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A Neuroscientific Approach to Explore Consumers' Intentions Towards Sustainability within the Luxury Fashion Industry

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Abstract: Little is presently known about customers' expectations and the unspoken relevant factors which lead them to prefer or not sustainable luxury products. This study aimed to deepen the understanding of luxury consumers' implicit intentions towards sustainability by using, for the first time, a neuroscientific approach applied to the luxury fashion domain. A greater cortical activity related to cognitive and emotional aspects was hypothesized for luxury sustainability-oriented consumers than for non-sustainability-oriented subjects when presented with sustainability-related cues. Sixteen luxury consumers were divided into two groups according to their sensitivity towards sustainability issues. They were asked to observe a set of 10 stimuli depicting sustainability issues and then to interact with a salesperson while their cortical activity was recorded by an electroencephalogram (EEG). Frequency band analysis revealed higher levels of beta, delta, and theta band EEG activity in temporoparietal than frontocentral areas when observing pictures related to sustainability and a specific right temporoparietal theta band activation for the Nonsustainable Group. An increased level of knowledge of sustainability themes was confirmed by the correct detection of stimuli valence and a significant presence of delta power when the salesperson explained the brand's sustainable policy. The specific brain responses related to sensitivity towards sustainability and the different effect of knowledge on sustainability topics based on group differences are discussed here in light of emotional behavior.

Keywords: sustainability; luxury; high fashion; consumer neuroscience; EEG; frequency band analysis

1. Introduction

Sustainability in the Fashion Industry

The fashion industry is presently growing day-by-day due to the increasingly frequent demands of the population, gaining success and popularity but also generating new social, environmental, and economic issues which need to be solved through global solutions [1]. This industry is one of the major contributors to social and environmental sustainability problems [2]. The fashion industry is third in line behind oil and agriculture as the most polluting industry on earth [3]. Indeed, the entire life cycle of a garment in the clothing supply chain (i.e., from the materials to the disposal, going through fabric and garment production, distribution, retail, and use) faces several sustainability challenges. These issues can be social (e.g., working conditions, sweatshops, child labor, workers' rights, different types of risks, and animal welfare) or environmental (e.g., greenhouse gas emissions, water use, toxicity, and

energy use) [4]. Their impact is strongly enhanced by the exponential growth in the daily consumption of clothing. Specifically, the world population is around 7.3 billion people and more than 80 billion garments are produced around the world [5]. Thus, more and more fashion companies are committing themselves to sustainability [6,7], and more broadly, this topic has gained prominence in many retail sectors [8].

Recent studies have drawn parallels between sustainable fashion and luxury brands and have found that sustainability issues and luxury branding have complex coinfluencing interrelationships [7,9,10]. As for customers, the literature shows that they seem to understand the importance of sustainability and the negative consequences that unsustainable activities and practices can have on their future. Thus, they are more aware than in the past and they positively respond to environmental and social sustainability initiatives pursued by luxury fashion brands [11]. However, there are still relevant barriers to purchasing sustainable luxury products, such as their availability, design, and the fact that consumers do not want to sacrifice esthetic attributes in favor of ethical ones [3,12].

Since little is presently known about customers' expectations and the unspoken relevant factors which lead them to prefer or not sustainable luxury products, the present study aimed at deepening the understanding of luxury consumers' knowledge of sustainability within the fashion luxury industry and their behaviors towards sustainable issues by applying an innovative neuroscientific approach.

2. Background

2.1. Eco-Luxury Products

According to De Barnier et al. (2012), luxury products can be identified by eight characteristics: exceptional quality, hedonism (i.e., beauty and pleasure), price (i.e., expensive), rarity, selective distribution, personalized services, exclusive character (i.e., prestige and privilege), and creativity [13].

However, in recent decades, a new category of products has been introduced into the luxury market: eco-luxury products [14]. We define products as eco-friendly if their goal is to reduce their environmental impact [15] throughout the entire product's life cycle [16]. The link between luxury and sustainable products seems to rely on two common characteristics of quality and durability [3]. Indeed, eco-friendly products are tightly connected to the concept of sustainability, which aims at minimizing negative impacts and maximizing positive impacts to achieve ecological, social, and cultural balance. Previous research has shown that eco-products tend to increase the emotional connection between consumers and luxury brands by creating a motivationally meaningful point of difference between those brands and their competitors [14]. Subsequently, there is the need for points of difference to create identity values and build strong brand images delivering high-end products. In fact, consumers no longer perceive sustainability as being opposed to beauty and elegance; instead, they look for products that are both of high quality and good for society [3].

Therefore, on the one hand, companies are driven to commit themselves to sustainability when the top management is willing to pursue new opportunities [17,18], new competitive advantages for the company's reputation [17,19], social well-being [20], environmental stewardship (i.e., environmental responsibility), and economic prosperity [5].

2.2. The Sustainable Fashion Paradox

Research shows that sustainability is rarely mentioned by consumers in the selection criteria of luxury brands [21]. Indeed, according to the attitude–behavior gap [22,23], consumers engage in inconsistent attitudes and behaviors when talking about ethical criteria in decision-making [12]. For instance, people do support corporate social responsibility (CSR) activities and ethical concerns, however, they are not willing to pay more for them [24]. This is known as the sustainable fashion paradox, according to which consumers are concerned about sustainability issues and they expect fashion companies to show their commitment to them [25]. Indeed, luxury consumers believe that

luxury brands have the duty of being sustainable, carrying out a mission of exemplarity due to their price and promised exceptional quality [12]. However, luxury consumers tend not to engage in sustainable fashion product consumption [25]. According to Cowe and Williams (2000), this phenomenon is known as 30:3, meaning that 30% of consumers declare the desire to buy ethical products, while only a niche of 3% actually buys them [26].

Furthermore, Ehrich and Irwin (2005) stated that even though consumers claim to care about sustainability issues when they shop, they purposely ignore them [27]. This happens because it keeps consumers away from negative emotions. Hence, with regards to luxury purchases, nothing should hurt the dream [28]. Nonetheless, according to Leary et al. (2014), consumers transform their sustainable attitudes into behaviors when they feel that their actions will make a difference in influencing the market through a snowball effect [29]. Consequently, customers are more aware now than in the past of the importance of being sustainable and the negative consequences that unsustainable activities and practices can have on their future. Hence, they positively respond to environmental and social sustainability initiatives pursued by luxury fashion brands [11].

According to Armstrong (2009), consumers purchase luxury products to satisfy their need for status and recognition, which leads them to personal happiness and satisfaction [30]. On the other hand, several consumers tend to justify their eco-luxury purchase believing that their consumption choice is motivated by a desire to contribute to a better world and future [30,31]. Prior studies have demonstrated that consumers buy eco-luxury products to match their personal values. They would prefer a sustainable luxury product over a nonsustainable one to have the opportunity to help or protect the environment. Nonetheless, they claim that, at the same time, there should be consistency with personal taste, and they should get as much information as wanted from employees in the prepurchase phase in order to trust the brand's commitment to sustainability practices and avoid greenwashing [3]. Indeed, nowadays, more and more firms are engaging in greenwashing, misleading consumers about their environmental performance or their products' sustainable benefits [32]. Greenwashing is "the practice of making unwarranted or overblown claims of sustainability or environmental friendliness in an attempt to gain market share" [33]. This practice can have very negative effects on consumers' and investors' confidence in green products [32].

Finally, the presence of recycled material in luxury products sometimes might be perceived as negative. Actually, luxury purchasers do not always positively value the idea of buying a luxury product made of recycled cotton. This is due to the fact that recycling is associated with a lack of rarity, and thus, less prestige. However, previous research shows that luxury consumers are not against using recycled materials in packaging [12].

Having said that, even if sustainability is sometimes considered to be inconsistent with the desirability of luxury products, a few luxury brands have managed to break this rule and have placed sustainability at the very heart of their corporate mission. This is the case with brands such as Tesla and Stella McCartney: the former produces electric luxury vehicles based on the desire for a better future, whereas the latter fashion brand refuses to use real leather, respecting vegetarian values and giving a more fashionable look to sustainable clothes to attain more customers. These two examples demonstrate that sustainability itself can become an element of differentiation and prestige at the very heart of the luxury brand values [12,20]. Finally, it is also a source of advantage and a matter of corporate survival [34].

2.3. Consumer Neuroscience Applied to Sustainability

Several studies have investigated neural processes during passive viewing of emotionally significant pictures of branded products; however, to our knowledge, none of them have focused on the theme of sustainability within the fashion luxury industry [35,36]. Despite the absence of research at the intersection of social cognitive neuroscience and sustainability management, neuroscience insights could contribute in different ways to the investigation of sustainability, for example, to develop (or

improve) more sustainable products, to implement more suitable marketing strategies for sustainable products, or to promote greater awareness of sustainable consumption [37].

In this study, we focused our attention on a well-known British fashion brand which has sustainability and eco-luxury products at the core of its business. The company defines itself as a vegetarian luxury firm which avoids using or killing animals for fashion business purposes. This sets this brand apart in an industry where using fur and leather is very popular. Its mission is to run a responsible and honest business that respects the planet, animals, and people. The brand is conscious of its strengths but also of its imperfections, communicating what has been done and what needs to be done to operate in a way which respects the environment [3].

We selected electroencephalogram (EEG) as a useful tool to provide quick and detailed insights into consumers' implicit brain activity; indeed, EEG provides a deeper understanding of the cognitive processes and the underlying emotional mechanisms that help explain consumers' behavior and can overcome the biases inherent in self-reports, which are mainly used in marketing research. Within the neuromarketing field, previous studies have exploited, in particular, the potential of the functional meaning of frequency bands to assess and interpret brain responses to advertising, brands, and marketing stimuli [38–41].

Thus, the main aim of the present study was to analyze consumers' implicit responses to sustainability issues in a luxury fashion context as the customers were exploring a store (in-store condition). To this end, we decided to consider two different groups of individuals, both of which have a strong interest in the luxury fashion field but completely different views on sustainability issues. Hence, the main goal was to assess changes in the cortical activity of the subjects in each group in two different conditions: the first was related to different stimuli, which were all about sustainability issues, while the second condition concerned interaction with a salesperson explaining the brand's sustainability policy. Considering this objective, we formulated four main hypotheses:

Hypotheses H1. *Greater cortical activity of subjects focused on sustainability than of subjects not focused on sustainability when observing sustainability stimuli.*

Hypotheses H2. *Subjects' capability to correctly discriminate between positive and negative images related to sustainability.*

Hypotheses H3. *The importance of an increase in knowledge of the brand's sustainability strategy, which began with a zero-level of knowledge and ended with an explanation of the brand's policy made by the salesperson.*

Hypotheses H4. *Greater cortical activity—during the interaction with the salesperson explaining the brand's sustainable policy—of subjects focused on sustainability than of subjects not focused on sustainability.*

3. Materials and Methods

3.1. Participants

A sample of 16 Italian female participants—mainly because the fashion store considered serves a predominantly female clientele—aged between 22 and 46 years (M = 25.94; SD = 6.98) were recruited for this study. All participants had a strong interest in the luxury fashion field and were divided into two different groups according to their sensitivity towards sustainable issues: a group of eight females (M = 28.87; SD = 9.12) focused on sustainability issues (Sustainable Group, SG), and a group of eight (M = 30; SD = 1.19) not oriented towards sustainability issues (Nonsustainable Group, NSG). This specific attitude towards sustainability was tested by a specific questionnaire on the topic before the experiment. All subjects had normal or corrected-to-normal vision. Informed consent was obtained from all individual participants included in the study.

3.2. Procedure

The experimental phase was conducted in-store to gradually increase knowledge of the brand's sustainability policy. During the first condition, participants were seated on a chair in front of a computer monitor (distance: 70 cm) and were asked to observe a set of stimuli while EEG cortical activity was recorded. The stimuli set consisted of 10 pictures depicting topics related to sustainability, focusing on environmental and social sustainability issues: three of them were explicitly positive, depicting wind turbines (image 1); an advertising against leather, feather, and fur use (image 6); and clean water (image 7), while others concerned actions against sustainable fashion (the visualization of the dataset of the stimuli is available from the corresponding author on request). Pictures were controlled for size (14 × 10 cm) and were displayed randomly to the participants for 6 s, with an interstimulus interval of 8 s. They were presented using E-Prime 2.0 software (Psychology Software Tools Inc., Sharpsburg, PA, USA) running on a personal computer with a 15 in. screen. At the beginning of the experiment, 120 s of EEG resting baseline was recorded; then, participants were asked to observe each stimulus for the entire time of exposure. An experimenter supported participants in keeping their attention focused on the set of stimuli. After stimuli presentation, subjects had time to rate their emotional experience on the Self-Assessment Manikin (SAM) scale evaluating valence (positive vs. negative) and arousal (high vs. low) on a bipolar scale applied to each picture [42].

After this first experimental phase, participants were asked to interact with a salesperson (second experimental phase), who explained to them, firstly, the brand's sustainable policy in general, secondly, cashmere manufacturing, and thirdly, fur production. Meanwhile, EEG cortical oscillations were recorded for each of these three interactive blocks.

3.3. Neurophysiological EEG Brain Activity Recording

EEG activity was recorded via an EEG wireless system (Live-Amp) and processed via Analyzer2 software (Brain Products GmbH, Gilching, Germany). The montage included 15 active electrodes (Fp1, Fp2, F3, Fz, F4, T7, C3, Cz, C4, T8, P3, Pz, P4, O1, and O2; placement according to the 10–20 International System; [43]) (see Figure 1). Electrode impedance was monitored for each subject before data collection and kept under 5 kΩ. Data were acquired using a sampling rate of 250 Hz and then filtered offline with a 0.5–45 Hz IIR bandpass filter (slope: 48 db/octave). Data were then segmented and visually inspected for ocular, muscle, and movement artifacts. Fast Fourier transform (Hamming window, resolution: 0.5 Hz) was applied to artifact-free segments to compute the average power spectra. Finally, average power for the main EEG frequency bands (delta: 0.5–3.5 Hz, theta: 4–7.5 Hz, alpha: 8–12.5 Hz, and beta: 13–30 Hz) was extracted.
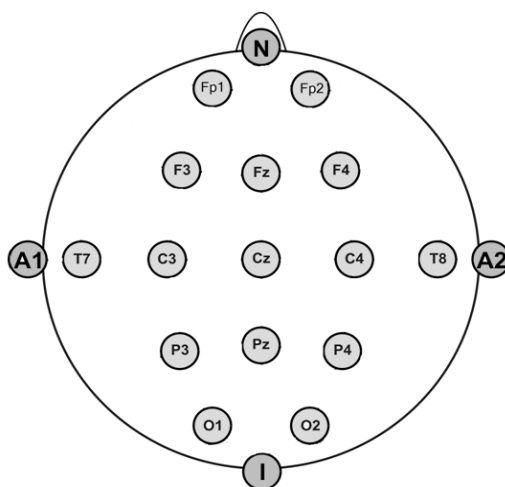

Figure 1. Electroencephalogram (EEG) montage over Fp1, Fp2, F3, Fz, F4, T7, C3, Cz, C4, T8, P3, Pz, P4, O1, and O2; placement according to the 10–20 International System.

4. Results

4.1. Statistical Analysis

A first set of mixed repeated measures ANOVAs with independent within factors region of interest (ROI) (2: frontocentral (FC) (F3, F4, C3, and C4) and temporoparietal (TP) (T7, T8, P3, and P4)), images (10), and laterality (2: left and right) and as between factor the group related to interest in sustainability issues (2: Sustainable vs. Nonsustainable) was applied to dependent EEG data. Moreover, a second set of mixed repeated measures ANOVAs with independent within factors ROI (2: frontocentral (F3, F4, C3, and C4) and temporoparietal (T7, T8, P3, and P4)), interaction (3: brand's sustainability policy, cashmere, and fur), and laterality (2: left and right) and as between factor the group related to interest in sustainability issues (2: Sustainable vs. Nonsustainable) was applied to dependent EEG responses. These mixed repeated measures ANOVAs were performed for each frequency band (delta, theta, alpha, and beta) to highlight the differences between the two groups. Pairwise comparisons were applied to the data in case of significant effects. Simple effects for significant interactions were further checked via pairwise comparisons, and Bonferroni correction was used to reduce multiple comparison potential biases. A third set of repeated measures ANOVA tests with group (2) as between factor and independent within factor images (10) was applied for the dependent measures of valence and arousal. For all of the ANOVA tests, the degrees of freedom were corrected using Greenhouse–Geisser epsilon where appropriate. Furthermore, the normality of the data distribution was preliminarily assessed by checking kurtosis and asymmetry indices. The size of statistically significant effects was estimated by computing partial eta squared (η^2) indices.

4.2. Sustainable Stimuli Presentation Condition

4.2.1. Beta Band

As shown by ANOVA, for the beta band, a main effect for ROI was found ($F[1,14] = 13.01$, $p = 0.003$, $\eta^2 = 0.48$). Higher levels of beta activity were found in TP regions of interest than in FC areas during stimuli presentation for both groups (Figure 2A).

4.2.2. Delta Band

As shown by ANOVA, for the delta band, a main effect for ROI was found ($F[1,14] = 68.58$, $p \leq 0.001$, $\eta^2 = 0.83$). In particular, higher levels of delta activity were found in TP regions of interest than in FC areas during stimuli presentation for both groups (Figure 2B).
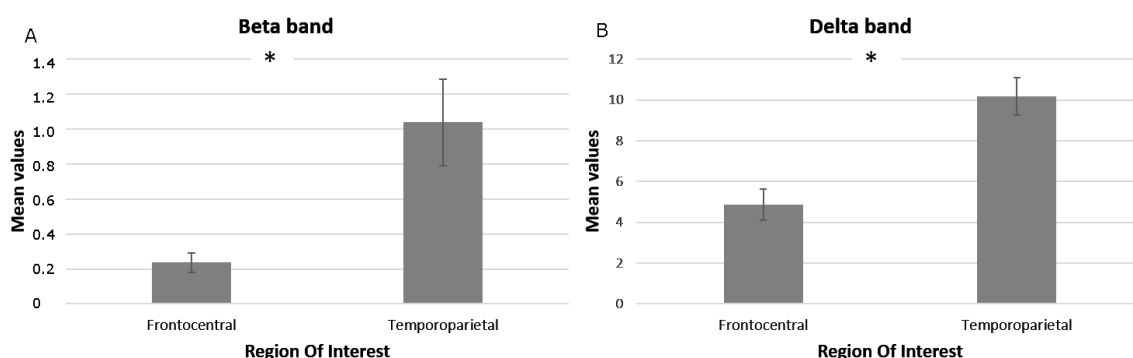

Figure 2. Significant differences in brain regions of interest activation during the first experimental condition (sustainable pictures presentation) for (**A**) beta and (**B**) delta bands.

4.2.3. Theta Band

As shown by ANOVA, for the theta band, a main effect for ROI was found ($F[1,14] = 83.78$, $p \leq 0.001$, $\eta^2 = 0.85$). Higher levels of theta activity were found in TP regions of interest than in FC

areas. In addition, a main effect for ROI × laterality was found (F[1,14] = 4.59, $p < 0.05$, $\eta^2 = 0.24$), with a higher presence of theta in the right compared with the left TP areas. Moreover, a main effect for group × ROI was found (F[1,14] = 4.70, $p = 0.048$, $\eta^2 = 0.25$), with higher levels of theta power in temporoparietal areas for NSG than SG (Figure 3A–C).
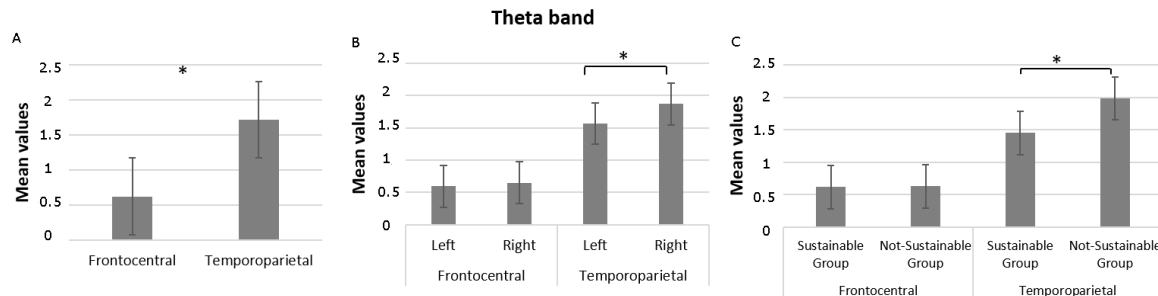

Figure 3. Significant results in theta band activity as a function of (**A**) region of interest (ROI), (**B**) ROI × laterality, and (**C**) ROI × group during sustainable pictures exposure.

4.2.4. Self-Assessment Manikin Scale

As shown by ANOVA, for the valence measure, a significant main effect was found for images (F[1,14] = 27.86, $p \leq 0.001$, $\eta^2 = 0.66$). Pairwise comparisons revealed that all images (except for images 1, 6, and 7) were evaluated with a negative valence and rated under a mean cut-off of 2–7 points (see Figure 4A).

In addition, the same main effect was shown by ANOVA for the arousal measure (F[1,14] = 5.08, $p \leq 0.001$, $\eta^2 = 0.26$). Pairwise comparisons revealed a significantly higher rate for image 10 compared with image 1 ($p \leq 0.001$), image 3 ($p = 0.006$), image 5 ($p = 0.002$), image 7 ($p = 0.036$), and image 9 ($p = 0.018$) (see Figure 4B). No interaction effects or other significant differences were found.
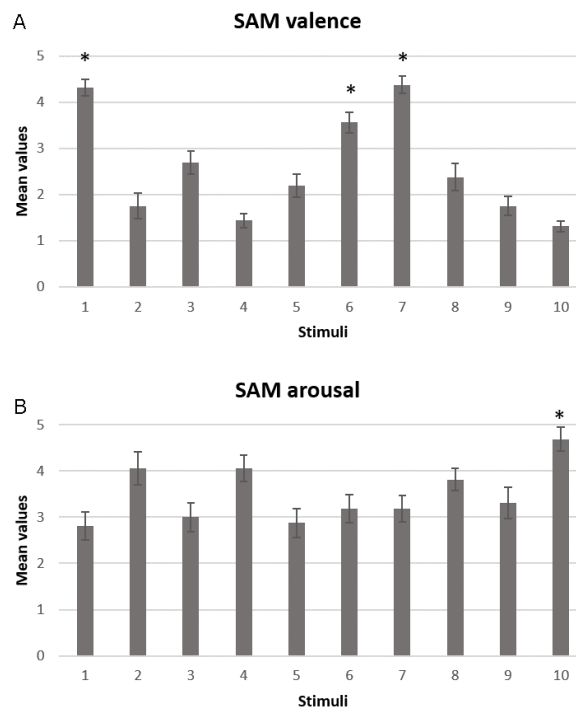

Figure 4. Significant differences between the 10 images on sustainability issues rated on the Self-Assessment Manikin (SAM) scale: (**A**) valence and (**B**) arousal.

4.3. Salesperson Interaction Condition

Delta Band Activity

As shown by ANOVA, for the delta band, a main effect for ROI was found (F[1,14] = 10.13, $p = 0.013$, $\eta^2 = 0.55$). Higher levels of delta activity were found in TP regions of interest than in FC areas while participants of both groups were interacting with the salesperson, without distinction between the three blocks. No other significant interaction effects were found (Figure 5).
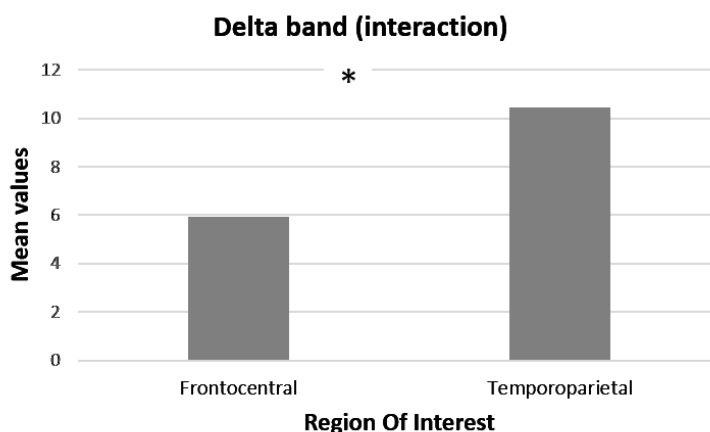

Figure 5. Significant delta band activation in temporoparietal compared with frontocentral regions of interest during the interaction with the salesperson explaining the brand's sustainability policy.

5. Discussion

This article aimed to explore cortical activity in response to sustainability issues in two groups of fashion luxury consumers with different attitudes towards sustainability. The study was conducted in a high-fashion luxury store during two different conditions—the first one related to the observation of pictures regarding sustainability, and the second one related to an interaction with a salesperson explaining the brand's sustainability policy. In this way, sustainability themes were presented to consumers both at implicit (i.e., sustainable images presentation) and explicit (i.e., sustainability explained by a salesperson) levels. In both cases, consumers' implicit cortical responses were recorded and, also, they were asked to rate the sustainability pictures for valence and arousal dimensions. The use of EEG combined with an explicit evaluation of the stimuli was shown to be a useful approach to understand complex cognitive and emotional mechanisms involved in processing the value of sustainability-related stimuli. The whole experimental phase was conducted in-store to increase knowledge related to the brand's sustainability strategy, which began with a zero-level of knowledge and ended with the explanation of the brand's policy.

Our results highlighted electrophysiological cortical responses in the temporoparietal area for beta, delta, and theta bands augmented for both groups of participants interested in the luxury fashion field when observing pictures related to sustainability issues in-store, independent of their attitude towards sustainability. Furthermore, the effect of the theta band in the temporoparietal regions was mainly found in the right compared with the left hemisphere (lateralization effect) and with higher levels for non-sustainability-oriented people compared with sustainability-focused consumers. On a behavioral level, participants were able to correctly discriminate between positive and negative images on sustainability, yet the images were evaluated by the entire sample, on average, in terms of arousal. Regarding the interaction with the salesperson explaining the brand's sustainability policy, unlike what was expected, we found no difference between the two groups in terms of cortical oscillations, but a significant presence of the delta band in the temporoparietal regions compared with the frontocentral areas was detected. This study is the first to shed light on cortical oscillations related to sustainability-related stimuli and themes within the fashion luxury context and presents

findings highlighting interesting aspects to consider for professional marketers and future studies on sustainability.

Our first hypothesis regarding greater cortical activity of subjects focused on sustainability than of non-sustainability-oriented subjects when observing sustainable stimuli in-store was partially supported. In fact, cortical responses in the temporoparietal area for beta, delta, and theta bands were augmented for both groups of participants interested in the luxury fashion field, thus showing that this effect was detected independent of participants' attitude towards sustainability. This evidence can be discussed mainly focusing on the functional meaning of these frequency bands over scalp distribution.

Previous basic research suggested that beta band activity in temporoparietal regions may be related to the temporoparietal junction role in social information processing, understanding others' mental states [44], shared interpersonal representations between oneself and others intended as others' intentions, desires or belief [45], and other social cognitive functions [46]. Delta and theta oscillations reflect the activity of brain systems that regulate behavior based on motivational drives and emotional appraisal and are involved in salience detection and emotional learning [47]. Therefore, it is possible to consider increased delta and theta activity as responsive to a process of emotional signal detection going on while the participants were observing emotionally relevant stimuli. In this case, it is possible to suppose that both groups experienced the social impact of sustainability-related pictures as an effect demonstrated by the high engagement with this topic when participants directly observed situations related to the theme of sustainability. Indeed, the activation of socially related brain areas reflected the evaluation of the high-impact social effect of pictures that, at zero-level knowledge of sustainability practices, affected both groups of luxury consumers. This effect may be in line with previous considerations pointing out that, nowadays, luxury fashion consumers are more sensitive to and aware of than in the past the environmental and social impact of nonsustainable luxury practices [11]. Still, brain cortical oscillations are neurophysiological automatic responses reflecting a mostly implicit processing level that, in this case, could reflect an earlier, perhaps more authentic, answer to sustainable themes shown by our group of consumers. Nonetheless, these results should be interpreted cautiously and in light of the combination with explicit measurements, providing, for example, indices of choice or preference for eco-luxury products [48].

In addition, special attention must be given to the role of the theta band in this set of results. In fact, a more lateralized effect of the theta band in temporoparietal regions and higher levels of its power for non-sustainability-oriented people compared with sustainability-focused consumers were found during this first experimental condition. A possible explanation is that the presence of the theta band in right temporoparietal areas for both of our groups of luxury consumers could reflect a strong negative emotional response going on, elicited by observing sustainability-oriented stimuli. Indeed, while the theta rhythm correlates with high-level cognitive functions when distributed over the frontal sites, its presence evoked over right parieto-occipital sites has been related to strong emotional processing [48–51]. Within our study, the stimuli set was composed of pictures related to sustainability issues that were not completely positive or negative; that is, both social and environmental pictures implied different levels of emotional value, predominantly negative. In particular, the right hemisphere lateralization effect we found suggested that mainly a negative emotion pattern was displayed by our luxury consumers, beyond orientation towards sustainability. Indeed, previous studies have explored the brain lateralization effect derived from exposure to emotional cues and found low-frequency oscillations mainly synchronized within the right side in response to negative more so than positive emotional patterns [52–54].

Taken together, this evidence allows us to suppose that sustainability-oriented pictures had a strong negative emotional impact, implying high engagement among luxury participants, who were negatively aroused when exposed to these sensitive topics. A possible explanation for this effect could be provided by the attitude–behavior gap and the sustainable fashion paradox [12], for which both groups of luxury consumers manifested a strong negative emotional reaction characterized by ethical concerns that disapproved of nonsustainable luxury practices, notwithstanding their declared

desire to purchase luxury products with different tendencies towards sustainability. Future studies would be necessary to address if, accordingly, luxury consumers will engage in sustainable fashion product consumption.

Moreover, unlike what was expected, significantly higher levels of theta power in temporoparietal areas emerged in the group of non-sustainability-oriented people compared with the sustainability-oriented group. This higher emotional response could have been due to the novelty of the sensitive sustainability stimuli, which were considered to be unfamiliar and innovative by the NSG group since they were not oriented towards sustainable management and themes compared with the other group. Nevertheless, another explanation for this intergroup difference could be related to the characteristics of our sample. In fact, it could be that our SG group was not completely sustainability oriented and were thus less sensitive to the social and environmental impact of nonsustainable luxury practices; for this reason, sustainability themes elicited a lower emotional reaction compared with the NSG group. However, the small sample size and the difficulty of deeply exploring sustainability orientation as a trait of the participants are caveats of this study to keep in mind for further research.

H2 and H3 were confirmed by SAM results, reflecting consumers' capability to correctly discriminate between positive and negative images regarding sustainability. More precisely, this evidence goes hand in hand with the increased knowledge demonstrated by the whole sample. That is, all participants began the experiment from a zero-level of knowledge of the brand's sustainability policy, where responses to stimulus presentation were recorded by an implicit measure (i.e., EEG) and were guided by their attitudes and beliefs. Nevertheless, when asked to rate the images' valence, positive and negative pictures were correctly identified by all participants without intergroup differences.

On the other hand, interestingly, arousal measurement results revealed a strong incoherence between different typologies of measure. That is, implicit EEG measurements revealed a strong emotional engagement in our sample when observing pictures related to sustainability, while explicit evaluations did not reflect this activation in terms of arousal. These two different levels of emotional responses could have been due to the nature of the emotional experience that, in addition to the implicit reactivity either to pleasant or unpleasant contexts, was characterized by an explicit appraisal. As stated by Lang et al. (1990), two motive systems may exist in the brain that explain the bidimensional model of valence and arousal [55]. Appetitive and defensive systems account for the hedonic valence and arousal evaluation in emotional comprehension. In this case, it is possible to hypothesize that the defensive system that is primarily activated in negative contexts, with a basic behavioral repertoire built on withdrawal, escape, or attack [56,57], had not been explicitly activated and stimuli were consciously evaluated as not arousing.

The fourth hypothesis of greater cortical activity—during the interaction with the salesperson explaining the brand's sustainability policy—of subjects focused on sustainability than of non-sustainability-oriented subjects was not confirmed; no differences were found between participants with different attitudes towards sustainability. Yet, higher levels of delta band activity were found in temporoparietal compared with frontocentral regions for both groups when the salesperson was describing the brand's sustainable practices. This effect on the delta band could be explained by an authentic orientation, with an emotional and rewarding connotation, towards the interpersonal interaction with an agent talking about specific sustainability-related topics [47]. Indeed, this last outcome could be in line with previous research underlining an enhanced activation of late positive event-related potential in posterior brain areas when consumers pay attention to luxury-branded positive stimuli in the presence of others [58]. Other previous qualitative marketing research has highlighted that consumers tend to cocreate marketing stimuli meanings with others [59]. Similarly, this way of exposing a sustainable brand's policy, cashmere manufacturing, and fur production seems to have an explicit immediate impact on the customers' representations and expectations, thus perhaps satisfying the need for contact with a person to deepen consumers' understanding of sustainability.

6. Conclusions

Further studies are needed to fill the gap between social cognitive neuroscience outcomes and sustainability topics, especially to investigate more in-depth consumers' attitudes towards embracing sustainable luxury initiatives and actual consumption. This could be done by employing other neuroscientific measures, such as physiological or hemodynamic tools, that may help, firstly, in unveiling possible additional and complementary interesting cognitive responses of consumers and, consequently, in determining methods to convey effective messages regarding sustainability based on neuroscientific findings. Furthermore, the present research focused only on women between the ages of 22 and 45 years, so future studies should be carried out in order to extrapolate and generalize the results to other market segments.

Overall, our findings may be useful for professional marketers interested in setting strategies for effectively communicating their eco-luxury product manufacturing process through visual cues (images, posters, or advertisings) or interactive presentations by a trained salesperson, as well as promoting sensitivity to these topics and facilitating their purchase by fashion luxury consumers with or without enhanced engagement in sustainability. Effective communication exploiting sustainability-related cues could be useful to orient consumers' emotional decision-making during purchase dynamics, specifically for companies with a strong sustainability policy. In conclusion, the present study provides initial evidence about cortical oscillations in consumers during stimulation with sustainable images and interaction with professionals about sustainability issues involving both implicit and explicit processing of this topic.

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