy the other one. Second, a broader set of stylistic elements (e.g., unique material and design) may be used to curb counterfeit consumption. Most consumers are motivated to purchase counterfeit luxury goods mainly for self-presentation-related goals and thus they prefer products with a prominent logo. If stylistic elements that are hard to counterfeit because of high cost and\or high technological requirements replace prominent logos, counterfeit consumption may be reduced. However, with respect to genuine luxury goods, logo prominence will not influence consumers' purchase intentions two much and some special stylistic elements can also fulfill consumers' self-presentational goal. Third, since the neuroscientific methods are likely to provide valuable information about consumers' preferences, emotions, and motivations that cannot be obtained through conventional marketing methods, it is worthwhile to include neuroscientific methods to predict the marketing performance of new products, which has been suggested and attempted by previous studies.[38,39,67]

Limitations And Future Research

Given that the preselected visual marketing stimuli were most relevant to women and we wanted to avoid gender confounds, only female participants were engaged in this study. As previous studies have found that gender has a deep influence on consumers' brand passion and purchase intention,[74,75] future studies may conduct a similar study with male participants and male-related genuine/counterfeit luxury products to supplement the findings of this study. Additionally, all participants in this study are Chinese, which leaves an open question regarding whether the findings from this study are applicable in western countries and other east countries. As social functions (goals) served by brands vary based on consumers' self-views and socialization[76] and Asia (compared to North America) is home to more collectivist (versus individualistic) cultures wherein the social pressures to both conform and save face are greater,[23] it will be very interesting to conduct a cross-cultural study. Meanwhile, considering that some patterns of consumer behavior can also be significantly different in east countries (e.g., China and Korea),[77] a cross-national study about different east countries seems to be necessary to confirm the applicability of our findings.

Conclusion

To summarize, this study primarily investigates consumers' interacted implicit social motivations for purchasing luxury brands based on functional theories of attitudes by using

event-related potentials. As consumers' value-expressive function can be modulated by logo prominence and their social-adjustive function can be modulated by brand authenticity, the present study compared consumers' preferences and brain activity when they are exposed to counterfeit and genuine luxury products with or without a prominent logo. This study provides evidence that consumers' preferences for luxury brands are based on the satisfaction of their social goals. The two social goals always coexist and perform as compensation with each other. The dissatisfaction of one social goal would promote their expectation of the satisfaction of another social goal. If this expectation is violated, greater anticipation conflict (N200) and emotion conflict (N400) will be induced, and the purchase motivation (LPP) cannot be aroused.

Ethics Approval And Informed Consent

The procedures of this study were reviewed and approved by the Internal Review Board of the Academy of Neuroeconomics and Neuromanagement at Ningbo University. Written informed consent was obtained from each participant. All data collected from the subjects were kept anonymous and confidential to protect the privacy of the study subjects.

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Disclosure

The authors declare that there is no conflicts of interest in this work.

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