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Abstract: Websites offer online consumers the channel to search, view and purchase various products, which leads to a critical role of web page features on consumers' online purchasing decision. This study primarily focuses on an important feature of web page - webpage background and explores the effect of web page background features on consumers' online responses and behaviors. We design a 2*2 （background feature * product type）within-subject experiment and collect both eye-tracking and survey data from 32 subjects for analysis. The empirical results show that (1) compared with cool color of webpage background, warm webpage background has more significant effects on consumers' emotion; (2) Product type can moderate the effect of webpage background feature on consumers' emotion. The findings of this study provide some valuable theoretical and practical implications regarding the effect of webpage background features on consumers' decision.

Keywords: webpage background feature, emotion, online purchase, eye tracking

1. INTRODUCTION

With the popularity and development of Internet around the world, participating in E-commerce activities has become an indispensable and important form of people's daily life. While the volume of e-commerce is rapidly expanding, the competition among e-commerce industries becomes increasingly fierce. To succeed in the tough competition, online retailers must strengthen their own competitive advantages. Shopping website is an online medium to build a bridge of communication between online retailers and consumers. The shopping website is considered as an important platform for sellers to convey information of their products and/or services to consumers. Therefore, shopping websites have become the basic means for online retailers to improve their competitiveness.

For retailers' websites, aesthetic design of a webpage is a critical key to improve online marketing effectiveness and service quality of the website [1]. Most of prior studies focus on an overall visual appearance of webpages [1-5], while few studies focus on the research area of webpage background features. As an important part of visual components on a web page, webpage background features were found to effectively evoke consumers' emotion and be a crucial factor by either attracting or deflecting consumers' attention [6, 7]. Therefore, it is important to explore the influence of webpage background features on consumers' emotions. This paper primarily studies an impact of webpage background color feature on consumers' responses.

Different types of products may need to match different categories of web page backgrounds. But most studies have failed to take into account the impact of product types on consumers' viewing web pages based on different backgrounds [8-10]. This research designs the simulated online shopping web pages regarding both search products and experience products to examine a moderating influence of product types on consumers' reactions to web page different background features.

This study is of significance to the theory and practice. In theoretical perspectives, this research enriches the areas of E-commerce, human-computer interaction, online marketing, web design management, visual aesthetics and other theories by uncovering the role of websites background features on consumers' responses. In practice, this study has an important reference value for website designers and managers to design or choose an

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appropriate webpage background based on its colors and various product types, so as to promote the competence of online shopping platform by enhancing users' purchase experience, and eventually facilitate users' purchase intention.

2. LITERATURE REVIEW AND HYPOTHESES

2.1 Webpage background

Consumers' shopping experience on the Internet is neither an instant nor a static point, but a process [11]. During the process of consumers' shopping experience, as a core ambience for the website, the background feature of webpages plays an important role on consumers' perception and behavior.

The webpage background features would have an impact on consumers' decision-making. Mandel et al. (2002) focused on the priming effects of embedding pictures related to product characteristics in the webpage, and studied whether consumers' behavior would be affected by background features of a webpage. Their results show that background pictures and colors of webpages have the significant effects on online shopping behavior, whether for experts or novices [12]. Kiritani and Shirai (2003) conducted a research about the effects of background colors on users' experience in viewing websites, and found that white, blue and green background made the subject feel time longer, while red and yellow background brought less overestimation of time duration. In addition, the weak level of background features caused bigger time error, brought some more irritation, fatigue, and also lead to weaker impression of the website [11]. Lin et al. (2016) studied the effects of visual complexity and figure-background color contrast of e-commerce websites on consumers' emotional responses (i.e. pleasure, arousal and dominance). Their results have showed that visual complexity and figure-background color contrast of websites have the significant effects on consumers' emotional responses [7]. Pelet et al. (2013) studied the impact of background and foreground color (contrast, brightness and saturation) on customer's emotion and trust in e-commerce websites [10]. Therefore, these prior studies have shown the significant importance of web pages' background features.

2.2 The impact of webpage background on emotion

Emotion refers to an attitude and inner experience of a person when he/she is examining whether the target meets his/her own needs [13]. Emotional responses have three primary dimensions: pleasure (emotional valence), arousal (body activation), and dominance [14]. Pleasure is the extent to which an individual feels good, joyful, or happy [15]. Pleasure lets consumers feel pleased and satisfied. Arousal refers to the degree to which an individual feels stimulated and active[15]. Arousal allows consumers to feel excited, positive, and motivated in a situation [16]. Dominance is defined that the degree to which a person feels that he or she can control or influence a particular situation [7].

The prior researches have showed the relationship between colors of websites and consumers' emotion. Chen and Wu demonstrated that a consumer's emotion is more positive toward online purchasing from travel websites that are designed with warm colors and with layouts having such features as left-hand side images and right-hand side texts [8]. Choi et al explored a mechanism of how color-based visual sensation affects people's judgment, and found that color-based warmth of an e-commerce website could significantly increase a web user's warmth stereotype, trust of the website and higher intention to purchase [9]. These studies have shown that warm colors of web page background have an important impact on consumers from different perspectives. This study proposes the following hypothesis:

H1: Compared with cool webpage background, warm webpage background has a more significant effect on

consumers' positive emotion.

2.3 The moderating effect of product type

Some literatures put forward the classification schemes on products [17], which provides us a categorical perspective to divide products into two types - search products and experience products [18]. The definition of search product is that consumers have actually known the quality and suitability of the product before buying it. Experience product is defined that consumers have no direct experiences to know the principal attributes of the product before purchasing and compared with the direct experience of the product, it's costly or difficult to search for the relevant information with main attributes of the products such as clothes [19].

Product type is a significant factor in studying consumers' online shopping decisions and behaviors. Different kinds of products have different information attributes. Consumers generally evaluate the products through their attributes when shopping online [20]. The type of the product can impact consumers' information search, purchase strategy, and purchase decisions on the Internet [21]. Consumers perceive the quality of search products through their objective performance parameters, while consumers perceive the quality of experience products by depending more on the subjective attributes for their own preferences [22]. That is, when purchasing experiential products, consumers pay more attention to their own experiences induced by the webpage. User's experience is a kind of subjective and primarily emotional experience [23]. Therefore, when purchasing experience products, the influence of webpage background color on consumers' emotion is more significant than that of search products. Thus, we propose the following hypothesis:

H2：Product type can moderate the effect of webpage background color feature on consumers' positive emotion.

3. METHODS

This study designed a 2*2（background feature * product type）within-subject experiment and collected both eye tracking data and survey data for analysis.

Eye tracking methods can objectively and accurately record eye movement data such as fixation count, fixation duration, pupil size change, blink count, saccade count and so on. The pupil size changes can reflect the user's emotional state, and the high degree of external visual arousal stimulation can cause pupil dilation [24]. The mean, maximum and minimum values of pupil size can be used to reflect the user's emotional responses induced by the external visual stimuli [25]. In this study, we consider the emotional potency as being positive (pleasure). The change of user's emotional response is mainly caused by the change of arousal degree. The change of pupil size reflects the emotional process of different arousal degree when viewing different stimulus materials. We used the mean pupil size to reflect the emotional state of the subjects when they were viewing the online shopping pages with different visual characteristics of the background.

3.1 Participants

38 university students were recruited as our subjects to complete the experiment, including 9 boys and 29 girls. Their ages ranged from 19 to 25 years. They all have some experiences of online shopping, and are familiar with the operation of web browsing. In addition, all subjects are right-handed and have corrected visual acuity of 5.0 or more. Because of some missing data for 6 samples, we finally included 32 subjects' data to analyze the results.

3.2 Stimuli materials

In order to study the influence of webpage background on consumers' emotion and the moderating effect of product type, the stimulus materials we produced were as close as possible to the search results pages displayed when the subjects used e-commerce websites for online shopping. We eventually designed 16 stimulus materials for online purchase pages containing product pictures, information description, different background features (cool background colour versus warm background colour), and different product type information (search product versus experience product). Each condition has four similar products.

3.3 Procedure

The whole experiment was carried out in the eye tracking laboratory. The laboratory room has a good anti-interference function. Before the beginning of the formal experiment, the participants should fill in their basic personal information, read and sign the consent form for the eye movement experiment. Then the experimenters introduce the eye movement equipment and the instructions of the experiment process to the subjects, and let them carry out simple equipment operation training. After this, the subjects were instructed to read a description of a hypothetical scenario designed. Finally, after the subjects understand the experimental task and master the basic operation skilfully, we calibrate the eye movement equipment for each subject. When the experimental subjects meet the requirements of eye movement debugging, they formally enter the process of eye movement experiment: (1) The computer screen presents the experimental instruction interface, and then the subject press the space bar to enter the online shopping pages to browse each of the stimulating materials; (2) sixteen stimulus materials of web pages were randomly presented. After browsing each web page, the subjects pressed the space key to enter the next web page; (3) after browsing 16 webpages, the computer screen presents the closing remarks.

4. DATA ANALYSIS AND RESULTS

4.1 Emotion

The research investigates the role of webpage background color on positive emotion by using eye-tracking data. From the Table1, the Mean of the pupil size for warm background color (1440.611) is higher than the Mean of the pupil size for cool background color (1345.542). Compared with cool background color, warm background color has the more significant effects on consumers' positive emotion (F=41.308, p=0.000).

Table1. Analysis of the impact of webpage background on pupil_size_mean

Factors	Group	Mean	SD	F-statistics	Sig
background	Cool color	1345.542	50.362	41.308	0.000
	Warm color	1440.611	49.592		

4.2 The moderating effect of product type

In addition, the result shows a significant interaction between webpage background colour and product type on consumers' positive emotion (F=4.981, sig<0.05) (Seeing Table 3). Compared to search product (cool background colour, M =1376.878; warm background colour, M=1438.970), the influence of background colour on consumer positive emotion is more significant when consumers view the webpages with experience products (cool background colour, M=1314.206; warm background, M=1442.251) (Seeing Table 2). Therefore, H2 is supported.

Table2. Descriptive statistics

background	Product type	emotion（pupil_size_mean）	
		Mean	SD
cool background color	search	1376.878	309.333
	experience	1314.206	275.766
warm background color	search	1438.970	282.333
	experience	1442.251	289.024

Table3. Analysis of the moderating effect of product type

		dependent variables
Factors	statistics	emotion（pupil_size_mean）
Background color	F-statistics	41.308
	Sig	0.000
Product type	F-statistics	3.413
	Sig	0.074
Background color * product type	F-statistics	4.981
	Sig	0.033

5. DISCUSSION AND CONCLUSION

5.1 Implications for theory and research

This paper studies the impact of webpage background feature on consumers' responses in the context of online shopping, and demonstrates that warm color of webpage background has a more significant influence on consumers' positive emotion than cool color of the webpage background. Moreover, this paper studies the moderating effect of product type on the relationship between webpage background color and consumers' positive emotion, and reveals that product type can moderate the effect of webpage background feature on consumers' positive emotion. Previous studies have either focused on the overall visual appearance of webpages or in the context of other situations [1-5]. This paper considers specific situations and explores consumers' responses from the perspective of detailed parts on webpage design, which provides a new way of thinking for future research.

In this study, eye-tracking methods is used to obtain objective physiological data from users, which make up for the limitations of subjective data collecting methods such as questionnaire and interview data in previous IS studies. Eye-tracking data technique can acquire the hidden psychological process of subjects, and it is more objective to use the obtained eye movement data for analysis. This study can provide a suitable guidance for research methods in studying the effect of webpage design and webpage background features.

5.2 Implications for practice

The results of this study provide a variety of practical guidelines for online retailers and website designers. Websites are an important channel to communicate and interact with online consumers for developing competitive online marketing. The feature of webpages background is analogous to the layout and arrangement of offline retail stores, and plays an important role in inducing a good ambience of stores for online consumers. The feature of webpages background as an environmental stimulus plays a significant influence on consumers' positive emotion and their purchase decisions. This study can help website designers better understand the

relationship between web page background features and consumers' emotional responses.

In the process of designing web pages, website designers and managers should consider using the background's colour with more warm tones to enhance consumers' positive emotion, and then facilitate consumers' purchase intention especially for experience products. Moreover, in some special festivals (e.g. New year), website designers can consider adding warm colours for the webpage background to foil the festival's online environment, so that consumers will feel warm, which would enhance consumers' positive sentiment and eventually promote their purchase intention.

5.3 Limitations and future research

Although this study provides some theoretical and practical implications for online marketing and HCI, it has a few limitations for future research. First, our subjects selected in this experiment are university students. Although university students are the main body of online consumers and have rich experiences in online shopping, the research samples can't represent all the characteristics for all online shoppers, maybe there is a different pattern between the junior and the young. The selected samples may lead to some deviations in the research results. In the future, the choice of subjects can be further expanded to the middle-aged and aged people, so as to improve the external validity. Second, when designing page stimulus materials in this study, we mainly focused the visual key dimensions of webpage background such as colour and controlled some information unrelated to the research questions, for example, the visual complexity of the webpage background and other factors. We can examine more factors on the webpage background in the future. Third, in terms of a user's response to stimulus, this study only examines users' emotional responses. In the future research, we can explore to study the impact of webpage background features on users' other responses, such as cognition, purchase intention and so on, thus obtaining a comprehensive understanding for the impact of webpage background features on consumers' online responses, their purchase decision-making and behaviours.

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