Effects of Interactive Product Presentation and Background Color on Online Behavior Intention

Yu-Chao Lin[a,*]   Chien-Jung Lai[b]

[a]Department of Business Management, National United University

[b]Department of Distribution Management, National Chin-Yi University of Technology

Abstract

The present study investigated the effects of visual design elements which are interactive product presentation and background color of a website on online shoppers' approach intention and the mediating role of emotional responses and perceived store image. A total of 72 subjects participated in the experiment. A 3×2 mixed design with interactive product presentation (high, median and low) as within subjects factor and background color (blue and yellow) as between subjects factor was used to investigate emotional responses (pleasure, arousal and dominance), perceived store image and approach/avoidance intention. The results show that interactive product presentation significantly affects arousal and dominance responses. In addition, the interactions of interactive product presentation and background color significantly affect pleasure and perceived store image. Furthermore, results reveal that pleasure and arousal mediate the relation between environmental stimuli (interactive product presentation and background color) and approach/avoidance intention. The implications of the results are discussed.

Keywords: website visual design, online behavior, interactive product presentation, background color

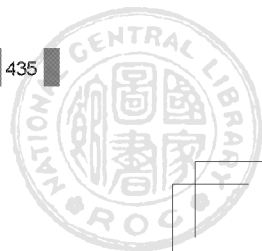---

互動式產品呈現與背景顏色對線上行為傾向之影響

林煜超[a]   賴建榮[b]

[a]國立聯合大學經營管理學系   [b]國立勤益科技大學流通管理系

摘要

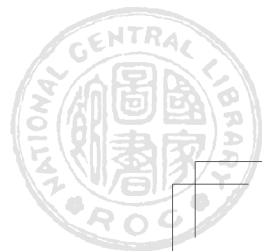本研究主要在調查產品互動式呈現和背景顏色等網站視覺設計要素，對線上消費者的趨避行為傾向的影響，同時也探討知覺商店形象和情緒反應是否具有中介效果。

共有 72 位受試者參加調查實驗。實驗設計採 3×2 混合設計，其中互動式產品呈現（高、中、低互動）為組內設計，而背景顏色（藍色和黃色）為組間設計。調查之依變數包括情緒反應（愉悅、亢奮和主控感）、知覺商店形象與趨避行為傾向。結果顯示，互動式產品呈現之主效應會顯著影響亢奮和主控感，而互動式產品呈現與背景顏色之交互作用會顯著影響愉悅和知覺商店形象。此外，結果也證明，愉悅和亢奮等情緒，會中介網站環境刺激（互動式產品呈現和背景顏色）與趨避行為傾向之關係。本研究同時也討論結果之意涵。

關鍵詞：網站視覺設計、線上行為、互動式產品呈現、背景顏色

1. Introdution

According to U.S. Department of Commerce, retail e-sales increased at an average annual growth rate of 18.1 percent from 2002 to 2009 and retail e-commerce sales reached $145 billion in US in 2009 (U.S. CENSUS BUREAU, 2011). The rapidly growing eCommerce markets have made the online retailing more competitive than ever. Previous studies have shown that visual design of a website was affecting not only emotional responses (Porat and Tractinsky, 2008) but also perceived store image (Heijden and Verhagen, 2004) of online shoppers. Moreover, evidences showed both emotion and store image were antecedents of online behavior intentions, including approach intention and purchase intention(Heijden and Verhagen, 2004; Tractinsky and Lowengart, 2007). Therefore, how to design an appealing and influencing website is an essential issue for online retailers.

For the visual design of a website, color is an important design element which may please browsers' mood and, in turn, satisfy browsers' needs. On the other hand, product presentation, specifically for the interactive product presentation (IPP), plays an significant role for a website not only on store perception but also on patronage behavior toward an online store (Kim et al., 2007). Due to both background color and product presentation are critical design elements which affect users' emotions and perception of an online store, it is important to know that how the background color and the product presentation method are used to elicit appropriate emotion, store perception and online behavior toward an online store.

However, limited studies discussed the combinative effect of background color and interactive product presentation on online behavior. Specifically, how background color and interactive product presentation affect emotion and perceived store image, and the roles of emotion and perceived store image on approach/avoidance intention remain unknown. Therefore, the purpose of the present study was to investigate the influences of interactive product presentation and background color on approach/avoidance intention and the mediating role of emotion and perceived store image in the online environment.

2. Theoretical background

2.1　S-O-R model

Based on Stimulus-Organism-Response (S-O-R) model from environmental psychology, Mehrabian and Russell (1974) introduced a model to study effects of store environment on human emotion and approach/avoidance intention. The model claims that the environment (S) leads to approach/avoidance behaviors (R) and that emotional states (O) which are induced by the environmental stimuli, mediate this relation. According to the model, approach behavior is a positive reaction to an environment, such as a desire to stay and to explore it. Avoidance behavior reflects negative response, such as refusing to stay or exploring it. There are three emotional states proposed in the model, which are pleasure-displeasure, arousal-non arousal, and dominance-submissiveness. Pleasure-displeasure refers to the degree to which a person feels good, joyful, happy or satisfied in the situation; arousal-nonarousal refers to the degree which a person feels excited, stimulated, alert or active in the situation; and dominance-submissive refers to the extent to which the individual feels in control of , or free to act in, the situation (Donovan and Rossiter, 1982).

Sherman et al. (1997) utilized S-O-R model to explore how store environment and emotional states may influence various dimensions of purchase behavior. The results found that consumer's emotions could mediate the purchase process. Although cognitive factors may largely account for store selection and for most planned store purchases, the environment in the store and the emotional states of consumers may be important determinants of purchase behavior. For the online store, Eroglu et al. (2003) showed that emotional states play intervening roles in shopper's attitude, satisfaction, and various approach/avoidance behaviors. These studies showed that S-O-R model is a viable model to investigate effect of environmental stimuli on behavior intention.
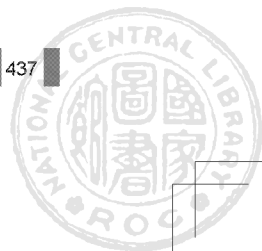
Accordingly, S-O-R model was used to investigate effects of website design elements on approach /avoidance intention in this study. Figure 1 depicts the relations among environmental stimuli (S) which are operationalized as levels of interactive product presentation and background color of website, organism (O) which is the reflection of emotional responses and perceived store image, and approach/avoidance intention (R).

2.2 Interactive product presentation on emotion and perceived store image

As information technology advanced, a variety of product presentation techniques can be used to draw shoppers' attention in the online environment. One of the techniques that widely employed in the apparel industry is interactive product presentation. The interactive product presentation allows user to manipulate image of product by providing 3-dimensional images that rote, and close-up image of a product (Li et al., 2001). The characteristics of interactive product presentation are that user can participate in modifying the form and content of a mediated environment in real time (Steuer, 1992), and interactive product presentation emphasizes the concepts of active control, two-way communication and synchronicity (Liu and Shrum, 2002). The benefits of interactive product presentation include facilitated communications, customization of presented information, image manipulation and entertainment (Fiore et al., 2005) .
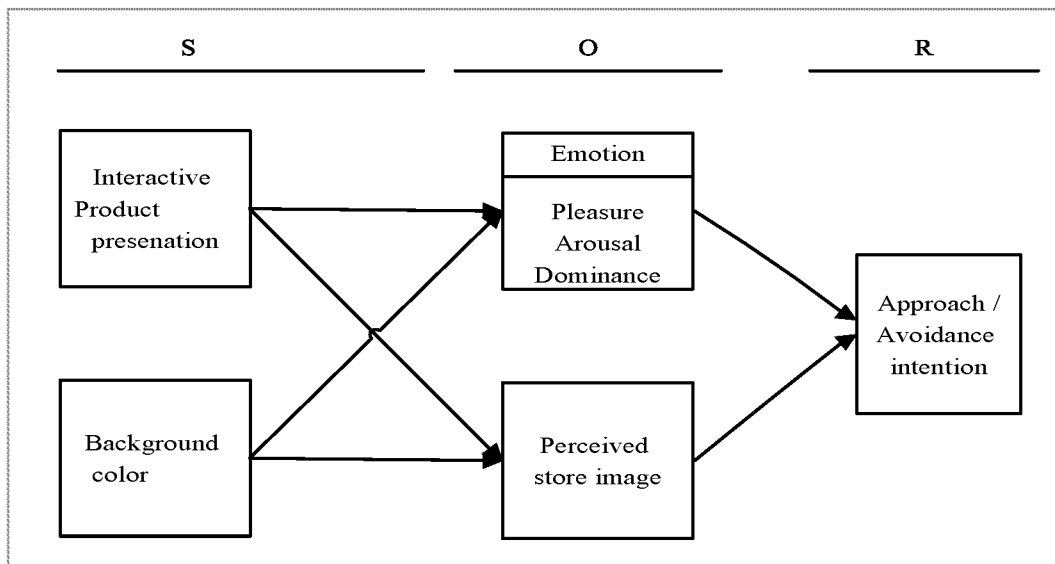
▲ Figure 1 Research model

Studies found that interactive product presentation positively affected consumer
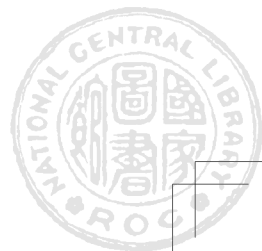
responses, including approach intention, purchase intention and desire to stay (Fiore and Fin, 2003; Park et al., 2005; Kim et al., 2007). Moreover, the 3D virtual product presentation provide vivid sensory information and the psychological sensation of being present in the online environment (Li et al., 2001). Studies also showed that interactive product presentation produced significant effects on mood, perceived risk, satisfaction, store perception, shopping involvement and shopping enjoyment (Fiore and Fin, 2003; Ballantine, 2005; Park et al., 2005; Kim et al., 2007). The mentioned studies indicated that interactive product presentation not only affects behavior intention but also individual perception of an online store.

According to Mehrabian and Russell (1974), emotional experiences that evoked by shopping environment can be represented by pleasure, arousal and dominance. In one study, Li et al. (2001) found that when users interacted with 3D visual products, they experienced emotions. Lee et al.(2006) used technology acceptance model to investigate the effects of level of image interactive technology in online environment and found that image interactive technology positively affects consumers' perception of online shopping enjoyment. Furthermore, Fiore et al. (2005) considered image interactive technology as a novelty technology which may result in emotional pleasure and arousal. In addition, interactive product presentation allows online user to manipulate the website by rotating or zooming the product image. In this situation, user perceives control or domination on product presentation. Accordingly, we expect that level of interactive product presentation positively affects the emotional responses of pleasure, arousal and dominance.

On the other hand, interactive product presentation provides user a vivid experience (similar to sensory and behavioral experience with physical product) and enriches information that helps consumer to estimate the visual and tactile qualities of online product. Mazursky and Jacoby (1986) indicated that store image is the cognition or/ and affect inferred from functional and emotional attributes of a store. Furthermore, the perceived interactivity of a store has the potential to bring the entertaining store image to consumer (Geissler, 2001). Thus, the positive relation between level of interactive product presentation and perceived store image is expected.

2.3　Color on emotion and perceived store image

Color plays an important role on consumer responses to retail design. The effects of color on emotion, perceived store image, and patronage intention have been widely studied (e.g., Bellizzi et al., 1983; Bellizzi and Hite, 1992; Valdez and Mehrabian, 1994; Babin et
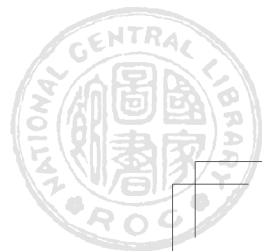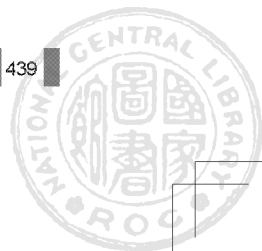
al., 2003). According to the Munsell system, color can be described of three dimensions: hue (pigment), chroma (color purity), and value (lightness). A color's hue is determined by its wavelength. The long wavelengths are classified as warm color such as red, orange and yellow, while the shot wavelengths are belonged to cool color such as violet, blue and green. Chroma represents the purity of a color in which lower chroma produces less pure of a color. The value of a color represents lightness which range from black to white with value 0 to value 10.

Colors are connected with certain feelings. Madden et al. (2000) found that the cool colors (green, blue, white) were related to peaceful, gentle and calming meanings and the warm colors (yellow, gold, orange, red and purple) were associated with emotional, vibrant, hot, active and sharp meanings. In addition, Schaie and Heiss (1964) indicated that the warm colors (red, orange, yellow) possess strong excitation potential and high arousal qualities and can induce elated mood states, and cool colors (blue and green) are associated with more sedate mood states, relatively low arousal and limited excitation potential.

On the other hand, study on the effect of color in store design showed that cool-colored (e.g., blue) environments received much preference than warm-colored (red) environment (Bellizzi et al., 1983). Furthermore, in the study of effects of color on emotion, Valdez and Mehrabian (1994) found that blue environments generally evoke better feelings than do orange environments and blue was one of the best pleasant hue while orange was one of the least pleasant color.

In the present study, blue and yellow are used as background colors, and blue and yellow represent as cool and warm colors, respectively. The reason for choosing blue as one of the investigated color is because it was widely investigated as cold color in previous studies and this could be helpful for comparing with present study. On the other hand, the reason for choosing yellow is because it is on the one end of warm color spectrum which is rarely investigated. For providing more information of effect of website background color with yellow on online behavioral intention, we therefore chose yellow as another color to be investigated.

Based on the forementioned discussion, we expect that yellow evokes higher arousal response than blue for the website's background color design and blue evokes higher pleasure response than yellow for the website's background color design. Since dominance is part of Mehrabian and Russell's three basic emotion states, the effect of color on dominance response was also investigated in this study. However, there was no significant

effect of color on dominance response (Bellizzi and Hite, 1992). Therefore, no specific hypothesis could be developed for the effect of color on dominance in the present study.

Retailers use colors to build their identities due to color shapes our perception, interpretation, and memory of everything we see. Moreover, color can have customer drawing power as well as image-creating potential in retail store design. Bellizzi and Hite (1992) examined effects of color on shopping-related context. They found that more positive retail outcomes occurred in blue rather than in red environments. In addition, Bellizzi et al. (1983) investigated the effects of color in store design and their findings suggested that color can physically attract shoppers toward a retail display. Furthermore, color has certain perceptual qualities that affect store and merchandise image. Bellizzi et al.'s study also showed that subjects perceived warm color (e.g., red) environment as negative and tense, in addition, subjects also considered warm color environment to be less attractive and less pleasant than cool color environment. As such, we expect that blue produces more positive perceived store image than yellow for the website's background color design.

2.4　Interaction of interactive product presentation and background color on emotion and perceived store image

Previous discussion revealed that with level of interactive product presentation increased, the more positive outcomes of pleasure, arousal, dominance, and perceived store image are expected. Background color with blue induces more pleasure and positive perceived store image than color with yellow. Arousal response is expected much higher for background color with yellow than color with blue. However, because consumers do not process environmental characteristics piecemeal, the combination of environmental stimuli affects how consumers perceive a store concept. It is expected that the emotional responses and perceived store image are amplified if these responses and perceptions that the interactive product presentation intends to evoke are congruent with background color intends to induce. Therefore, the interaction of interactive product presentation and background color on emotional responses and perceived store image are expected.

In particular, the higher level of interactive product presentation, the background color with blue would induce higher pleasure and more positive perceived store image than color with yellow because of the consistence of pleasure and happy nature of high interactive product presentation and blue. In addition, the background color with yellow induces higher arousal under high interactive product presentation. However, under low interactive
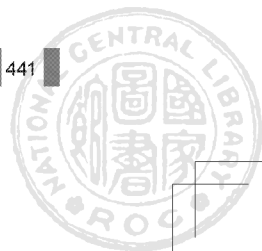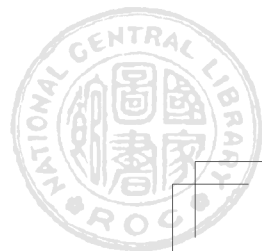
product presentation, background color with blue produces higher pleasure, more positive perceived store image and lower arousal response compared to background color with yellow.

2.5 Perceived store image and emotion as mediators on approach/avoidance intention

Previous studies have shown the mediating role of pleasure and arousal states in approach/avoidance behavior for both brick-and-mortar retail and online store environments (Donovan and Rossiter, 1982; Sherman et al., 1997; Eroglu et al., 2003; Gilboa and Rafaeli, 2003). However, the role of dominance state in mediating the relation between environment and approach/avoidance was not clear. In some studies, while pleasure and arousal states were found described well as emotional responses evoked by environments, dominance state was not found to have a predictable effect (Russell and Pratt, 1980; Russell et al., 1981). On the other hand, researchers also found a valid effect of dominance state on predicting approach behavior (Foxall and Greenley, 1998; Rafaeli and Kluger, 2000; Koufaris et al., 2001). Koufaris et al. (2001) showed that perceived control and shopping enjoyment can increase the intention of new Web customers to return. Furthermore, over a vast range of consumption environment, Foxall and Greenley (1998; 1999) found that pleasure, arousal and dominance separately explain consumers' approach/avoidance behaviors. Because of wide range investigations conducted by Foxall and Greenley (1998; 1999) and to confirm the model proposed by Mehrabian and Russell (1974), we hypothesize that level of interactive product presentation bears positive relations to approach intention, and the relations are mediated by emotional states. In addition, background color with blue produces higher approach intention, and the effect of background color on approach intention is mediated by emotional states.

Studies have shown that perceived store image significantly positive influences on intention to purchase and the store choice decision (Malhotra, 1983; Grewal et al., 1998; Heijden and Verhagen, 2004). Oh et al. (2008) proposed a model to test effects of store atmosphere on consumers' expectation of merchandise quality. Their model followed Baker et al.'s (1994) theoretical framework and considered store image as a consequence of store atmosphere. The results revealed that store image mediates the relation between information display and the perception of merchandise quality. Furthermore, Darden et al. (1983) found that consumers' beliefs about physical attractiveness of a store had a higher correlation with patronage intentions. These results imply that perceived store image is

a consequence of store atmosphere and a positive perceived store image produces higher approach intention. Accordingly, we expected that level of interactive product presentation bears a positive relation to approach intention, and the relations mediated by perceived store image. In addition, background color with blue produces higher approach intention, and the effect of background color on approach intention is mediated by perceived store image.
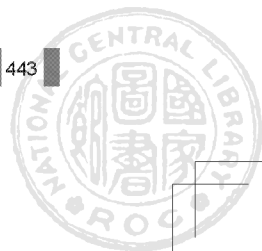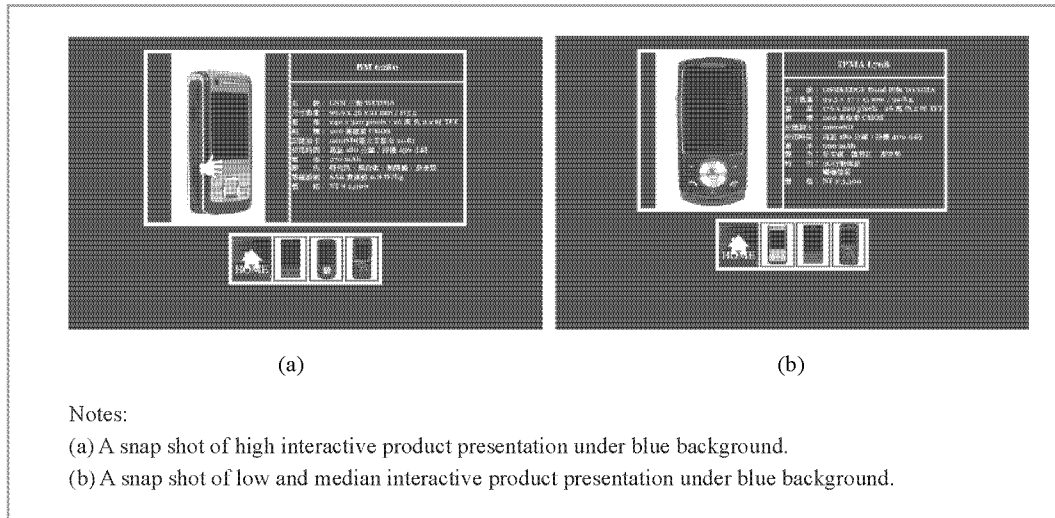
3. Method

3.1 Experimental design

A 3×2 mixed design is used in the present study. The level of interactive product presentation which comprise high, median and low interaction levels is a within subjects factor, and background color which comprise blue and yellow is a between subjects factor.

For the high interactive product presentation, the product image presented on the screen could be rotated $360°$ by clicking right or left side of the product to rotate the product on a round plate, thus, subjects could look at the product in different angles. For the median interactive product presentation, the product image presented on the screen could be zoomed in or zoomed out by clicking the product, thus, subjects could look at the product in different sizes of the image. For the low interactive product presentation, the product was presented as static image. Subjects were not allowed to interact with the image presented on the screen but looked at the product.

Blue and yellow were used as background color of webpages tested in the present study. Blue is considered as coldest color in the cool end of the color spectrum, and yellow is considered the warm end of the spectrum. Figure 2 shows the examples of experimental webpages.

(a)   (b)

Notes:
(a) A snap shot of high interactive product presentation under blue background.
(b) A snap shot of low and median interactive product presentation under blue background.

▲ Figure 2   Examples of interactive product presentation.

3.2   Subject

Overall, 72 graduate and undergraduate students who were recruited from National United University in Taiwan participated in the experiment. There were 42 males and 30 females, and their ages ranged from 18 to 25 years old. The experience with online purchasing was 1.33 times a month in average with $SD=1.14$ times. The average time spent on the internet was 5.03 hrs. a day with $SD=2.43$ hrs. The experience of using internet was 9.49 years in average with $SD=1.93$ years. All the subjects were voluntary for winning the credits of management related courses.

3.3   Material and Apparatus

The experimental websites were created to closely mimic the design of actual mobile phone online specialty store. Websites were created for each of the six experimental conditions. For the purpose of control extraneous variables, each website included three tiers which were homepage, product category page and product presentation page. All the design elements of websites were kept the same excepting the product presentation methods and webpage background colors.

The experiment was conducted in a computer laboratory with controlled ambient lighting and temperature. Each of the PCs was equipped with 2.4 GHz CUP and 17-inch screen with the resolution of 1280×1024 pixels.
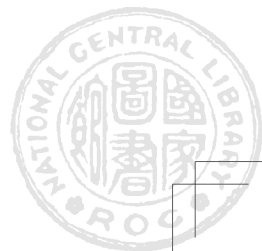
3.4　Measurement

In the present study, Mehrabian and Russell's (1974) 18-item semantic differential scale was slightly modified to measure emotional responses to online store context. The items on the emotion scale were presented as bipolar statements (e.g., happy-unhappy) measured on a 7-point scale. The pleasure dimension of emotion scale comprises happy-unhappy, pleased-annoyed, satisfied-unsatisfied, contented-melancholic, hopeful-despairing, and relax-bored. The arousal dimension comprises stimulated-relaxed, excited-calm, frenzied-sluggish, jittery-dull, wide awake-sleepy, and aroused-unaroused. The dominance dimension comprises controlled-controlling, influenced-influential, crowded-uncrowded, awed-important, submissive-dominant, and restricted-free.

Perceived store image is collective perception toward a store. Components or attributes of a store make up the perception. Heijden and Verhagen (2004) identified that online store image comprises seven components which are online store usefulness, enjoyment, ease of use, in style, familiarity, trustworthiness, and settlement performance. The present study utilized Heijden and Verhagen's (2004) conceptual construct to measure the perceived online store image. However, the websites used in the experiment were not a real online store, therefore, the online store familiarity was eliminated and the settlement performance was replaced by intention to purchase on the store. Subjects indicated their level of agreement on the items using a seven point Likert-type scale (1: strongly disagree; 7: strongly agree).

Eroglu et al.'s (2003) semantic differential items measured on a 7-point scale was employed to measure approach/avoidance intention. The scale consisted of 'How much time would you like to spend on this website? Lots of time/Very little time,' 'Once at the site, how much did you enjoy exploring around? Enjoy exploring/didn't enjoy exploring,' 'Would you like to either approach or avoid this particular site while shopping? Approach/Avoid,' and 'Would you avoid looking around or exploring the site? Approach/Avoid'.

3.5　Procedure

A total of 72 subjects were randomly assigned to two background color conditions. In each of the color conditions, experimenters gave the introduction and explained the purpose of the experiment to the subjects and they had to browse three different levels of interactive product presentation websites, respectively, in a counter balance sequence. Subjects were instructed to browse each of the experimental websites for three minutes
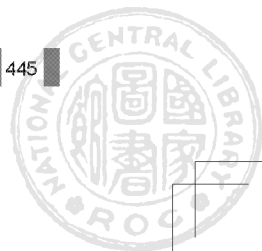
as if they were planning to purchase from the site. After browsing the website for three minutes, subjects were asked to finish the emotion, perceived store image and approach/ avoidance intention scales according to their impression of the website they browsed for no longer than five mins. When subjects completed the scales, they repeated the same procedure for the second and third websites until they completed all three sessions.

4. Results and discussion

The descriptive statistics of each item and reliability of each dimension of scales are summarized in Table 1. The score of each item within each dimension of scales was summed for further analyses. The descriptive statistics of dependent measures under experimental conditions is shown in Table 2. Analysis of variance (ANOVA) was used to test the relationship among environmental stimuli (interactive product presentation and background color) on dependent measures (pleasure, arousal, dominance, perceived store image and approach/avoidance intention), as shown in Table 3.

▼ Table 1 Descriptive statistics and reliability of scales.

| Scale	Dimension	item	mean	SD	Cronbach's α
Emotional state (7-point semantic differential scale)	Pleasure	The website makes me feel happy-unhappy	4.54	1.04	0.823
		The website makes me feel pleased-annoyed	4.58	1.03	
		The website makes me feel satisfied-unsatisfied	4.29	1.05	
		The website makes me feel contented-melancholic	4.43	1.01	
		The website makes me feel hopeful-despairing	4.50	0.91	
		The website makes me feel relax-bored	4.25	1.45	
	Arousal	The website makes me feel stimulated-relaxed	3.93	1.18	0.818
		The website makes me feel excited-calm	3.82	1.29	
		The website makes me feel frenzied-sluggish	3.93	1.32	
		The website makes me feel jittery-dull	3.88	1.05	
		The website makes me feel awake-sleepy	4.38	1.21	
		The website makes me feel aroused-unaroused	3.93	1.37	
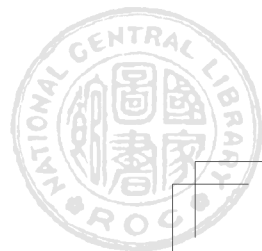
Emotional state (7-point semantic differential scale)	Dominance	The website makes me feel controlled-controlling	4.80	1.20	0.702
		The website makes me feel influenced-influential	4.47	0.94	
		The website makes me feel crowded-uncrowded	5.00	1.06	
		The website makes me feel awed-important	4.44	0.89	
		The website makes me feel submissive-dominant	4.70	1.15	
		The website makes me feel restricted-free	4.79	1.27	
Store image (Likert-type scale: (1) strongly disagree; (7) strongly agree)		I feel the online store is usefulness	5.02	0.96	0.731
		I feel the online store is enjoyment	4.44	1.28	
		I feel the online store is ease of use	5.47	0.98	
		I feel the online store is in style	4.21	1.05	
		I feel the online store is trustworthiness	4.35	0.96	
		I intent to purchase on the online store	3.81	1.17	
Approach/ Avoidance intention (7-poin semantic differential scale)		How much time would you like to spend on this website? Lots of time/Very little time	3.68	1.23	0.852
		Once at the site, how much did you enjoy exploring around? Enjoy exploring/didn't enjoy exploring	4.13	1.29	
		Would you like to either approach or avoid this particular site while shopping? Approach/ Avoid	4.35	1.27	
		Would you avoid looking around or exploring the site? Approach/Avoid	3.93	1.36	

▼ Table 2　Descriptive statistics of dependent measures under experimental conditions.

IPP[a] n=72	Color n=36	Pleasure	Arousal	Dominance	Perceived Store Image	Approach/ Avoidance
High	Blue	28.69[b]	28.19	31.81	31.08	18.94
		(3.61)[c]	(4.53)	(2.99)	(2.91)	(3.17)
	Yellow	32.53	29.44	31.92	29.69	19.39
		(3.68)	(3.90)	(3.56)	(4.16)	(2.85)
Median	Blue	25.83	22.81	28.08	26.36	16.89
		(3.38)	(3.73)	(2.01)	(3.03)	(3.51)
	Yellow	27.22	23.47	27.83	26.92	16.58
		(3.15)	(3.07)	(2.76)	(3.85)	(3.54)
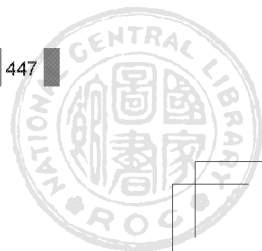
Low	Blue	23.56	20.05	25.69	26.72	13.14
		(2.99)	(3.59)	(3.40)	(2.80)	(3.43)
	Yellow	21.64	19.25	23.83	23.03	11.58
		(2.66)	(4.13)	(2.70)	(3.19)	(2.71)

Notes: a: Interactive product presentation ; b: mean; c: SD.

▼ Table 3　Effects of interactive product presentation and background color on dependent variables.

| Source of variation	df	F value				
		Pleasure	Arousal	Dominance	Store image	Approach/ Avoidance
IPPa	2	163.40**	131.20**	136.41**	84.92**	159.89**
Background color	1	3.68	0.35	1.89	6.01*	0.59
Subjects × Color	70					
IPP × Color	2	21.18**	1.72	2.98	12.12**	3.43*
Error	140					
Total	215					

Note: a: Interactive product presentation. *p<0.05; **p<0.01.

If interaction of environmental stimuli on dependent measures was not significant, main effect analysis was carried out. Duncan post hoc test was followed up if main effect was significant at significant level of 0.05. The mediating effects of emotional responses and perceived store image between environmental stimuli and approach/avoidance intention were tested using the procedure suggested by Baron and Kenny (1986) and Hastak and Olson (1989).
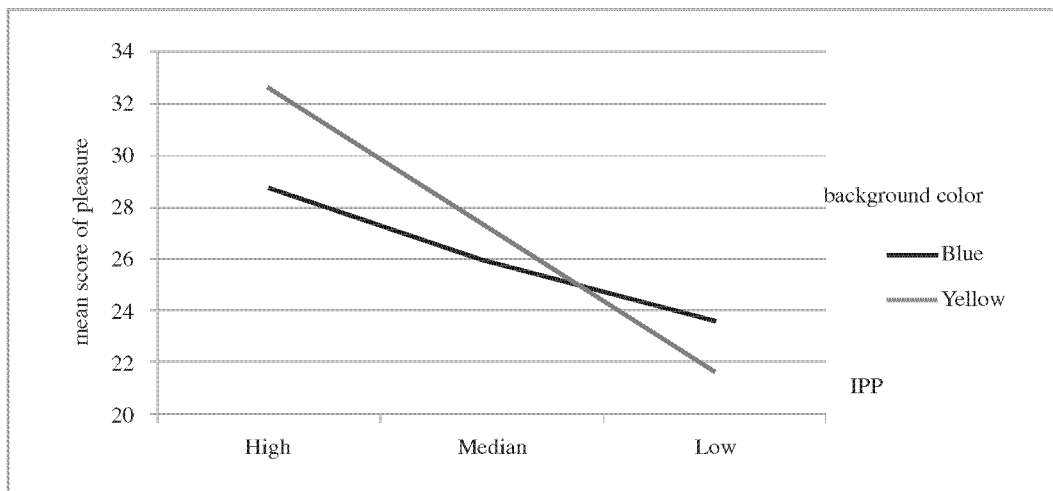
4.1.　Effects of interactive product presentation and background color on emotions

4.1.1　Effects of interactive product presentation and background color on pleasure

As shown in Table 3, the interaction of interactive product presentation and background color on pleasant response is significant (F(2, 140)=21.18, p<0.01). Therefore, analysis of simple main effect was carried out to test effect of background color on pleasant responses under levels of interactive product presentation. For the high level of interactive product presentation, the effect of color on pleasure is significant (F(1, 210)=24.81, p<0.01). The pleasant response for background color with yellow (M=32.53)
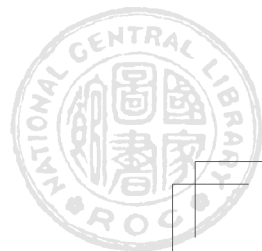
is much higher than for color with blue (M=28.69). For the median level of interactive product presentation, the effect of color on pleasure is not significant. The pleasant response for background color with yellow and with blue are M=27.22 and M=25.83, respectively. For the low level of interactive product presentation, the effect of color on pleasure is significant (F(1, 210)=6.20, p<0.05). The pleasant response for background color with blue (M=23.56) is much higher than for color with yellow (M=21.64). Figure 3 shows the interaction plot.

▲ Figure 3　Interaction plot of IPP and background color on pleasure

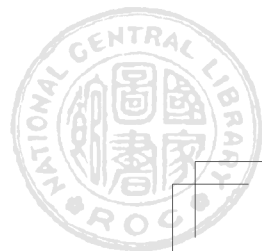## 4.1.2　Effects of interactive product presentation and background color on arousal

The results of ANOVA show that the interaction between interactive product presentation and background color on arousal is not significant (F(2, 140)=1.72, p>0.1) , as shown in Table 3. Therefore, main effects of interactive product presentation and background color were analyzed. Interactive product presentation significantly affect arousal (F(2, 140)=131.20, p<0.01). Duncan's post hoc test reveals that the arousal score for high interactive product presentation (M=28.82) is significantly higher than median interactive product presentation (M=23.14) and median interactive product presentation is significantly higher than low interactive product presentation (M=19.82). The ANOVA reveals that there is no significant effect of background color on arousal (F(1, 70)=0.35, P>0.1). The mean arousal responses of background color with blue and with yellow are M=24.06 and M=23.80, respectively.

4.1.3 Effects of interactive product presentation and background color on dominance

The results of ANOVA indicate that there is no significant interaction between interactive product presentation and background color on dominant response ($F_{(2, 140)}=2.98$, $p>0.1$), as shown in Table 3. Therefore, main effects of environmental stimuli were analyzed. The effect of interactive product presentation on dominance is significant ($F_{(2, 140)}=136.41$, $p<0.01$). Duncan's post hoc test was performed at $\alpha=0.05$. Results show that the dominant response for high level of interactive product presentation ($M=31.86$) is significantly higher than median level ($M=27.96$). Furthermore, the dominant response is significantly higher for median level of interactive product presentation ($M=27.96$) than for low level of interactive product presentation ($M=24.76$). However, there is no significant effect ($F_{(1, 70)}=1.89$, $p>0.1$) of background color on dominant response. The means of dominance for background color with blue and with yellow are $M=28.53$ and $M=27.86$, respectively.

The above results show that pleasant response is affected by the interaction of interactive product presentation and background color. An unexpected outcome shows that background color with yellow produces higher pleasant response than color with blue under high interactive product presentation. Although high interactive product presentation produces higher pleasure (Fiore et al., 2005), cool-colored background should receive much preference than warm-colored (Bellizzi et al., 1983). The reason for the unexpected result may be that both high interactive product presentation and yellow background possess strong excitation potential (Schaie and Heiss, 1964) which produces the same mood of subject. However, the blue background is associated with more sedate mood state which is not consistent with the mood the high interactive product presentation intends to evoke. Thus, in the high interactive product presentation condition, the yellow background produces higher pleasure than blue background. For the median interactive product presentation, the pleasant responses are not significant between background color with blue and with yellow. For the low interactive product presentation which is static product image, pleasant response induced by background color with blue is higher than with yellow. The reason may be that the static image webpage plays the role which is similar to storefront design. The color in a physical store design is very important. The study of Bellizzi et al. (1983) showed that cool-colored (e.g., blue) environments are more favorite than warm-colored (red) environment and Valdez and Mehrabian (1994) also indicated that blue environments generally evoke better feeling and blue is one of the best pleasant hue.

For the arousal response, only main effect of interactive product presentation was found in the present study. It is expected that higher interactive product presentation induces higher arousal. Because interactive product presentation is considered as novel technology which induces pleasure and arousal (Fiore et al., 2005), higher interactive product presentation would produce higher arousal. However, the effect of background color on arousal is not significant. The reason may be that the measures of emotional responses to color stimuli are not reliable, valid and comprehensive (Valdez, 1993). Bellizzi and Hite (1992) used PAD-scale and found effect of color can only be found on pleasure dimension. Furthermore, Brengman and Geuens (2004) found that the arousal construct revealed two separate 'tension' and 'excitement' dimensions which may weaken the validity of arousal measure in PDA-emotional scale. Therefore, effect of background color on arousal response was not found.

For the dominance, only main effect of interactive product presentation was found. The result indicates that as the interactivity of product presentation is increased, the dominant response increases. Because dominance is the extent to which the individual feels control of the situation (Donovan and Rossiter, 1982), it is inherent that high level of interaction produces higher dominance. In addition, there was no significant effect of color on dominance (Bellizzi and Hite, 1992). Therefore, the main effect of background color and the interaction of interactive product presentation and background color on dominance were not found in the present study.
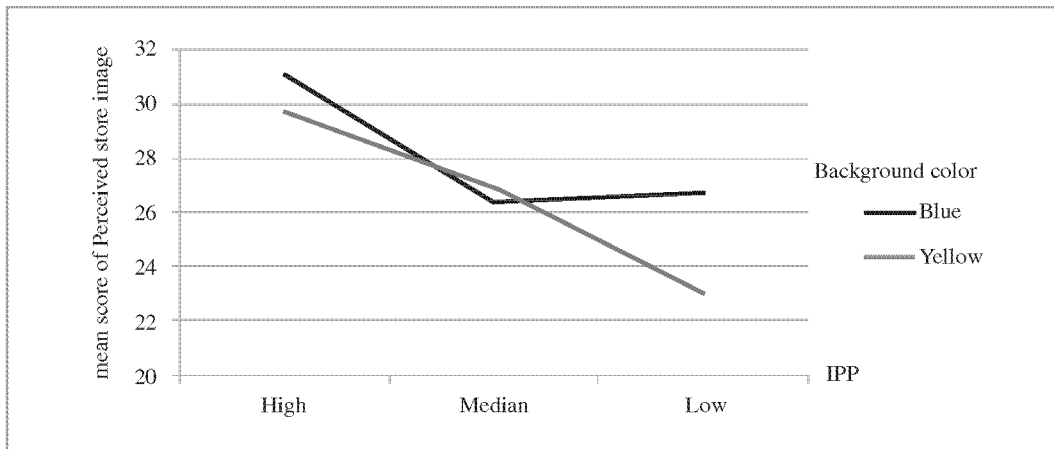
4.2 Effects of interactive product presentation and background color on perceived store image

An ANOVA was performed to test the effects of environmental stimuli on perceived store image. As shown in Table 3, the interaction of interactive product presentation and background color is significant ($F(2, 140)=12.12$, $p<0.01$). Analysis of simple main effect was conducted to test the effect of background color on perceived store image under levels of interactive product presentation. For the high level of interactive product presentation, background color produces marginal effect ($F(1, 210=3.07$, $p<0.1$) on perceived store image. Background color with blue ($M=31.08$) produces more positive perceived store image than background color with yellow ($M=29.69$). For the median level of interactive product presentation, there is no significant effect of background color on perceived store image. The means of perceived store image in background color with blue and with yellow are $M= 26.36$ and $M=26.92$, respectively. For the low level of interactive
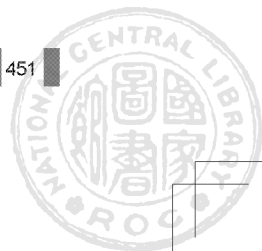
product presentation, background color significantly affects perceived store image ($F(1, 210) = 21.74$, $p < 0.01$). The perceived store image for background color with blue ($M = 26.72$) is more positive than for background color with yellow ($M = 23.03$). Figure 4 shows the interaction plot.

The results indicate that for both high and low interactive product presentation conditions, perceived store image for background color with blue is more positive than color with yellow. It was expected that background color with blue is more attractive compared to the yellow one. According to Bellizzi and Hite (1992), more positive retail outcome occurred in blue environment compared to in red environment. In addition, Bellizzi et al. (1983) showed that subjects considered warm color environment to be less attractive and less pleasant than cool color environment. Therefore, background color with blue is perceived more positive store image than color with yellow. However, there is no significant difference between background color with blue and yellow under median interactive product presentation. The reason may be that the median interactive product presentation only allowed subjects zoom in or zoom out the product image which is not a novel product presentation technology and may not interest the subjects of the technology. Therefore, the effect of background color on perceived store image was not found in median interactive product presentation condition.
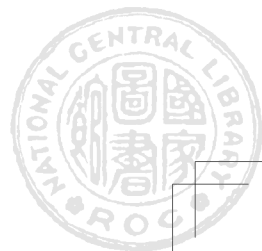
4.3 The mediating effects of emotions and perceived store image between environmental stimuli and approach/ avoidance intention

To test the mediating effects of emotional responses and perceived store image between environmental stimuli and approach/avoidance intention, the procedure suggested by Baron and Kenny (1986) and Hastak and Olson (1989) was performed. The criteria to assess the mediating effect are as follows: firstly, the independent variables must affect the mediators; secondly, the independent variables must affect the dependent variables; thirdly, the mediators must affect the dependent variables while the effects of the independent variables on the dependent variables must be reduced.

According to above procedure, the effects of environmental stimuli (interactive product presentation and background color) on emotional responses and perceived store image were tested for the first step. Results of ANOVA show significant effect of interactive product presentation on emotional responses and perceived store image. Furthermore, interaction of interactive product presentation and background color significantly affects pleasure and perceived store image, as show in Table 3. For the second step, as shown in table 3, main effect of interactive product presentation ($F_{(2, 140)}=159.89$, $p<0.01$) and interaction of interactive product presentation and background color ($F_{(2, 140)}=3.43$, $p<0.05$) significantly affect approach/avoidance intention. For the last step, analysis of covariance (ANCOVA) was performed to test effects of environmental stimuli on approach/avoidance intention and mediators were treated as covariates. The results, as shown in Table 4, indicate that main effect of interactive product presentation ($F_{(2, 136)}=19.52$, $p<0.01$) is reduced and interaction of interactive product presentation and background color ($F_{(2, 136)}=0.22$, $p>0.1$) is eliminated on approach/avoidance intention while emotional responses and perceived store image are treated as covariates. Furthermore, while effects of dominance and perceived store image on approach/avoidance intention are not significant, effects of pleasure and arousal are prominent ($F_{(1, 136)}=3.94$, $p=0.05$ and $F_{(1, 136)}= 9.83$, $p<0.01$, respectively). A regression analysis was used to test the effects of pleasure and arousal on approach/avoidance intention. Result shows that approach intention increases while pleasant and arousal responses are increased (pleasure: $\beta=0.49$, $t=7.65$, $p<0.01$; arousal: $\beta=0.37$, $t=5.71$, $p<0.01$), as shown in Table 5.
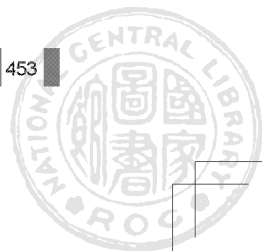
Table 4 Analysis of covariance for environmental stimuli on approach/avoidance intention.

Source of variance	df	SS	MS	F value
IPP[a]	2	155.57	77.79	19.52[**]
Color	1	9.43	9.43	2.37
Subjects × Color	70	512.62	7.32	
IPP × Color	2	1.76	0.88	0.22
Covariates				
Pleasure	1	15.70	15.70	3.94[*]
Arousal	1	39.18	39.18	9.83[**]
Dominance	1	2.74	2.74	0.69
Perceived store image	1	8.16	8.16	2.05
Error	136	541.97		

Note: a: Interactive product presentation. *p<0.05, **p<0.01.

Table 5 Regression analysis: approach/avoidance intention with pleasure and arousal.

| Source	B	SE B	β	t
Constant	-2.53	0.97		-2.60[**]
Pleasure	0.44	0.06	0.49	7.65[**]
Arousal	0.29	0.05	0.37	5.71[**]

Note: R^2=0.66, adjusted R^2=0.65 ($F_{(2, 213)}$=202.63, p<0.01).
**p<0.01.

The interactions of interactive product presentation and background color on pleasure and approach intention were further examined. Results show that background color with blue produced higher pleasure and approach intention than color with yellow under low interactive product presentation. For pleasure and approach/avoidance intention, there are no significant differences between background color with blue and with yellow under median interactive product presentation. In contrast, pleasant response for background color with yellow is higher than for color with blue and no significant difference of approach intention was found between colors under high interactive product presentation.

The above results show that pleasant and arousal emotions mediate the effect of environment stimuli (interactive product presentation and background color) on approach/avoidance intention. However, dominance and perceived store image do not mediate the relationship between environmental stimuli and approach/avoidance intention.

The results are similar to some of previous findings (Russell and Pratt, 1980;
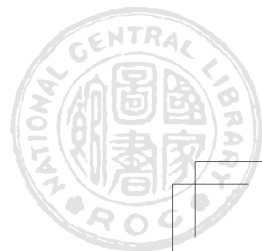
Donovan and Rossiter, 1982; Donovan et al., 1994; Wu et al., 2008) that pleasure and arousal mediate the relationship between environment stimuli and approach/avoidance, and dominance is not a good predictor of environmental stimuli on approach/avoidance intention. An unexpected outcome was found in the present study that perceived store image doesn't mediate the relationship between environment stimuli and approach/ avoidance. The reason may be that there is no universally acceptable definition of perceived store image for online store. For example, while Oh et al. (2008) defined that perceived store image comprises safety, convenience and entertainment dimensions, Baker et al. (1994) found perceived store image as an one dimensional construct with four items. Another reason may be that the dependent measures are different. The dependent measure is approach/avoidance intention in the present study, rather expectation of merchandise quality was treated as dependent measure in the study of Oh et al. (2008). Furthermore, the ways perceived store image manipulated were different. While some studies treated perceived store image as mediators (e.g. Oh et al., 2008; Verhagen and van Dolen, 2009), other studies treated perceived store image as dependent measures (Baker et al., 1994; Heijden and Verhagen, 2004).

5. Conclusion

The present study employed Stimulus-Organism-Response (S-O-R) model to investigate the influences of interactive product presentation and background color on approach/avoidance intention and the mediating role of emotion and perceived store image. The findings support S-O-R model. The results of the organic responses in the research model reveal that for the emotional response of arousal and dominance, only the main effect of interactive product presentation was found in the present study. As the level of interactive product presentation is elevated, arousal and dominant responses are increased. In addition, the interactions of interactive product presentation and background color significantly affect pleasure and perceived store image.

Under low interactive product presentation (static image), perceived store image and pleasure for background color with blue are significantly higher than for color with yellow. For median interactive product presentation (zooming image), there are no significant effects of background color on perceived store image and pleasure. For the high interactive product presentation (rotatable image), background color with yellow produces higher
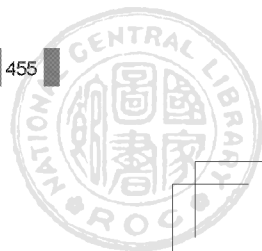
pleasure than color with blue and there is no significant difference for perceived store image between the background colors.

The test of mediating effects of pleasure, arousal, dominance and perceived store image shows that pleasure and arousal mediate the relation between environmental stimuli (interactive product presentation and background color) and approach/avoidance intention. However, the organic factors of dominant response and perceived store image do not mediate the relation between environmental stimuli and approach/avoidance intention. Furthermore, as pleasure and arousal are increased, the approach intention is enhanced.

The results imply that interactive product presentation and background color affect online store shoppers' approach intention. By increasing pleasant and arousal responses, interactive product presentation and background color enhance the approach intention. The website designers should be aware that while interactive product presentation is used in a webpage, background color should be carefully selected to congruent with the emotion that the type of product presentation intends to evoke. According to the evidences from the present study, rotatable image with yellow background color will produce higher pleasure than with blue background color. For the static image of product presentation, background color with blue produces higher pleasure than background color with yellow for the online shoppers. The mentioned results imply that webpage with yellow background will attract online shoppers to stay longer than blue background under rotatable image of product presentation design. However, for the static image of product presentation design, webpage with blue background will be more attractive than yellow background.

Some limitations need to be noted in the present study. There are different types of interactive product presentation existed in the online environment. Although positive relation between level of interactive product presentation and approach intention was found in the present study, generalization of the results to different type of interactive product presentation should be cautious. Therefore, extended investigation for the effect of the type of product presentation is suggested for future researches. In addition, there are only blue and yellow background colors which represented cool and warm colors were investigated in the present study. Due to the limited colors were investigated in the study, different brightness, chroma and hue of color is suggested to further investigation to gain more elaborate knowledge of the effect of background color on online behavior. Finally, because the subjects were recruited in the campus of a university in Taiwan, highly homogeneous sample of college students may hinder the generalization of the results. A wider range of sample is suggested for future investigation.
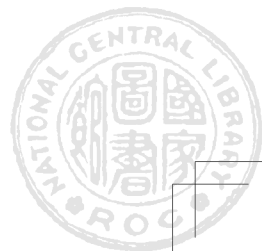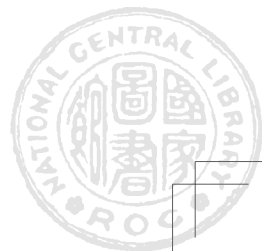
References

Babin, B. J., Hardesty, D. M., & Suter, T. A. (2003). Color and shopping intentions: The intervening effect of price fairness and perceived affect. *Journal of Business Research, 56*(7), 541-551.

Baker, J., Grewal, D., & Parasuraman, A. (1994). The influence of store environment on quality inferences and store image. *Journal of the Academy of Marketing Science, 22*(4), 328-339.

Ballantine, P. W. (2005). Effects of interactivity and product information on consumer satisfaction in an online retail setting. *International Journal of Retail & Distribution Management, 33*(6), 461-471.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology, 51*(6), 1173-1182.

Bellizzi, J. A., Crowley, A. E., & Hasty, R. W. (1983). The effects of color in store design. *Journal of Retailing, 59*(1), 21-45.

Bellizzi, J. A., & Hite, R. E. (1992). Environmental color, consumer feelings, and purchase likelihood. *Psychology and Marketing, 9*(5), 347-363.

Brengman, M., & Geuens, M. (2004). The four dimensional impact of color on shopper's emotions. *Advance in consumer research, 31*, 122-128.

Darden, W. R., Erdem, O., & Darden, D. K. (1983). A comparison and test of three causal models of patronage intention. In Darden, W. R., & Lusch, R. F. (Eds.), *Patronage Behavior and Retail Management* (29-43). New York: North-Holland.

Donovan, R. J., & Rossiter, J. R. (1982). Store atmosphere: An environmental psychology approach. *Journal of Retailing, 58*(1), 34-57.

Donovan, R. J., Rossiter, J. R., Marcoolyn, G., & Nesdale, A. (1994). Store atmosphere and purchasing behavior. *Journal of retailing, 70*(3), 283-294.

Eroglu, S. A., Machleit, K. A., & Davis, L. M. (2003). Emperical testing of a model of online store atmospherics and shopper responses. *Psychology and Marketing, 20*(2), 139-150.

Fiore, A. M., & Fin, H. F. (2003). Influence of image interactivity on aproach responses toward an online retailer. *Internet Research: Electronic Networking Applications and Policy, 13*(1), 38-48.

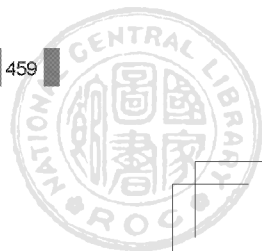Fiore, A. M., Jin, H. J., & Kim, J. (2005). For fun and profit: Hedonic value from image
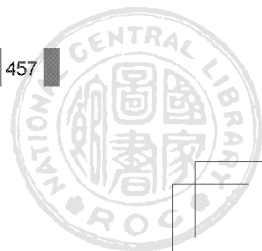
interactivity and responses toward an online store. *Psychology and Marketing, 22*(8), 669-694.

Foxall, G., & Greenley, G. (1998). The affective structure of consumer situations. *Environment and Behavior, 30*(6), 781-798.

Foxall, G. R., & Greenley, G. E. (1999). Consumers' emotional responses to service environments. *Journal of Business Research, 46*(2), 149-158.

Geissler, G. L. (2001). Building customer relationships online: the website designers' perspective. *Journal of Consumer Marketing, 18*(6), 488-502.

Gilboa, S., & Rafaeli, A. (2003). Store environment, emotions and approach behaviour: Applying environmental aesthetics to retailing. *International Reviews of Retail, Distribution and Consumer Research, 13*(2), 195-211.

Grewal, D., Krishnan, R., Baker, J., & Borin, N. (1998). The effect of store name, brand name and price discounts on consumers' evaluations and purchase intentions. *Journal of retailing, 74*(3), 331-352.

Hastak, M., & Olson, J. C. (1989). Assessing the role off brand-related cognitive responses as mediators of communication effects on cognitive structure. *Journal of Consumer Research, 15*(4), 444-456.

Heijden, H. V. D., & Verhagen, T. (2004). Online store image: Conceptual foundations and empirical measurement. *Information & Management, 41*(5), 609-617.

Kim, J., Fiore, A., & Lee, H. (2007). Influences of online store perception, shopping enjoyment, and shopping involvement on consumer patronage behavior towards an online retailer. *Journal of Retailing and Consumer Services, 14*(2), 95-107.

Koufaris, M., Kambil, A., & Labarbera, P. A. (2001). Consumer behavior in web-based commerce: An empirical study. *International Journal of Electronic Commerce, 6*(2), 115-138.

Lee, H. H., Fiore, A. M., & Kim, J. (2006). The role of the technology acceptance model in explaining effects of image interactivity technology on consumer responses. *International Journal of Retail & Distribution Management, 34*(8), 621-644.

Li, H., Daugherty, T., & Biocca, F. (2001). Characteristics of virtual experience in electronic commerce: A protocol analysis *Journal of Interactive Marketing, 15*(3), 13-30.

Liu, Y., & Shrum, L. J. (2002). What is interactivity and is it always such a good thing? Implications of definition, person, and situation for the influence of interactivity on advertising effectiveness. *Journal of Advertising, 31*(4), 53-64.

Madden, T. J., Hewett, K., & Roth, M. S. (2000). Managing images in different cultures:

A cross-national study of color meanings and preferences. *Journal of International Marketing, 8*(4), 90-107.

Malhotra, N. K. (1983). A threshold model of store choice. *Journal of Retailing, 59*(Summer), 3-21.

Mazursky, D., & Jacoby, J. (1986). Exploring the development of store images. *Journal of Retailing, 62*(Summer), 145-165.

Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology.* Cambridge, MA: MIT Press.

Oh, J., Fiorito, S. S., Cho, H., & Hofacker, C. F. (2008). Effects of design factors on store image and expectation of merchandise quality in web-based stores. *Journal of Retailing and Consumer Services, 15*(4), 237-249.

Park, J., Lennon, S. J., & Stoel, L. (2005). On-line product presentation: Effects on mood, perceived risk, and purchase intention. *Psychology and Marketing, 22*(9), 695-719.

Porat, T., & Tractinsky, N. (2008). Affect as a mediator between web-store design and consumers' attitudes toward the store. In Peter, C., & Beale, R. (Eds.), *Affect and emotion in HCI* (142-453). Berlin Heidelberg: Springer-Verlag.

Rafaeli, A., & Kluger, A. (2000). The three dimensions of affective reactions to physical appearance. In Ashkanasy, N. M., Härtel, C. E. J., & Zerbe, W. J. (Eds.), *Emotions in the workplace: Theory, research and practice* (141-156). CT: Greenwood Publishing Group.

Russell, J. A., & Pratt, G. (1980). A description of the affective quality attributed to environments. *Journal of personality and social psychology, 38*(2), 311-322.

Russell, J. A., Ward, L. M., & Pratt, G. (1981). Affective quality attributed to environments: A factor analytic study. *Environment and Behavior, 13*(3), 259-288.

Schaie, K. W., & Heiss, R. (1964). *Color and personality.* England, Grune & Stratton: Oxford.

Sherman, E., Mathur, A., & Smith, R. B. (1997). Store environment and consumer purchase behavior: Mediating role of consumer emotions. *Psychology & Marketing, 14*(4), 361-379.

Steuer, J. (1992). Defining virtual reality: Dimensions determining telepresence. *Journal of Communication, 42*(4), 73-93.

Tractinsky, N., & Lowengart, O. (2007). Web-store aesthetics in e-retailing: A conceptual framework and some theoretical implications. *Academy of Marketing Science Review, 11*(1). Retrieved July 28, 2011, from http://www.amsreview.org/articles/Tractin-

sky11-2007.pdf

U.S. CENSUS BUREAU (2011). *E-Stats report*. Retrieved July 28, 2011, from http://www. census.gov/econ/estats/2009/2009reportfinal.pdf

Valdez, P. (1993). *Emotional responses to color*. Unpublished doctoral dissertation, University of California, CA, USA.

Valdez, P., & Mehrabian, A. (1994). Effects of color on emotions. *Journal of Experimental Psychology: General, 123*(4), 394-409.

Verhagen, T., & Van Dolen, W. (2009). Online purchase intentions: A multi-channel store image perspective. *Information & Management, 46*(2), 77-82.

Wu, C. S., Cheng, F. F., & Yen, D. C. (2008). The atmospheric factors of online storefront environment design: An empirical experiment in Taiwan. *Information & Management, 45*(7), 493-498.