

RETAIL LIGHTING DESIGN PREFERENCES BETWEEN RECREATIONAL AND TASK
ORIENTED SHOPPERS

By

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To my family, and those who contributed their support to me

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Abstract of Thesis Presented to the Graduate School
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Retail design has moved beyond the scope of providing basic displays since atmospherics have been proved as an important role during shopping process. Lighting is recognized as a valuable design element to store environments and brand images. Despite the effects of lighting have been investigated in retail environmental studies, the knowledge of lighting's impacts on emotional responses is scarce. Moreover, it is suggested that consumers' motivations can affect environmental impacts on shopping behavior. So far, no study has been dedicated to the influence of lighting on customers' behavior based on different shopping motivations. Therefore, this study was conducted to examine the effects of two Color Correlated Temperatures (warm and cool) and two light contrasts (uniform and non-uniform) to ascertain how shoppers' behavioral intentions (purchasing behavior), emotional states (arousal and pleasure), and preferences are affected and mediated by shoppers' motivational orientations (task-oriented and recreation-oriented).

A simulated research was conducted in Behavioral Research Lab in the Marketing Department at the University of Florida. A total of 208 female students between the ages of 18 and 35 were recruited. Based on randomization, 104 task-oriented assignments and 104 recreation-

oriented assignments were distributed respectively. Participants then completed a self-administered questionnaire which was organized to answer each page of questions for each lighting condition.

The findings indicate that: 1) Participants' arousal states for different lighting conditions were significantly affected by CCT and light contrast. Participants perceived cool lighting and uniform lighting as more arousing. 2) The light contrast had an effect on participants' pleasure state. Participants felt more pleasant in uniform lighting condition. 3) Participants were assigned to task-oriented motivation responded that uniform lighting enhanced their purchasing behavior, while participants were assigned recreation-oriented motivation responded non-uniform lighting enhanced their purchasing behavior. 4) To both groups, the store with uniform lighting was rated as more preferable than non-uniform lighting. Although both groups preferred uniform lighting, it seems that participants were assigned recreation-oriented motivation preferred non-uniform lighting than participants were assigned to task-oriented motivation.

CHAPTER 1 INTRODUCTION

In an increasingly competitive marketplace, retailers are striving to gain popularity over their rivals and outsell one another. While retailers are making their effort to better the quality of their products while maintaining competitive pricing; however, more and more retailers are realizing that intangible values provide a further venue for market differentiation. Consumers' in-store experience recently has received much attention and reflected in today's retail store design. Store atmosphere is recognized as an important marketing tool which can influence consumers' shopping behaviors (Donovan, Rossiter, Marcolyn, & Nesdale, 1994; Orth, Limon, & Rose, 2010; Turley & Milliman, 2000) and product evaluation (Baker, Parasuraman, Grewal & Voss, 2002). While an effective shopping environment facilitate sales (Chebat & Michon, 2003); bad store atmosphere can negatively affect purchases (Maxwell & Kover, 2003). Good ambiances also enhance the shopper's mood that helped increase sales and influenced consumers' satisfaction with the store (Singh, 2006).

Visibility of merchandise and the space is a major element of design components in retail store, which contributes to the store experience, merchandise attractiveness and customers' willingness to purchase. Lighting is a key element that is designed to fulfill these goals (Rea, 2000; Schlosser, 1998). Lighting researchers and designers indicated that lighting causes psychological responses and affects how people perceive and react to a built environment (Boyce, 2003; Davis, 2011; Fleischer, Krueger & Schierz, 2001; Van Erp, 2008). In-store lighting has been shown to impact consumer's perceptions of qualities of the environment (Custers, Kort, IJsselateijn & Kruiff, 2010) the appraisal of products (Hegde, 1996; Roush, 1994), and promote interaction between merchandise and customers (Areni & Kim, 1994; Park & Farr, 2007; Summers & Hebert, 2001). Indeed the importance of good lighting design can no

longer be denied, yet few studies attempted to evaluate the contribution and role of good lighting in retail environments.

In today's fluctuating market, retailers bring memorable experience to their customers (Pine & Gilmore, 1999) who with their own personality, feelings and longings (Custers et al., 2010) to differentiate themselves from competitors. Studies showed there were many types of consumers with various shopping motives (Westbrook & Black 1985). Subsequent researchers focused on two fundamental shopping motives, task-oriented and recreation-oriented (Babin, Darden & Griffin, 1994; Childers, Carr, Peck & Carson, 2001; Chitturi, Raghunathan, & Mahajan, 2008; Kaltcheva & Weitz, 2006). Kaltcheva and Weitz (2006) found consumers' shopping motives can enrich or diminish their store experiences, suggesting that retailers to design each department separately according to its target shopper typologies. It follows that, retail store lighting, as a major design element, should be designed with particular consumers in different shopping motivations in mind.

Research Purpose and Questions

While many lighting researchers have examined the physical characteristics of lighting in shopping environments (Areni, & Kim, 1994; Park & Farr, 2007; Quartier, Christiaans, & van Cleempoel, 2008; Summers, & Hebert, 2001). Most of these studies only focus on the effects of illumination levels and color of light on shopping behaviors and perceived atmosphere. In contrast, the current study examines the influence of color of light and light contrast on consumers' emotional states, behavioral intentions and preference. Furthermore, few studies, if any, examined the role of shopping motivations and lighting. In Kaltcheva and Weitz's (2006) study of consumers' motivations and physical cues of shopping environments, lighting was not reviewed even though it is a key visual element in retail store environment. More research is needed to determine whether and to what extent in-store lighting influence consumers' shopping

behaviors, and how different types of shoppers react to various lighting conditions. The current study seeks to explore the relationship of in-store lighting, to shoppers' emotional states, behavioral intentions, and preferences according to different shopping motivations.

The purpose of this study is to investigate how the two Color Correlated Temperatures (CCT) (warm and cool) and two light contrasts (uniform and non-uniform) impact shoppers' emotional states (arousal, pleasure), behavioral intentions (purchasing behavior), and preferences relate to task-oriented and recreation-oriented shopping motivations. The specific research questions this study attempts to answer are:

1. How does the impact of lighting contrast and CCT relate to emotional state of **arousal** in retail store environments between task-oriented and recreation-oriented shoppers?
2. How does the impact of lighting contrast and CCT relate to emotional state of **pleasure** in retail store environments between task-oriented and recreation-oriented shoppers?
3. What is the impact of lighting contrast and CCT on task-oriented and recreation-oriented shoppers' **behavioral intentions** in retail store environments?
4. What is the impact of lighting contrast and CCT on task-oriented and recreation-oriented shoppers' **lighting preference** in retail store environments?

Definition of Terms

- **AROUSAL.** Arousal is defined as the experience of energy mobilization (Russell & Barrett, 1999). It is the subjective state that consumers can experience as pleasant or unpleasant (Kaltcheva & Weitz, 2006).
- **PLEASURE.** Hedonic valence (pleasant or unpleasant) of the affective response to a stimulus. Stimuli that facilitate goal achievement are experienced as pleasant, whereas stimuli that impede goal achievement are experienced as unpleasant (Clore, Schwarz & Conway, 1994).
- **TASK-ORIENTED CONSUMERS.** Shoppers are those who derive satisfaction from task completion, the outcome of the shopping activity and like efficient shopping (Babin et al., 1994; Bellenger & Korgaonkar, 1980; Kaltcheva & Weitz, 2006).
- **RECREATION-ORIENTED CONSUMERS.** Shoppers are those whose satisfaction is derived from the rich experience and shopping activity itself and feel shopping is an enjoyable use of their time (Babin et al., 1994; Bellenger & Korgaonkar, 1980; Kaltcheva & Weitz, 2006). Light contrast is "the difference between surface are lighted (the focus or foreground) and

those that are left in comparative darkness (the surround or background)" (Gordon, 2003, 11).

- **UNIFORM LIGHTING.** A lighting condition characterized by a large portion of diffuse light and a small amount of focused light. Luminance is uniformly distributed throughout the room (Gordon, 2003; Steffy, 2002; Turner, 1998).
- **NON-UNIFORM LIGHTING.** A lighting condition characterized by a large portion of focused light (on an object or the foreground) and a small amount of diffuse light (the background), which presents a non-uniform luminance environment (Gordon, 2003; Steffy, 2002; Turner, 1998).
- **CORRELATED COLOR TEMPERATURE.** The color of light emitted from a light source, which can be measured in Kelvin (K). It is determined by the x and y location on a color diagram developed by the International Commission on Illumination (Gordon, 2003; Winchip, 2008).

CHAPTER 2 LITERATURE REVIEW

This chapter reviews the literatures containing studies that had investigated: 1) retail design and atmosphere, 2) lighting in retail stores, 3) light contrast and colors, and 4) shopping motivations. At the end of this chapter, the process of developing the theoretical framework that shoppers' emotional states, behavioral intentions (purchasing behaviors), and preferences are mediated by different motivational orientations (task-oriented vs. recreation-oriented) is introduced. The integration of theories regarding physical environment atmospheric and shoppers' motivational orientations is discussed.

Retail Design and Atmosphere

Mehrabian and Russell's (1974) model had been used in most researches as grounds to access impacts of store atmosphere on shopping behaviors. They proposed that environmental stimuli directly affect people's emotion, thereby influencing people's behaviors (approach-avoidance) in that environment (Mehrabian & Russell, 1974). Emotional responses include three variables, which are pleasure, arousal, and dominance (PAD).

Donovan and Rossiter (1982) were the pioneers who applied Mehrabian and Russell's (1974) PAD model to examine the environmental effects on shoppers' behaviors within the retail context. Their results suggested retail environment could induce customers' emotional responses that altered shopping intentions. However, they found pleasure and arousal were significantly related to approach-avoidance behaviors while dominance was not. Thus, dominance has not been given much attention in subsequent researches. Baker, Levy, & Grewal, (1992) furthered Donovan and Rossiter's (1982) finding. They found stores which employed different ambient and social levels evoked various emotional states and these responses did influence consumers' willingness to buy (Baker et al., 1992).

Marketing researchers have noticed the importance of environmental factors and the emotion as a mediator of customers' behaviors was investigated. The findings exhibited that the physical environment had an effect on the perceptions of prices (Grewal & Baker, 1994), values (Babin & Attaway, 2000; Grewal, Dhruv, Baker, Levy, & Voss, 2003), and service quality (Baker, Grewal, & Parasuraman, 1994), while it also influenced sales (Donovan & Rossiter, 1982; Milliman, 1986), time spent in a store (Donovan et al., 1994; Grossbart, Hampton, Rammohan, & Lapidus, 1990), willingness to buy (Baker et al., 1992), consumers' satisfaction (Bitner, 1992), and loyalty (Sherman, Mathur, & Smith, 1997).

While retailers have focused their marketing strategies on factors regarding products themselves, such as assortment, brands, prices, promotion, and service, physical surrounding where these products are consumed should be treated as a part of consumers' purchase (Buckley, 1991). The whole shopping environment played an important role in customers' satisfaction with the service offering (Bitner, 1990), and gave reasons to customers to choose which store to go to. Through controlling environmental attributes, retailers could create different levels of ambience that influenced shopping experiences. Consumers in a store with classical music being played and soft lighting which produce a high-ambient shopping environment had higher acceptance of prices than those in a low-ambient store (Grewal & Baker, 1994). They also conceived the store sold merchandise of quality and expect to receive attentive services (Baker et al., 1994). Retailers aim for long-term relationships with their patrons to maintain their businesses. Shopping value encourages repeated patronage. When products or services customers purchased are proven worthwhile to make the trips, those customers tend to return for business. Physical surrounding was said to have a substantial influence on customers' emotional states that could

raise consumers' perception of values and thereby achieve store loyalty (Babin & Attaway, 2000).

Studies also showed physical surrounding was a promising medium for retailers to encourage buying behaviors. A pleasant shopping environment encouraged shoppers to spend extra time and money (Donovan et al., 1994). Milliman (1986) investigated the effects of music on length of stay and money spent in the supermarket. The results indicated that "the pace of in-store traffic flow was significantly slower with the music of slow tempo than with the one of faster tempo" (Milliman, 1986, 89). "As customers move more slowly through the store, they tend to buy more. Conversely, as customers move more quickly through the store, they tend to purchase less" (Milliman, 1986, 90).

As mentioned before, many studies had showed that the emotional responses help to facilitate a series of shopping behaviors, yet there is inconsistency in arousal effects on behavior intentions. Some researchers suggested arousal had a positive effect on approach behavior (Baker et al., 1992; Donovan & Rossiter, 1982), spending intention (Sherman et al., 1997), and time spent in a store (Donovan & Rossiter, 1982; Sherman et al., 1997).

On the contrary, some found arousal negatively affected spending intention (Milliman, 1982) and time spent in a store (Smith & Curnow, 1966), while others found no effect (Smith & Curnow, 1966; Sweeney & Wyber, 2002). Finally, Kaltcheva and Weitz (2006) provided evidence proving that the effects of arousal on behaviors were moderated by shopping motives, and suggested store owners to determine arousal levels in their store environments according to shopping motivational orientation held by intended customers.

Lighting in Retail Stores

Kotler (1973-1974) introduced the term "atmospheric" to describe the conscious designing of space to create certain effects on buyers (Kotler 1973-1974, p. 40). He defined atmospherics

consist of visual (color, brightness, size, and shape), aural (volume and pitch), olfactory (scent and freshness), and tactile (softness, smoothness, and temperature) dimensions, and pointed out these sensory stimuli could be more crucial in making purchase decisions than products themselves (Kotler, 1973-1974). Empirical studies had provided understanding about contributions of a wide array of physical stimuli, including music (Alpert et al., 2005; Baker et al., 1992; Hui, Dubé, & Chebat, 1997; Mattila & Wirtz, 2001; Milliman, 1982), color (Belizzi, Crowley, & Hasty, 1983; Crowley, 1993), scent (Chebat & Michon, 2003; Mattila & Wirtz, 2001; Morrin & Ratneswhar, 2000; Spangenberg, Crowley, & Henderson, 1996), crowding (Eroglu, Machleit, & Barr, 2005; Hui & Bateson, 1991; Machleit, Kellaris & Eroglu, 1994), and lighting (Baker et al., 1992; Golden & Zimmerman, 1986; Magnum, 1998; Park, Pae & Meneely, 2010; Quartier et al., 2008).

Among all these elements, lighting has been proved to be a significant variable to create a desired store environment. Retail lighting is multi-functional and should help reflect a store's image, well present merchandises, and attract customers (Rea, 2000). Two studies had suggested that lighting had an influence on sales performance. Cuttle and Brandston (1995) studied the relationship between light and profit of two furniture stores. They employed an energy-efficient lighting solution and replaced filament spotlights with fluorescent and halogen lamps as ambient and accent lighting. Over a five-month period, the energy cost had fallen by 25% in both stores and sales had increased 35% in one store. Boyce, Lloyd, Ekhund, and Brandston (1996) investigated the effect of renewed lighting systems on sales of a supermarket. Customers completed questionnaires for the evaluation of their perception of the store before and after the improvement. The results showed that new lighting made the store a more pleasant space to shop and sales increased substantially.

Custers et al. (2010) conducted a field study with 57 fashion shops to assess the impact of light within a retail setting on perceived atmosphere. Brightness was found to be strongly related to coziness, tenseness, and detachment. A shop with brighter lighting was evaluated as less cozy, but tenser and more detached. In addition, more contrast lighting in a store was perceived as less tense. Glare and sparkle were perceived as livelier and less detached.

Areni and Kim (1994) were among the first to apply the Mehrabian-Russell (M-R) model to examine impact of lighting on purchase behaviors in a wine store. They conducted a field research, collected data by directly observing the participants' responses to the cellar under two different lighting conditions, soft and bright. The results of the test showed that products were examined and touched by customers more often under the bright lighting condition than the soft lighting condition. These implied that cognitive needs should be considered as important as emotional needs when using lighting as a tool to create atmosphere.

Based on the M-R model, Summers and Hebert (2001) further examined the influence of display lighting on consumers' approach-avoidance behaviors. They installed supplemental lighting in the ceilings and recorded customers' involvement with merchandise. The videotapes were reviewed and they found that under the brighter display lighting, consumers touched more products and stayed longer. The results showed that supplemental lighting treatments had a positive effect on consumers' interactions with displayed merchandise. They suggested that further studies are needed to evaluate the relationship between contrast threshold and approach behavior.

Park and Farr (2007) used the M-R model to test the effects of lighting on consumers' emotional states, behavioral intentions, and perceptions through a cross-culture comparison between Korean and American people. They used a 2 x 2 x 2 factorial design to assess the

mutual effects of color temperatures, color rendering properties, and cultural differences. Two color temperatures (3000K and 5000K) and two color rendering properties (75CRI and 95CRI) were adopted to generate four lighting scenarios. Participants were asked to experience the inside and outside of the store-like cubicle in which different lighting conditions were employed, and then complete a questionnaire for the purpose of evaluating their perception of arousal, pleasure, and approach-avoid intention. The finding showed that higher temperature (5000K) lighting was considered more arousing and approachable than lower temperature (3000K) one. Visual clarity was also rated higher with higher color temperature level. Besides, participants rated the lower temperature setting as more pleasant than the higher temperature setting. The lower color temperature lighting was also found to be more attractive than the higher one.

Many researches have established the importance of lighting as a mean to create a desired retail environment. While it has been agreed that lighting is an influential part of a built environment, how shoppers with different motivational orientations react to different lighting conditions in retail context has not yet been addressed. This study is necessary to clarifying the role of retail lighting, specifically lighting contrast and color, on store experiences of shoppers with different motivational orientations.

Lighting Contrast and Color of Light

Contrast is related to the visibility to an object that makes it noticeable among others and its background. In other words, contrast is "the difference between surfaces that are lighted (focus or foreground) and those that are left in comparative darkness (surrounding or background)" (Gordon, 2003, p.11). On the one hand, a higher contrast level may make a lighted target attractive to people, and can help build a room where people feel energetic. On the other hand, a space without contrast makes people feel listless and depressed (Gordon, 2003). To determine the light contrast level of a space, designers must identify the intended activity and

then create an agreeable stimulation to that space. Successful light contrast level may reinforce the activity and users' emotion, but inappropriate contrast level may hinder them (Gordon, 2003). A uniform environment is made up of mostly diffuse light and a small amount of focused light. Luminance is uniformly distributed throughout the room (Gordon, 2003; Steffy, 2002; Turner, 1998). This kind of environment is good for task performance, random circulation, and relocating work surfaces. However, it evokes emotion during a cloudy day. Non-uniform environment consists of mostly focused light and a small amount of diffuse light which can draw people's attention and build an environment with the properties of a sunny day (Gordon, 2003).

Color temperature, or correlated color temperature (CCT) describes the color of light emitted from a light source, which can be measured in Kelvin (K). Warm light appears to be of orange-yellow tone, with a CCT rating of 3500K or less. Neutral light with a white appearance has a CCT rating between 3500K and 4000K. In addition, cool light with a blue-white appearance has a CCT of 4000K or higher. Incandescent lamps are considered as warm light sources because they are located at the long end of the spectrum, with a yellowish color appearance. Fluorescent lamps are considered as cool white sources, because they concentrate on the short end of the spectrum, with a bluish appearance (Gordon, 2003).

Fleisher et al. (2001) examined the effect of intensity, color temperature, and ratio of direct and indirect light on emotions. They adopted the PAD theory (Mehrabian & Russell, 1974) to measure participants' emotional states. High intensity was found to be more pleasant compared with low intensity. Cool white light was found to be more arousing compared to warm white light. Furthermore, dominance was affected by intensity. High illuminance levels with an indirect component of 50% may lead to a feeling of dominance. Inversely, lower illuminance levels, especially with direct light, may cause a feeling of weakness.

Park et al. (2010) conducted a cross-culture study to explore the impact of different lighting conditions in a hotel guestroom on customers' preferences. The participants were recruited from two universities in the U.S. and South Korea respectively. The findings showed American participants and Korean ones reported different responses toward lighting preferences, arousal levels, and behavioral intentions. American participants preferred low intensity and warm color lighting condition whereas Korean participants preferred high intensity and warm color lighting one. Dim lighting was found more arousing for American participants, while Korean participants considered bright lighting more arousing. In addition, for American participants, dim lighting condition enhanced their hotel loyalty, while for Korean participants, bright lighting condition would lead to a longer stay in the hotel guestroom.

Van Erp (2008) conducted a research in an experimental room to explore the effect of lighting, intensity levels (low vs. high), color temperatures, (cool vs. warm) and spatial distributions (diffuse vs. directional), on perceived atmosphere. He proposed that atmosphere perception can be described with four items: coziness, liveliness, tenseness, and detachment. The results indicated atmosphere perception was affected by different lighting characteristics. Lighting of higher intensity and low CCT level was perceived as livelier, less cozy, and less tense. At the same brightness, directional light was considered as cozier, livelier, and less tense compared to diffuse light. Additionally, participants had clear preferences for particular levels of intensity, CCT levels, and spatial distributions. In general, high intensity, low CCT level, and directional light were preferred over their counterparts.

Perception of a lighted setting is the result of a brain's interpretation of physiological reactions to the lighted setting (Steffy, 2008). Several researches have discussed the effects of lighting on people's moods and emotions. Baron, Rea, and Daniels' (1992) study showed no

effects of luminous conditions on moods. However, it provided some indication that specific lighting conditions generated positive effects and influenced work-related behaviors.

McCloughan, Aspinall, and Webb (1999) manipulated illuminance levels and CCT levels to assess effects of lighting on participant's moods at two moments. One moment was within 5 minutes after first entering the room, the other was after at least 30 minutes in the room. An interaction effect of illuminance and CCT on anxiety and hostility was obtained, but aesthetic ratings showed no difference. Küller, Ballal, and Laike (2006) conducted a cross-cultural study and investigated the intensity on mood in an office setting. They found the mood was low when presented lighting was too dark or too bright. When the lighting was considered as just right, the mood reached its highest level. Yet these researches lack for integrated measurement scales, and this fact makes it difficult to make comparisons.

Flynn (1992) provided several design guidelines to establish specific perception toward a given space. He suggested uniform lighting can enhance the perception of spaciousness while non-uniform lighting is associated with an impression of pleasantness and privacy. Flynn, Spencer, Martyniuk, and Hendrick (1973) were among the first to investigate the effect of lighting conditions on users' impressions and judgments. In this study, 34 semantic differential scales were used to measure responses on six different lighting conditions. They identified five dimensions or "categories of impression", which included 1) evaluative (e.g., beautiful-ugly), 2) perceptual clarity (e.g., clear-hazy), 3) spaciousness (e.g., large-small), 4) spatial complexity (e.g., simple-complex), and 5) formality (e.g., rounded-angular) (Flynn et al., 1973). The follow-up examination showed three factors had significant difference. These factors were evaluative impressions, perceptual clarity, and spaciousness (Flynn et al., 1973). The evaluative impression is about the judgment of preference, and perceptual clarity and spaciousness describe the visual

perception of an environment. In the second part of the test, multi-dimensional scaling (MDS) was used and three dimensions were found to be useful for rating similarities and differences of lighting conditions. The three were peripheral-overhead, uniform-non-uniform, and bright-dim. Flynn (1992) summarized this work and later studies and suggested that lighting design can influence or modify at least six categories of human impressions, which were 1) perceptual clarity, 2) spaciousness, 3) relaxation and tension, 4) public versus private space, 5) pleasantness, and 6) spatial complexity (sometimes liveliness). Based on these impressions, several design guidelines were offered. Firstly, to achieve perceptual clarity, a designer has to apply 'higher luminance on horizontal plane and central part of the room along with usage of 'cool-tone' light sources. Secondly, an impression of spaciousness is elicited when stressing 'uniform lighting on vertical surfaces and ceiling'. As well, impressions of relaxation and pleasantness are influenced by 'non-uniform' wall lighting and usage of 'warm-tone' light sources. Finally, if a private impression is desired, the designer has to 'use non-uniform lighting away from the occupant zone'. Two or more impression factors can be used in one space. For example, relaxation and visual clarity together can help create a cozy and productive home office (Steffy, 2002).

Mehrabian (1976) suggested that level of arousal influences environmental preferences and varies by intensity of the environmental stimuli. According to Mehrabian(1976), lighting is a significant environmental stimulus which affects level of arousal. Mehrabian stated “brightly lit rooms are more arousing than dimly lit ones”.

Biner, Butler, Fischer, and Westergren (1989) found students' lighting preferences depended on the social situation as well as task demands. This finding was consistent with the arousal optimization theory. Individuals' preferred lighting levels are lower for situations involving a romantic partner than a platonic friend or a group of friends, whereas lighting level

preferences were higher for visual activities than non-visual activities (Biner et al., 1989). This suggested lighting levels influenced individuals' arousal levels, preferences, and visual ability. A base level of lighting sufficient for the specific activity resulted in positive attitudes.

Although many studies have investigated effects of lighting on emotions, the findings have showed small or no effects. However, no research has investigated effects of lighting contrast in a retail store, which is a key issue of lighting dimensions. Given that researches and knowledge regarding lighting impacts on shopping motivations are insufficient, the current study aims to provide a comprehensive and explicit explanation specifically in the area of light contrast and color.

Shoppers' Motivational Orientations

Back to 1940s, the reason underlying people's retail preferences and choices has gained its attention in marketing literatures (Blankertz, 1949-1950; Heidingsfield, 1949). Understanding and fulfilling customers' desire leads to store patronage (Jolson & Spath, 1973). It helps retailers to map out marketing strategies and an effective implementation of retailing mix, which helps a store to gain competitive advantages, ultimately raising profits and attain higher market share (Lazer & Kelley, 1961). Subsequent researches have suggested that consumers' shopping motivational orientations play a leading role in consumption models (Bellenger, Robertson & Greenberg, 1977; Darden & Ashton, 1974).

A variety of shopping motivations has been discussed in literature. In his earlier study, Stone (1954) investigated urban shopping orientations through interviews with adult female residents. Based on their responses, four types of shoppers had been discovered: economic consumers, personalizing consumers, ethical consumers, and apathetic consumers. Darden and Reynolds (1971) replicated Stone's research using a different methodology and the same results were obtained. Moschis (1976) applied the same rating measure as Darden and Reynolds, studied

shopping orientations of cosmetic buyers, and confirmed that different types of shoppers did have different shopping habits. He stated four types of shoppers, which were 1) store-loyal consumers, 2) compulsive and recreation consumers, 3) convenience consumers, and 4) price-bargain-conscious consumers. With regard to shopping orientations of grocery buyers, Appel's (1970) study introduced innovative shoppers and conventional shoppers. Having taken this one step further, Darden and Ashton (1975) suggested seven types of grocery shoppers, which were 1) quality-oriented shoppers, 2) fastidious shoppers, 3) convenience shoppers, 4) demanding shoppers, 5) trading stamp shoppers, 6) stamp avoider shoppers, and 7) apathetic shoppers. Similarly, Williams, Painter, and Nichols (1978) analyzed the shoppers' preference ratings of grocery stores and proposed four shopper types: low-price consumers, convenience consumers, involved consumers, and apathetic consumers.

Bellenger and Korgaonkar (1980) discussed two motivational typologies, recreational shoppers and functional economic shoppers, in term of the amount of time consumers are willing to spend on accomplishing shopping task. The results of the test indicated that, compared to economic shoppers, recreational shoppers contributed more impulsive purchase. On the contrary, economic shoppers minimized the time spending on shopping and wouldn't spend extra time in shopping trip as soon as their goal is accomplished. From the demographic view, recreational shoppers were mostly females and engage in social activity. They care more about store aesthetic than economic shoppers (Bellenger & Korgaonkar, 1980). Westbrook and Black (1985) reviewed and summarized the motivations for shopper typology. They stated that three essential factors elicited shopping behavior: to acquire desired product (product-oriented), to shop for reasons other than the need for product (experience-oriented), or a combination of product

acquisition and non-product-related fulfillment. They suggested that shopping motivation can be a competitive tool in managing customers' satisfaction with retailers.

While numbers of studies have examined shopper typology toward retail outcome, most did not look into specific shopping motivations that could have influenced consumers' emotions. Dawson, Bloch, and Ridgway (1990) linked the shopping motives to emotions by investigating their relationship using the M-R model (Mehrabian & Russell, 1974). They conducted a survey to identify shopping motivations and behavioral patterns of consumers in an open marketplace. Findings from this study indicated the shoppers' satisfaction with product-oriented motives changed with the temporary feeling of pleasure generated on site, while shoppers with experience-oriented motives were relatively uninfluenced. With no surprise, purchase behavior was found to be affected by shopping motives, while transient feeling didn't influence it, which is contradicted to the earlier findings (Hill & Gardner, 1987; Sherman & Smith, 1986). They suggested future research should be conducted with consideration of different types of retail settings and consumers.

Babin et al. (1994) developed a measure to assess consumers' perception of shopping value characterized by utilitarian and hedonic attributes. They argued shopping can produce either extrinsic rewards (e.g., monetary and prizes) or intrinsic rewards (e.g., playfulness and fun). In some cases, both rewards can be obtained together at one time. A utilitarian consumer behavior was described as task-oriented, meaning the value may rely on whether a purchase is complete in an efficient and timely manner. In contrast, hedonic consumers may find values when they feel entertained without achievement of planned purchase goals.

A recent examination of effects of shopping motivations on consumers' in-store behaviors by Kaltcheva and Weitz (2006) showed how shopping motives influence shoppers' emotional

states, which in turn influence retail related appraisals and outcomes. Participants in the study were asked to imagine they were visiting a store with a task-oriented or recreational motivation. Then they were presented with images of retail store environments that have different arousal levels. High arousal environment was with faster and louder music, higher complexity, warmer colors, and higher color saturation, in contrast, low arousal was presented in an opposite way. The study found that motivational orientation significantly moderated the effect of arousal on pleasantness (Kaltcheva & Weitz, 2006). Recreation-oriented consumers found high-arousal environments are pleasant because they can obtain rich shopping experiences. On the contrary, a low-arousal environment was pleasant for task-oriented consumers for they can complete their tasks efficiently. This research indicated that shopping motivation is an important consideration for retailers to determine the level of excitement in their stores. Retailers can infer their customers' major motivational orientations, and then use different design dimensions of their stores to influence their customers' arousal levels. The theme of their study provided a new direction for adapting the M-R model to investigate the connection between physical surroundings and consumers' affective responses. This suggested the motivational orientation, as a mediator, changes the relationship between arousal and pleasantness as well as subsequent shopping behaviors.

Conceptual Framework

Mehrabian and Russell's (1974) model (M-R model) and Kaltcheva and Weitz's (2006) framework served as this study's theoretical bases to examine the effects of different CCT and light contrasts on emotional states (arousal and pleasure), behavioral intentions (purchasing behavior), and lighting preferences by comparing two shopper typologies, task-oriented one and recreation-oriented one.

The M-R model postulates a stimulus-organism-response (S-O-R) process from an environmental psychology perspective. According to this model, physical environment (S) influences emotional states of individuals (O) to the environment, which affect their behaviors (R). Applying the S-O-R paradigm to a retail setting, the response represents the approach or avoidance behaviors of consumers (Donovan & Rossiter, 1982; Sherman & Smith, 1986; Sherman et al., 1997). The approach behavior is the intention to stay in, move toward, or explore an environment, while the avoidance one is the opposite responses (Bitner, 1992; Mehrabian & Russell, 1974). Mehrabian and Russell (1974) identified three underlying dimensions of emotional states to an environment- arousal, pleasure, and dominance (PAD) which in turn induce approach and avoidance behaviors of individuals. Pleasure is defined as the degree to which a person feels contented, happy, satisfied, or hopeful in a situation. Arousal exhibits the extent to which a person feels stimulated, excited, or active. Dominance presents the level to which a person feels in control, influential, or important. Basically, the hypothesis of the M-R model is that pleasure positively increases the possibility of one's approach behaviors, whereas moderate arousal level produces maximized positive attitudes toward physical approach. Subsequent researchers have found that while pleasantness and arousal showed significant influences on approach/avoidance behaviors, dominance did not have any significant effect in store environments. Therefore, researchers had focused on those two variables (Russell 1978; Russell & Pratt 1980; Ward & Russell, 1981). For theoretical reasons, the dominance dimension had usually been eliminated in studies that adopted the M-R model. A number of marketing studies had used the M-R model to investigate the relationship between physical in-store stimuli and retail outcomes (Babin & Attaway, 2000; Donovan et al., 1994; Kaltcheva & Weitz 2006; Summers & Hebert, 2001). However, there has been little research focusing on effects of lighting

as a retail environmental feature on consumers' emotional states and behaviors (Areni & Kim, 1994; Park & Farr, 2007; Summers & Hebert, 2001).

Until Kaltcheva and Weitz (2006) adapted the M-R model to study shopping motives. They proposed consumer motivational orientation moderates the relationship between arousal and pleasantness. Their framework showed environmental stimuli affect consumers' arousal, and which influences consumers' perception of whether the environment is pleasant or not. The degree of pleasantness determines the final outcome, consumers' shopping behaviors. For consumers with a recreational motivational orientation, arousal has a positive effect on pleasantness. Recreational consumers consider a high arousal environment as a pleasant space. In contrary to task-oriented consumers, they perceive that a low arousal environment is pleasant. They examined this framework by manipulating two visual elements (environment complexity and color) and one audient element (background music) to produce different levels of arousal in a retail environment. This research suggested that levels of excitement of their stores depend on shopping motivations of their targeted customers (Kaltcheva & Weitz, 2006). After a retailer determines the dominant motivational orientation of its customers, it should create a high-arousal environment for recreational consumers and a low-arousal environment for task-oriented consumers (Kaltcheva & Weitz, 2006).

Studies investigating the relationship between lighting attributes in a built environment and users' behaviors have relied on the M-R model. However, they did not pay much attention to how CCT and light contrast affect consumers' behaviors nor consider how motivational orientation moderates the relationship between arousal and pleasantness. The conceptual model (Figure 2-1) follows the S-O-R framework proposed by Mehrabian and Russell (1974) and extends the empirical work of Kaltcheva and Weitz (2006).

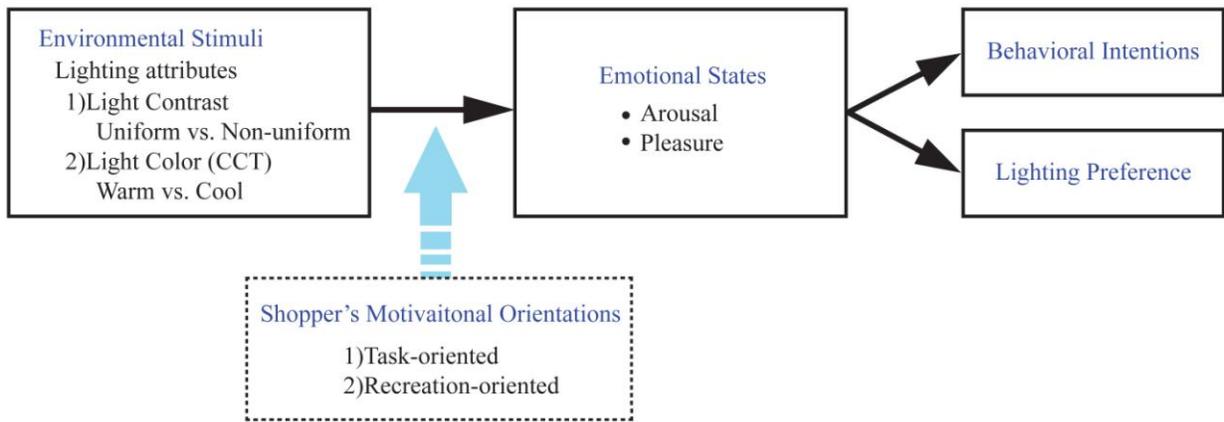


Figure 2-1. Theoretical framework

CHAPTER 3 RESEARCH METHODS

This chapter presents the research methods of this study. First, the study participants is presented. Then it explains the rationale for selecting experimental settings and lighting conditions. Finally, it addresses the study instruments, pilot study, data collection, and methods of data analysis.

Participants

The sample was recruited through the Behavioral Research Lab in the Marketing Department at the University of Florida. The behavioral lab research pool is administered in conjunction with the Principles of Marketing (MAR3023) and/or Statistics for Business Decisions (QMB3250) classes. Females between the ages of 18 and 35 were invited in this study. The participants were undergraduate business students who volunteered to participate in the studies in return for an extra credit point toward their course grade. The purpose of this study is to understand the differences of the lighting perceptions between task-oriented shoppers and recreation-oriented shoppers. Therefore, to minimize possible distractions that influence the outcome, the experimental setting was confined to a women's handbag store. Otherwise, one of the major independent variables of this study is the manipulation of shopping motivations. Before testing subjects' responses to store lighting, they were assigned to either task-oriented motivation or recreation-oriented motivation. Considering recreational shoppers tend to be mainly females (Bellenger & Korgaonkar, 1980) who are more likely to deem shopping as a recreational activity than men (Campbell, 2000), as a result, are more possible to adapt themselves to both scenarios (recreation-oriented motivation or task-oriented motivation) than men. Taken together, only female students were asked to participate in the study.

This study requires subjects' ability to perceive colors. To ensure that, all participants were asked whether they have any visual impairment or color deficiency that cannot be corrected by eyeglasses or contact lenses. Prior to contacting participants, the researcher applied for and was granted permission to engage in research with human subjects by the University's Institutional Review Board (Appendix A).

Experimental Settings

In order to understand how lighting affect shoppers' emotional states, behavioral intentions, and preferences in a retail store environment according to different shopping motives, computer rendered color images of four different lighting conditions in a theoretical handbag store environment were created to show the research participants. Although conducting real-world experiments provides a more nuanced assessment, simulated experiments are replications of actual situations which provide real-world information with more control for isolating variables (Groat & Wang, 2002; Sheppard, 1989; Sommer & Sommer, 1997). This research technique is designed to obtain measurable and reliable data in ways of showing drawings, photographs, videos, or models of spaces which is useful for "studying the subjective dimensions of human behavior in relation to built environment" (Groat & Wang, 2002, p.277). Also this approach is more affordable than constructing and modifying an existing store.

Several research studies have successfully used images as visual stimuli to derive information for actual environments. Hendrick, Martyniuk, Spencer, & Flynn, (1977) replicated the early work (Flynn et al. 1973) to test the comparability between subjects' perceptions of viewing slides of built environments and those of observing real spaces. Their results suggested two-dimensional images had the potential to represent actual scenes and semantic differential ratings were reliable measure of lit environments. In the later studies, computer generated images of spaces were accepted to be a reasonable replacement for lighting evaluation of interior

environments (Mahdavi & Eissa, 2002; Newsham, Richardson, Blanchet & Veitch, 2005). Rendered images, as a research tool, were efficient in evaluating the light quality features of real spaces in certain aspects: dim vs. bright, non-uniform vs. uniform, boring vs. interesting, private vs. public, dull vs. shiny, and cool vs. warm (Mahdavi & Eissa, 2002). Subjects' lighting preferences gained from rendered image were consistent with those gained from real scenes, which indicated rendered scenes of lit environments were perceived as similar as real spaces (Newsham et al., 2005). This method has widely used to study people's responses to luminous environment. For example, to investigate the differences among generations in evaluating living room lighting (Oi, 2005), different cultures' preference of hotel guestroom lighting (Park et al., 2010)

The size of the theoretical handbag store was approximately 139 m² (1,500 sq.ft.) with a rectangular floor plan which reflecting a typical medium-size store found along a street or in a mall (Karlen & Benya, 2004). Functional and aesthetic design elements, such as lighting solutions (Figure 3-1), color scheme, finish materials, and furniture arrangements were chosen in light of current trends. The objective is to minimize the discrepancy between created images and typical handbag stores design. This was done by conferring with lighting professionals, interior design professionals, and marketing professionals during production stage. Revit Architecture 2010 and 3ds Max 2010 were used to build the physical features, give textures, and place light sources. Mental-Ray was used to render the final images.

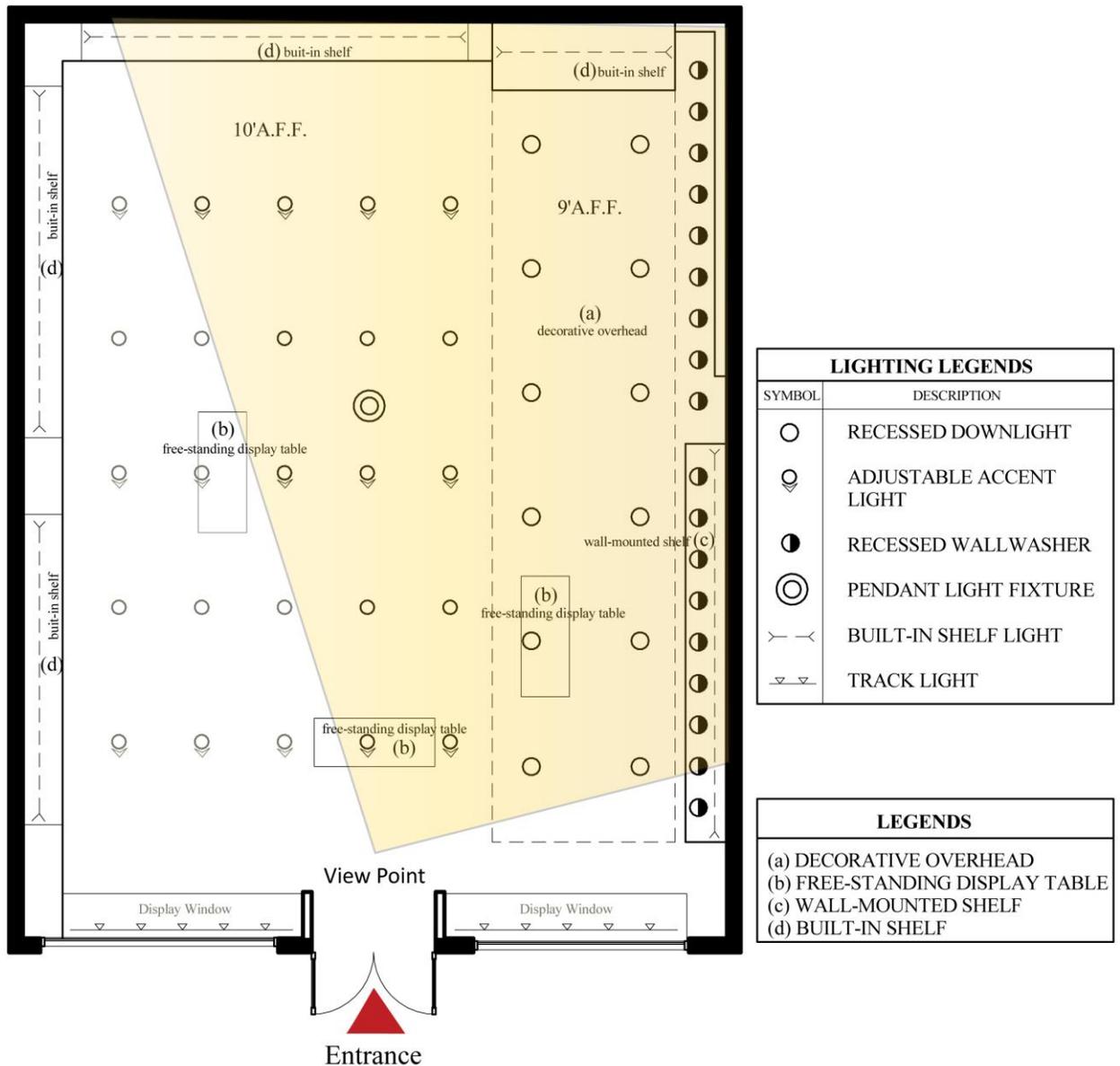


Figure 3-1. The lighting plan for an experimental handbag store (1500 sq.ft. / Not to Scale)

Lighting Conditions

The study's objective is to understand the effects of contrast levels and Correlated Color Temperature(CCT) of lighting on preferences. Light contrast is a term that describes " the luminance difference between the two parts of the field" (Turner, 1998, p.158). According to Gordon (2003), uniform lit environment consists of a large portion of diffuse light and a small

amount of focused light. Non-uniform lit environment can be achieved with a large portion of focused light and a small amount of diffuse light. CCT is the color of light emitted by a light source measured by Kelvin (K) (Gordon, 2003). The CIE Chromaticity diagram was applied to define the color of light. International Commission on Illumination developed the triangular-shaped diagram on which colors ranging from red to violet. A black curved line in the center of the triangle demonstrate the progression of light color. The color appearance progress from warm to cool (Winchip, 2008). Warm light has a CCT rating of 3500K or less, cool light has a CCT of 4000K or higher.

In this study's experimental setting, uniform lighting was created by turning down the focused light with an approximate luminance ratio of 8 to 1 to maintain a general lighting with even foot candle level. Non-uniform lit environment was achieved by emphasizing merchandise with spotlights and reducing the background lighting with an approximate luminance ratio of 50 to 1. For “warm” color light, the color temperature of the image approximated 3,000K and for “cool” color light, the color temperature approximated 5,000K was used. Day lighting was excluded from the study to focus solely on artificial lighting within the retail store environment. 3ds Max 2010 and Mental-Ray were used to generate the experimental lighting conditions.

Lighting conditions in this study were in accordance with the guidelines of retail design and lighting design handbooks (Diamond & Diamond, 2004; Karlen & Benya, 2004; Rea, 2000). Four computer-rendered images of handbag stores were created into the following lit scenes: 1) Scene one- warm color and high-contrast lighting, 2) Scene two- warm color and low-contrast lighting, 3) Scene three- cool color and high-contrast lighting, and 4) Scene four- cool color and low-contrast lighting. Figures 3-2 to 3-5 are four scenes presented in PowerPoint to collect data for this study.



Figure 3-2. Scene one (warm color and non-uniform lighting condition)



Figure 3-3. Scene two (warm color and uniform lighting condition)



Figure 3-4. Scene three (cool color and non-uniform lighting condition)



Figure 3-5. Scene four (cool color and uniform lighting condition)

Instruments

The data-collection instrument for this study was a self-administered questionnaire, presented in two parts. Part one (Appendix C) introduced two types of hypothetical shopping experience (visiting the store with a task-oriented or recreation-oriented motivation). Part two (Appendix D) included a series of questions accompanied three slides, which was used to understand the effects of lighting with designated CCT and light contrasts on emotional states, behavioral intentions, and preferences. Questions regarding the effectiveness of study manipulations, demographic and background information were asked in the following section.

For hypothetical shopping environments, the researcher developed two scenarios. Each was with either of the following visiting purposes: a) task-oriented shopper: looking for the handbag for their job interview, and b) recreation-oriented shopper: to relieve the sense of boredom. The descriptions of two scenarios are as follows:

Task-oriented situation:

Imagine that you have a very important job interview in New York city. You arrive one day before your interview to buy a professional-looking suit and a handbag for your job interview. You go to a nice shopping mall. Because you need to prepare for the tomorrow's job interview and have a good rest, all you want to do is to find one suit and one bag and leave.

Recreation-oriented situation:

It is a weekend. None of your friends are around. You find what's on TV too dull to watch. You feel very, very bored. So, you decide to visit some stores to relieve your boredom. You stop by a nice shopping mall. You find new stores just opened a few days ago. You are curious about these stores.

Participants were asked to imagine themselves under the situation and write down what they imaged in the scenario in order to reinforce their recognition of being in a task-oriented or a recreation-oriented shopping occasion. The principles were adapted from empirical study

concerning consumers' shopping motivations (Arnold & Reynolds, 2003; Babin et al., 1994; Kaltcheva & Weitz, 2006; Massara, Liue, & Melara, 2009).

Measures for emotional states (arousal and pleasure) were selected from Mehrabian and Russell's pleasure-arousal scales (Mehrabian & Russell, 1974; Russell & Snodgrass, 1987). Arousal was measured using four bipolar semantic differential scales: wide awake/sleepy, stimulated/ relaxed, excited/calm, and aroused/unaroused. The pleasure scale also used four bipolar semantic differentials: comfortable/uncomfortable, satisfied/dissatisfied, pleasant/unpleasant, and happy/unhappy. 7-point Likert scales were used to score the bipolar adjectives.

The behavioral intentions (purchasing behavior) were assessed using a 7-point Likert scales, score ranged from -3 as being "strongly disagree" to +3 as being "strongly agree". Participants were asked to provide their level of agreement with statements: "I definitely would shop in this store"; "I would be willing to buy merchandise at this store"; and "I would be willing to spend more time." These questions were adapted from previous store patronage intentions studies (Bitner, 1992; Singh, 2006; Wakefield & Baker, 1998).

Lighting preference was also measured using a 7-point Likert scales. Participants rated their preference for each of four lighting conditions respectively with the statement: "How much do you like this store lighting condition?" Moreover, participants were shown four lighting conditions in one slide to compare and select the most and least preferred handbag store lighting among four lighting conditions in a handbag store.

Manipulation checks were conducted using 7-point Likert scales ranging from -3 as being "strongly disagree" to +3 as being "strongly agree" to following statements: "be task-oriented"; "be recreation-oriented"; "try to get things done"; and " try to have fun" based on the shopping

motivation they were allocated. Lighting perception also measured by using a 7-point Likert scales with three bipolar semantic differential scales: warm/cool, bright/dim, and uniform/non-uniform. These questions were suggested by the previous consumers' shopping motivations study (Kaltcheva & Weitz, 2006; Westbrook & Black, 1985) and lighting study (Babin, Hardesty, & Suter, 2003; Flynn et al. 1973).

Demographic questions were asked to determine participants' background information and whether they were qualified for this study. Two multiple choice questions were provided. One was to answer "yes" or "no" about the statement: "Do you have a visual impairment (such as color blindness) that cannot be corrected by your glass or contact lenses?" Another was to choose either "a task-oriented shopper" or "a recreation-oriented shopper" regarding the following: "In general, do you consider yourself as?"

Pilot Study

A pilot study was conducted prior to the main study for the purpose of evaluating the study instrument and procedure as well as checking the experimental procedure's timing and sequencing. The test was administered to undergraduate students from the Principles of Marketing (MAR3023) and/or Statistics for Business Decisions (QMB3250) classes at the same location, Behavioral Research Lab in the Marketing Department at the University of Florida. A total of 30 females were recruited through four experimental sessions on February, 2011. Since each student was only allowed to participate each test once, there was no duplicate research participant in the main study. The pre-test included two types of stores, clothing store and handbag store, as experimental settings. Feedback from participants indicated that stores with non-uniform lighting were too dark to see the merchandise and warm lighting were too yellowish. Other comments showed the format of the questionnaire was confusing and time consuming and the handbag store setting was more convincing than the clothing store. Based on

those suggestions and collected data from the pre-test, the researcher modified the lighting conditions, reformatted the questions, and included only handbag store environmental setting in the major study. The data collected from the pilot study were not included in the main study.

Data Collection

The main experiment was conducted at Behavioral Research Lab in the Marketing Department at the University of Florida in the month of April, 2011. The study was posted on CB-Central, a website for scheduling experimental sessions and tracking research participation, and students signed up through the interface (<http://bear.warrington.ufl.edu/experiments/>).

Behavioral Research Lab

Located in the Bryan Hall at UF, the behavioral lab was a neutral designed room of 810 square feet (75 m²), 30' by 27' (9.1m by 8.2m) size. The concrete wall and ceiling were painted in white and the floor was covered with gray carpet. There are two sources of lighting in the behavioral lab. The first is daylight from two windows on the left side of the room (Figure 3-6). The second is down lighting from linear pendant light fixtures. To prevent lighting effects from disturbing visual presentation, all lighting were turned off and the natural light was blocked out by blind to maintain the minimum general lighting (20 fc on each desk) throughout sessions. The room consisted of 24 stations and each contained a PC and 15 inch flat-screen monitor (Figure 3-7). Only 17 stations were used to conduct the research in order to minimized the influences of daylight (Figure 3-8). The size of each carrel was about 3'4" by 2'8" (1m by 0.8m) which allowed both pencil-and-paper surveys and physical stimulus materials to be performed simultaneously. Carrels also had a noise-dampening construction that minimized cross-participant interference. An experimenter station was positioned on a riser at the back of the room. The researcher monitored each participant's workstation through central computer system.



Figure 3-6. View of the behavioral lab from the back



Figure 3-7. View of the research participants' station

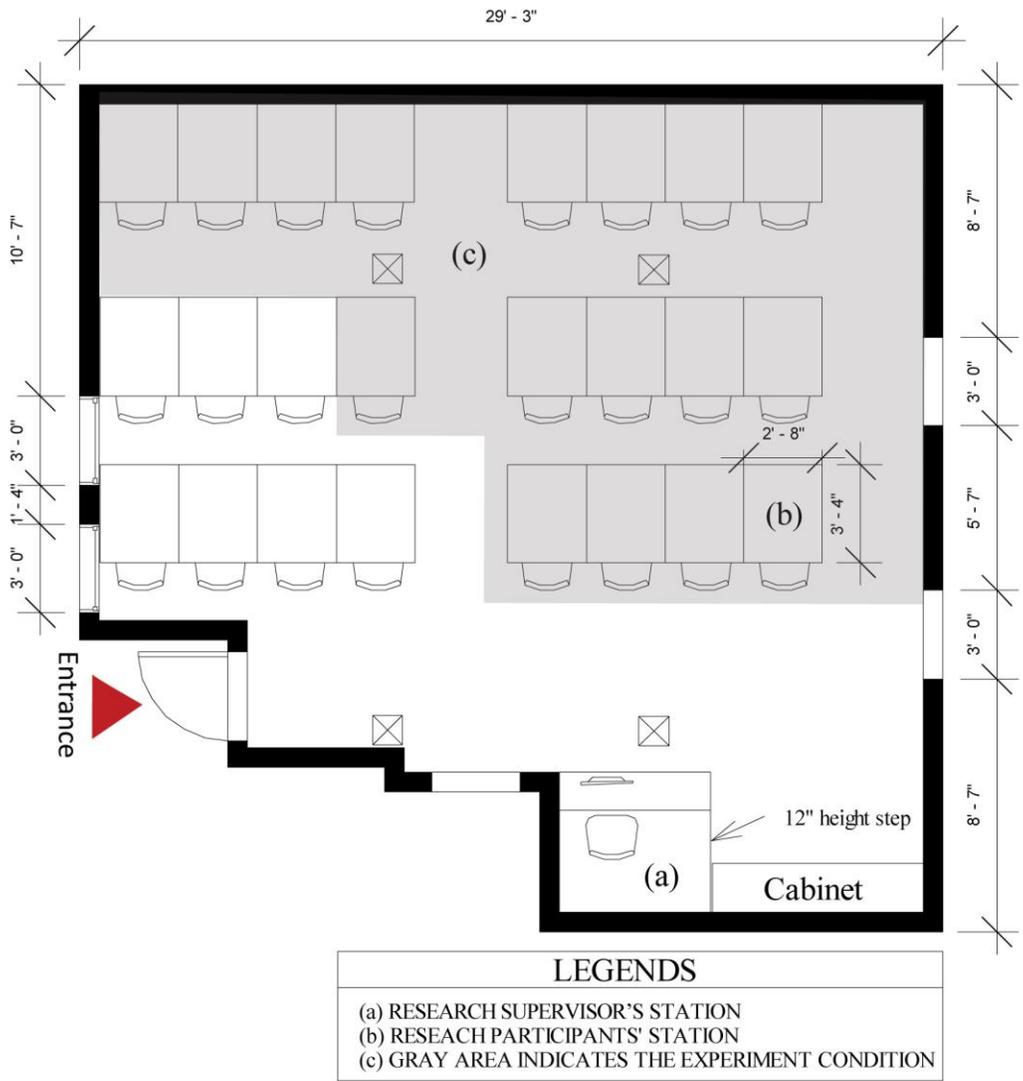


Figure 3-8. Behavioral Research Lab floor plan

Procedure

Prior to the start of each session, the experimental packages for each station were reset and alternated in order to randomize the data collection. All computer screens were adjusted to ensure each participant watched their screens with the same color contrast and from the same angle. Upon arriving at the lab, participants signed up the attendant sheet then were randomly assigned to one station. Based on randomization, 104 task-oriented assignments and 104 recreation-oriented assignments were distributed respectively. Each participant was randomly

assigned to view only one of four lighting conditions of handbag stores. The computers remained locked before the procedure of the experiment was explained to participants. The subjects read the scenario on the first page and completed the questionnaire which was organized to answer each page of questions for each lighting condition. Each subject was randomly viewed a visual experimental package which included three slides: the first and second slide presented single lighting condition, and the third slide presented four lighting conditions altogether. The average length of time participants spent in the behavioral lab was 15 minutes with a range from 10 to 30 minutes.

Data Analysis

Raw data coding and cleaning were performed before fulfilling data processing task . Prior to inferential analyses, Cronbach's alpha test was performed on three dependent variables including behavioral intentions, arousal, and pleasure. Descriptive statistics summarized the collected data and described the characteristics of each variable. A 2 (CCT) \times 2 (light contrasts) \times 2 (motivational orientations) mixed between-subject factorial experimental design was then utilized for four evaluation dimensions, including arousal, pleasure, behavioral intentions, and preferences. For the most and least preferred lighting out of four lighting conditions associated with two different CCT and light contrasts based on two different motivational orientations was analyzed by using the Chi-square analysis. Furthermore, for the preference of each lighting condition, a 2 (CCT) \times 2 (light contrasts) \times 2 (motivational orientations) mixed between-subject analysis of variance (ANOVA) was also conducted to test the effectiveness of the manipulations of lighting perception and motivational orientations. The final set of analyses explored sources of the most and least lighting preferences through a content analysis of the open-ended responses. A p-value of 0.05 was used to determine statistical significance.

CHAPTER 4 RESULTS

This chapter presents findings from the data analysis of the study. First, it begins with an introduction of the characteristics of the participants and the results of the reliability test. The second section presents findings on emotional states of arousal and pleasure, behavioral intentions, and lighting preference. Final section is manipulation checks for testing the effectiveness of lighting perceptions and motivational orientations.

Characteristics of the Participants

A total of 208 women participated in the study. The participants were undergraduate students between the ages of 18 and 35 and recruited through the Behavioral Research Lab in the Marketing Department at the University of Florida. The Behavioral Lab research pool is administered in conjunction with the Principles of Marketing (MAR3023) and/or Statistics for Business Decisions (QMB3250) classes. Participants were volunteered to participate in the study and offered an extra credit point toward their course grade.

All participants were first asked to adopt either a task-oriented motivational orientation or a recreation-oriented motivational orientation. In order to obtain even number for comparison of two motivational orientations, 104 task-oriented motivational orientation (50%) and 104 recreation-oriented motivational orientation (50%) were assigned respectively. Each participant was randomly assigned to view one of four lighting conditions. Therefore, among 104 participants assigned to task-oriented motivation, each lighting condition was viewed by 26 task-oriented participants. Likewise, among 104 participants assigned to recreation-oriented motivation, each lighting condition was viewed by 26 recreation-oriented participants.

In the demographic questions, participants were asked whether they consider themselves as task-oriented or recreation-oriented shopper. The results showed the 208 subjects comprised 78

who considered themselves as task-oriented shoppers (37.5%) and 130 who considered themselves as recreational shoppers (62.5%). All participants met the requirement because they listed themselves not visual-impaired. Table 4-1 presents the frequency and percentage distributions for the participant demographic characteristics.

Table 4-1. Characteristics of the participants

Characteristics	<i>n</i>	%
Recreation-oriented motivational orientation assigned	104	50
Task-oriented motivational orientation assigned	104	50
Total	208	100
Task-oriented shoppers	78	37.5
Recreation-oriented shoppers	130	62.5
Total	208	100
Visual-impaired	0	0
Not visual-impaired	208	100
Total	208	100

Reliability of Measures

The Cronbach's alpha test was performed to verify the measuring variables: behavioral intentions (purchasing behavior), arousal and pleasure. The acceptable range limit recommended by George and Mallery (2003, p.231) is as follows: > .9 - Excellent, > .8 - Good, > .7 - Acceptable, > .6 - Questionable, > .5 - Poor, and < .5 - Unacceptable". To measure the participants' behavioral intentions (purchasing behavior), the levels of agreement with three statements were used: I definitely would shop in this store; I would be willing to buy merchandise at this store; I would be willing to spend more time. The internal consistency of the scale was 0.93. The participants' states of arousal were measured using four bipolar adjectives: wide awake/sleepy, relaxed/stimulated, excited/calm and unaroused/aroused. The reliability value was 0.78. The participants' state of pleasure in the handbag store was also measured using

four bipolar adjectives: uncomfortable/comfortable, satisfied/dissatisfied, pleasant/unpleasant and unhappy/happy with a reliability of 0.88.

Arousal States

A 2 x 2 x 2 factorial design was used to assess lighting arousal states for the interaction effects of shopping orientations by CCT and by light contrast. Table 4-2 shows the mean and standard deviation scores. As can be seen in Table 4-3, no three-way interaction was obtained. However, a two-way interactions, CCT by light contrast, approached significance ($F(1, 200) = 3.56, p = .061$). All participants rated cool/uniform lighting ($M = 5.16, SD = .96$) as more arousing than warm/non-uniform lighting ($M = 3.37, SD = 1.32$). There were two significant main effect, namely CCT ($F(1, 200) = 15.99, p < .001$) and light contrast ($F(1, 200) = 50.27, p < .001$). For CCT, all participants perceived cool lighting ($M = 4.44, SD = 1.30$) as more arousing than the warm lighting ($M = 3.79, SD = 1.30$). Regarding light contrast, all participants perceived uniform lighting condition ($M = 4.69, SD = 1.16$) as more arousing than non-uniform lighting condition ($M = 3.54, SD = 1.26$).

Table 4-2. Mean and standard deviation (SD) scores for subjects' lighting evaluation of arousal states

Source	<i>n</i>	<i>Mean</i> *	<i>SD</i>	<i>p-value</i>
Motivational Orientation (MO)				.645
Task-oriented	104	4.15	1.41	
Recreation-oriented	104	4.08	1.26	
Correlated Color Temperatures (CCT)				.000
Warm	104	3.79	1.30	
Cool	104	4.44	1.30	
Light Contrast				.000
Non-uniform	104	3.54	1.26	
Uniform	104	4.69	1.16	
MO by CCT				.523
Task-oriented x Warm	52	3.88	1.29	
Task-oriented x Cool	52	4.42	1.49	
Recreation-oriented x Warm	52	3.70	1.32	
Recreation-oriented x Cool	52	4.45	1.09	

Table 4-2. Continued

Source	<i>n</i>	<i>Mean*</i>	<i>SD</i>	<i>p-value</i>
MO by Light Contrast				.432
Task-oriented x Non-uniform	52	3.51	1.38	
Task-oriented x Uniform	52	4.79	1.14	
Recreation-oriented x Non-uniform	52	3.57	1.14	
Recreation-oriented x Uniform	52	4.59	1.17	
CCT by Light Contrast				.061
Warm x Non-uniform	52	3.37	1.32	
Warm x Uniform	52	4.21	1.15	
Cool x Non-uniform	52	3.71	1.18	
Cool x Uniform	52	5.16	.96	
MO by CCT by Light Contrast				.350
Task-oriented x Warm x Non-uniform	26	3.47	1.38	
Task-oriented x Warm x Uniform	26	4.29	1.07	
Task-oriented x Cool x Non-uniform	26	3.56	1.40	
Task-oriented x Cool x Uniform	26	5.29	1.00	
Recreation-oriented x Warm x Non-uniform	26	3.27	1.27	
Recreation-oriented x Warm x Uniform	26	4.13	1.24	
Recreation-oriented x Cool x Non-uniform	26	3.87	.92	
Recreation-oriented x Cool x Uniform	26	5.04	.92	

*7 point Likert-type scale: 1 = Strongly Disagree and 7 = Strongly Agree

Table 4-3. Analysis of variance for subjects' lighting evaluation of arousal states

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p-value</i>
Motivational Orientation (MO)	1	.289	0.289	.212	.645
Correlated Color Temperatures (CCT)	1	21.743	21.743	15.987	.000 ***
Light Contrast	1	68.368	68.368	50.268	.000 ***
MO x CCT	1	.556	.556	.409	.523
MO x Light Contrast	1	.844	.844	.621	.432
CCT x Light Contrast	1	4.846	4.846	3.563	.061
MO x CCT x Light Contrast	1	1.193	1.193	.877	.350
Error	200	272.012	1.360		
Total	208	3890.563			

p* < .05. *p* < .01. ****p* < .001

Pleasure States

A 2 x 2 x 2 factorial design was used to assess lighting pleasure states for the interaction effects of motivational orientations by CCT by light contrast. Table 4-4 shows the mean and standard deviation scores. As can be seen in Table 4-5, no significant two-way or three-way interactions were obtained. The only one significant main effect on pleasure was light contrast (*F*

(1, 200) = 10.49, $p = .001$). All participants perceived uniform lighting condition ($M = 5.11$, $SD = 1.29$) as more pleasant than the non-uniform lighting ($M = 4.52$, $SD = 1.33$).

Table 4-4. Mean and standard deviation (SD) scores for subjects' lighting evaluation of pleasure states

Source	<i>n</i>	<i>Mean*</i>	<i>SD</i>	<i>p-value</i>
Motivational Orientation (MO)				.647
Task-oriented	104	4.86	1.41	
Recreation-oriented	104	4.77	1.27	
Correlated Color Temperatures (CCT)				.906
Warm	104	4.83	1.30	
Cool	104	4.81	1.38	
Light Contrast				.001
Non-uniform	104	4.52	1.33	
Uniform	104	5.11	1.29	
MO by CCT				.865
Task-oriented x Warm	52	4.88	1.28	
Task-oriented x Cool	52	4.83	1.54	
Recreation-oriented x Warm	52	4.77	1.33	
Recreation-oriented x Cool	52	4.78	1.21	
MO by Light Contrast				.196
Task-oriented x Non-uniform	52	4.44	1.44	
Task-oriented x Uniform	52	5.27	1.27	
Recreation-oriented x Non-uniform	52	4.60	1.22	
Recreation-oriented x Uniform	52	4.95	1.31	
CCT by Light Contrast				.927
Warm x Non-uniform	52	4.54	1.26	
Warm x Uniform	52	5.12	1.30	
Cool x Non-uniform	52	4.50	1.41	
Cool x Uniform	52	5.11	1.29	
MO by CCT by Light Contrast				.803
Task-oriented x Warm x Non-uniform	26	4.50	1.25	
Task-oriented x Warm x Uniform	26	5.27	1.22	
Task-oriented x Cool x Non-uniform	26	4.38	1.63	
Task-oriented x Cool x Uniform	26	5.28	1.33	
Recreation-oriented x Warm x Non-uniform	26	4.58	1.29	
Recreation-oriented x Warm x Uniform	26	4.96	1.38	
Recreation-oriented x Cool x Non-uniform	26	4.62	.17	
Recreation-oriented x Cool x Uniform	26	4.94	.26	

*7 point Likert-type scale: 1 = Strongly Disagree and 7 = Strongly Agree

Table 4-5. Analysis of variance for subjects' lighting evaluation of pleasure states

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p-value</i>
Motivational Orientation (MO)	1	.368	.368	.211	.647
Correlated Color Temperatures (CCT)	1	.024	.024	.014	.906
Light Contrast	1	18.332	18.332	10.492	.001 **
MO x CCT	1	.051	.051	.029	.865
MO x Light Contrast	1	2.945	2.945	1.686	.196
CCT x Light Contrast	1	.015	.015	.008	.927
MO x CCT x Light Contrast	1	.108	.108	.062	.803
Error	200	349.435	1.747		
Total	208	5195.813			

* $p < .05$. ** $p < .01$. *** $p < .001$

Behavioral Intentions (Purchasing Behavior)

A 2 x 2 x 2 factorial design was conducted to assess behavioral intentions for the interaction effects of motivational orientations by CCT by light contrast. Table 4-6 shows the mean and standard deviation scores. The results of the ANOVA analysis (Table 4-7) revealed that there was no three-way interaction or main effect. Only a significant two-way interaction, motivational orientations by light contrast, was obtained with a calculated $F(1, 200) = 7.37, p = .007$. As illustrated in Figure 4-1, participants were assigned to task-oriented motivation condition ($M = 5.41, SD = 1.64$) had a more positive evaluation toward uniform lighting on their behavioral intentions, while participants were assigned to the recreation-oriented motivation condition ($M = 4.81, SD = 1.48$) considered non-uniform lighting had more positive influence on their behavioral intentions.

Table 4-6. Mean and standard deviation (SD) scores for subjects' lighting evaluation of behavioral intention (purchasing behavior)

Source	<i>n</i>	<i>Mean*</i>	<i>SD</i>	<i>p-value</i>
Motivational Orientation (MO)				.236
Task-oriented	104	4.94	1.74	
Recreation-oriented	104	4.67	1.56	
Correlated Color Temperatures (CCT)				.888
Warm	104	4.79	1.63	
Cool	104	4.82	1.69	

Table 4-6. Continued

Source	<i>n</i>	<i>Mean*</i>	<i>SD</i>	<i>p-value</i>
Light Contrast				.143
Non-uniform	104	4.97	1.69	
Uniform	104	4.63	1.61	
MO by CCT				.631
Task-oriented x Warm	52	4.87	1.68	
Task-oriented x Cool	52	5.01	1.82	
Recreation-oriented x Warm	52	4.71	1.59	
Recreation-oriented x Cool	52	4.63	1.55	
MO by Light Contrast				.007
Task-oriented x Non-uniform	52	4.46	1.73	
Task-oriented x Uniform	52	5.41	1.64	
Recreation-oriented x Non-uniform	52	4.81	1.48	
Recreation-oriented x Uniform	52	4.53	1.64	
CCT by Light Contrast				.932
Warm x Non-uniform	52	4.63	1.52	
Warm x Uniform	52	4.94	1.73	
Cool x Non-uniform	52	4.64	1.71	
Cool x Uniform	52	4.99	1.66	
MO by CCT by Light Contrast				.324
Task-oriented x Warm x Non-uniform	26	4.51	1.67	
Task-oriented x Warm x Uniform	26	5.22	1.64	
Task-oriented x Cool x Non-uniform	26	4.41	1.82	
Task-oriented x Cool x Uniform	26	5.60	1.64	
Recreation-oriented x Warm x Non-uniform	26	4.74	1.38	
Recreation-oriented x Warm x Uniform	26	4.67	1.80	
Recreation-oriented x Cool x Non-uniform	26	4.87	1.60	
Recreation-oriented x Cool x Uniform	26	4.38	1.48	

*7 point Likert-type scale: 1 = Strongly Disagree and 7 = Strongly Agree

Table 4-7. Analysis of variance for subjects' lighting evaluation of behavioral intentions (purchasing behavior)

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p-value</i>
Motivational Orientation (MO)	1	3.769	3.769	1.410	.236
Color Temperatures (CCT)	1	.053	.053	.020	.888
Light Contrast	1	5.778	5.778	2.162	.143
MO x CCT	1	.618	.616	.231	.631
MO x Light Contrast	1	19.692	19.692	7.367	.007 **
CCT x Light Contrast	1	.019	.019	.007	.932
MO x CCT x Light Contrast	1	2.618	2.618	.979	.324
Error	200	534.573	2.673		
Total	208	5362.000			

p* < .05. *p* < .01. ****p* < .001

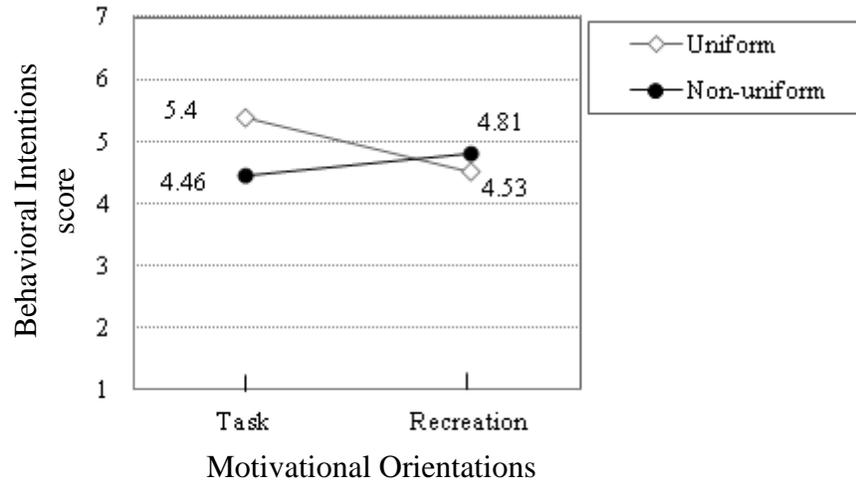


Figure 4-1. Interaction effect for motivational orientations by light contrast on behavioral intentions (purchasing behavior)

Lighting Preference

In order to investigate lighting preference, two different statistical analyses were performed based on the types of questions. First, participants were asked to rate their preference by showing independent lighting conditions. A 2 x 2 x 2 factorial design was used to assess lighting preference for the interaction effects of motivational orientations by CCT by light contrast. Table 4-8 shows the mean and standard deviation scores. No two-way or three-way interactions were obtained. As can be seen in Table 4-9, one significant main effect on preference was light contrast ($F(1, 200) = 18.97, p < .001$). Regardless motivational conditions, all participants evaluated uniform lighting condition ($M = 4.93, SD = 1.66$) as their most preferred lighting than the non-uniform lighting ($M = 3.88, SD = 1.81$).

Table 4-8. Mean and standard deviation (SD) scores for subjects' lighting evaluation of lighting preferences

Source	<i>n</i>	<i>Mean*</i>	<i>SD</i>	<i>p-value</i>
Motivational Orientation (MO)				.693
Task-oriented	104	4.45	1.75	
Recreation-oriented	104	4.36	1.87	
Correlated Color Temperatures (CCT)				.527
Warm	104	4.33	1.81	
Cool	104	4.48	1.81	
Light Contrast				.000
Non-uniform	104	3.88	1.81	
Uniform	104	4.93	1.66	
MO by CCT				.477
Task-oriented x Warm	52	4.46	1.61	
Task-oriented x Cool	52	4.44	1.89	
Recreation-oriented x Warm	52	4.19	2.00	
Recreation-oriented x Cool	52	4.52	1.73	
MO by Light Contrast				.527
Task-oriented x Non-uniform	52	3.58	1.81	
Task-oriented x Uniform	52	5.06	1.47	
Recreation-oriented x Non-uniform	52	3.90	1.82	
Recreation-oriented x Uniform	52	4.81	1.83	
CCT by Light Contrast				.812
Warm x Non-uniform	52	3.83	1.86	
Warm x Uniform	52	4.83	1.64	
Cool x Non-uniform	52	3.92	1.77	
Cool x Uniform	52	5.04	1.68	
MO by CCT by Light Contrast				1.000
Task-oriented x Warm x Non-uniform	26	3.88	1.68	
Task-oriented x Warm x Uniform	26	5.04	1.34	
Task-oriented x Cool x Non-uniform	26	3.81	1.96	
Task-oriented x Cool x Uniform	26	5.08	1.61	
Recreation-oriented x Warm x Non-uniform	26	3.77	2.05	
Recreation-oriented x Warm x Uniform	26	4.62	1.90	
Recreation-oriented x Cool x Non-uniform	26	4.04	1.59	
Recreation-oriented x Cool x Uniform	26	5.00	1.77	

*7 point Likert-type scale: 1 = Strongly Disagree and 7 = Strongly Agree

Table 4-9. Analysis of variance for subjects' lighting preference

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p-value</i>
Motivational Orientation (MO)	1	.481	.481	.157	.693
Correlated Color Temperatures (CCT)	1	1.231	1.231	.401	.527
Light Contrast	1	58.173	58.173	18.973	.000 ***
MO x CCT	1	1.558	1.558	.508	.477
MO x Light Contrast	1	1.231	1.231	.401	.527
CCT x Light Contrast	1	.173	.173	.056	.812
MO x CCT x Light Contrast	1	.000	.000	.000	1.000
Error	200	613.231	3.066		
Total	208	4710.000			

*p < .05. **p < .01. ***p < .001

Second, four different lighting conditions were simultaneously showed to participants in one slide view in order to select the most and least preferred lighting among four lighting condition. The Chi-square analysis was utilized and the results of the analysis are shown in Table 4-10.

Table 4-10. Results of the chi-square analysis for the subjects' lighting preference

	Lighting condition A (warm / non-uniform)	Lighting condition B (warm / uniform)	Lighting condition C (cool / non-uniform)	Lighting condition D (cool / uniform)	Total
The Most Preferred Lighting					
Task	8 (3.8%)	40 (19.2%)	10 (4.8%)	46 (22.1%)	104 (50.0%)
Recreation	15 (7.2%)	40 (19.2%)	18 (8.7%)	31 (14.9%)	104 (50.0%)
Total	23 (11.1%)	80 (38.5%)	28 (13.5%)	77 (37.0%)	208 (100%)
χ^2					7.338
<i>p-value</i>					.062
The Least Preferred Lighting					
Task	55 (26.4%)	10 (4.8%)	27 (13.0%)	12 (5.8%)	104 (50.0%)
Recreation	62 (29.8%)	10 (4.8%)	7 (3.4%)	25 (12.0%)	104 (50.0%)
Total	117 (56.3%)	20 (9.6%)	34 (16.3%)	37 (17.8%)	208 (100%)
χ^2					16.751
<i>p-value</i>					.001 **

**p < .01

For the most preferred lighting condition as illustrated in Figure 4-2, there was a statistical significance ($\chi^2 = 7.34, p = .062$). Although the *p-value* was at 0.06 that was approaching significance of 0.5, it is important to mention that. Participants in task-oriented motivation

condition evaluated Lighting Condition D (cool /uniform) as their most preferred lighting (22.1%) and Lighting Condition B (warm/uniform) as their second preferred one (19.2%). Participants in the recreation-oriented motivation condition selected Lighting Condition B (warm/uniform) as their most preferred lighting (19.2%) and Lighting Condition D (cool/uniform) as their second preferred one (14.9%). Comparing two motivational conditions, a greater proportion of participants in the task-oriented motivation condition (22.1%) evaluated Lighting Condition D (cool /uniform) as their most preferred lighting than did participants in the recreation-oriented motivation condition (14.9%). However, a greater proportion of participants in the task-oriented motivation condition (8.7%) selected Lighting Condition A (warm /non-uniform) as their most preferred lighting than did participants in the recreation-oriented motivation condition (4.8%). Also, a higher percentage of participants in the recreation-oriented motivation condition (7.2%) selected Lighting Condition C (cool /non-uniform) as their preferred lighting than did participants in the task-oriented motivation condition (3.8%).

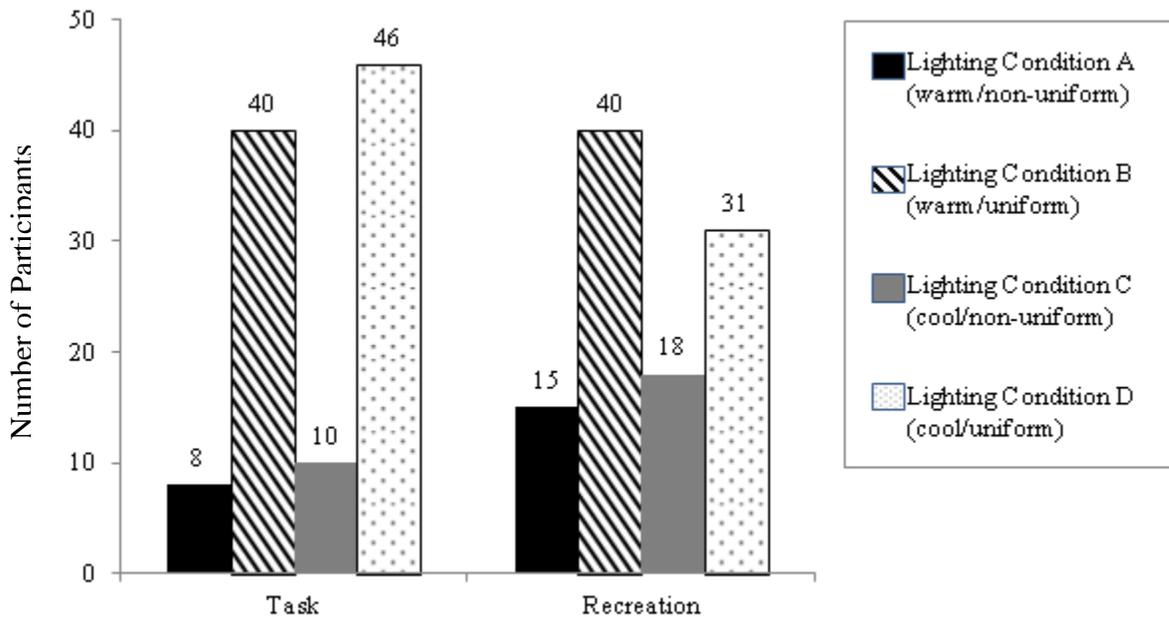


Figure 4-2. A graph of the subjects' most preferred handbag store lighting

For the least preferred lighting condition as illustrated in Figure 4-3, motivational orientation shows statistical difference between task-oriented and recreation-oriented shoppers ($\chi^2 = 16.75, p = .001$). Participants in task-oriented motivation condition evaluated Lighting Condition A (warm /non-uniform) as their least preferred lighting (26.4%) and Lighting Condition C (cool/non-uniform) as their secondly least preferred one (13.0%). Participants in the recreation-oriented motivation condition selected Lighting Condition A (warm/non-uniform) as their most preferred lighting (29.8%) and Lighting Condition D (cool/uniform) as their second preferred one (12.0%). Comparing two motivational conditions, a greater proportion of participants in the task-oriented motivation condition (13.0%) evaluated Lighting Condition C (cool /uniform) as their least preferred lighting than did participants in the recreation-oriented motivation condition (3.4%). However, a greater proportion of participants in the recreation-oriented motivation condition (12.0%) selected Lighting Condition D (cool /non-uniform) as their least preferred lighting than did participants in the task-oriented motivation condition (5.8%).

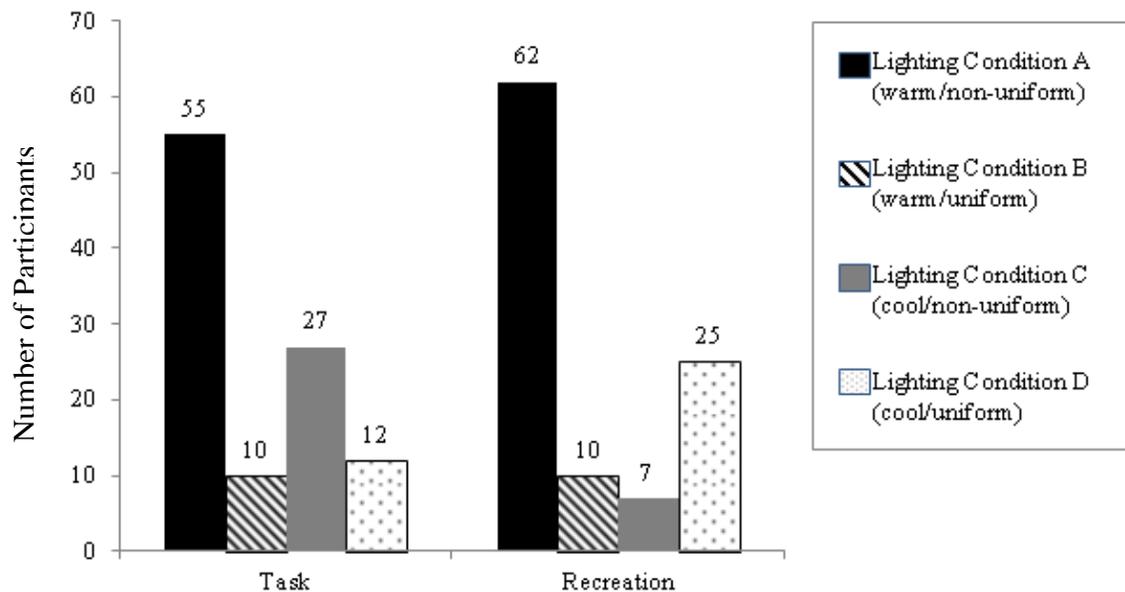


Figure 4-3. A graph of the subjects' least preferred handbag store lighting

Manipulation Checks

A 2 (CCT) \times 2 (light contrast) \times 2 (motivational orientations) mixed between subjects ANOVA was conducted to test the effectiveness of the manipulations. CCT (warm/cool), light contrast (uniform/non-uniform), and motivational orientations (task-oriented/recreation-oriented) were measured in order to ascertain if they were sufficiently controlled.

Correlated Color Temperatures (CCT)

The CCT manipulation had a significant main effect on CCT manipulation check ($F(1, 200) = 25.98, p < .001$), while there was no other significant main or interaction effects on the CCT manipulation check (Appendix E). All participants perceived cool color lighting condition as cool ($M = 4.38, SD = 2.10$) while rated warm color lighting as warm ($M = 2.98, SD = 1.83$).

Light Contrast - Uniform vs. Non-uniform

One independent variable was measured in order to ascertain if light contrast was sufficiently controlled. One significant main effect on uniform/non-uniform manipulation check ($F(1, 200) = 16.45, p < .001$), and one two-way interactions, motivational orientations by light contrast ($F(1, 200) = 5.71, p = .018$) were obtained (Appendix E).. Participants rated low-contrast lighting condition as uniform ($M = 5.13, SD = 1.78$) and high-contrast lighting condition as non-uniform ($M = 4.06, SD = 2.06$).

As illustrated in Figure 4-4, participants in the task-oriented considered low-contrast lighting condition as uniform ($M = 5.42, SD = 1.58$), and perceived high-contrast lighting as non-uniform ($M = 3.71, SD = 2.11$). Participants in the recreation-oriented considered low-contrast lighting condition as uniform ($M = 4.85, SD = 1.93$), and perceived high-contrast lighting as non-uniform ($M = 4.40, SD = 1.97$).

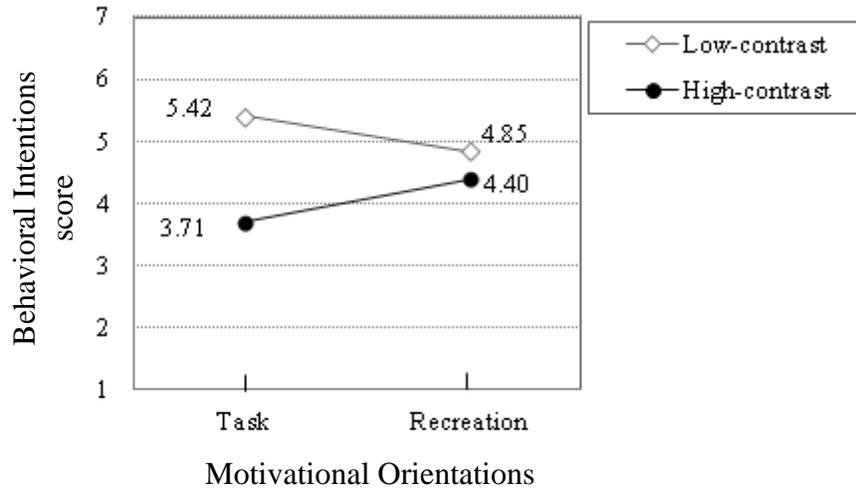


Figure 4-4. Interaction effect for motivational orientation by light contrast on manipulation check of uniform/non-uniform light

Light Contrast – Bright vs. Dim

The significant main effect on light contrast manipulation were obtained with a calculated $F(1, 200) = 196.70, p < .001$. All participants rated low-contrast lighting condition ($M = 5.20, SD = 1.81$) as bright lighting, but they did not strongly feel the high-contrast lighting ($M = 2.38, SD = 1.43$) was dim lighting (Appendix E).

Task-oriented Motivational Condition

The significant main effect of motivational orientations on task-oriented (be task-oriented) manipulation checks was obtained with a calculated $F(1, 200) = 9.45, p = .002$ (Appendix E).

The participants in the task-oriented motivation condition rated their motivational orientation as more task-oriented ($M = 5.08, SD=1.82$) than recreation-oriented ($M = 4.33, SD=1.72$). Another significant main effect of motivational orientations on task-oriented (try to get things done) manipulation checks (Table 4-20) was obtained with a calculated $F(1, 200) = 16.94, p < .001$.

The participants in the task-oriented motivation condition felt on this shopping occasion, they would try to get things done ($M = 5.17, SD = 1.62$).

Recreation-oriented Motivational Condition

The significant main effect of motivational orientations on recreation-oriented (be recreation-oriented) manipulation check were obtained with a calculated $F(1, 200) = 4.00, p = .047$ (Appendix E). The participants in the recreation-oriented motivation rated their motivational orientation as more recreation-oriented ($M = 4.88, SD = 1.71$) than task-oriented ($M = 4.39, SD = 1.90$). Another main effect of motivational orientations on recreation-oriented (try to have fun) manipulation checks (Table 4-24) approaching significance were obtained with a calculated $F(1, 200) = 3.68, p = .057$. The participants in the recreation-oriented motivation rated on this shopping occasion, they would try to have fun ($M = 5.09, SD = 1.71$).

Qualitative Findings of Lighting Preferences

In order to understand the specific factors of lighting preferences, participants were asked to make additional comments on their most and least preferred lighting choices among four lighting conditions. Responses to the open-ended questions on the questionnaire were reviewed to identify emerging categories that could be used to classify lighting factors of the most and least preferences. These categories were then used in a thematic content analysis, quantifying the number of participants mentioning each lighting condition in their responses. Two raters read and coded all of the responses to obtain reliability measures. One rater's assessments were used for the remaining analyses.

Table 4-11 shows six major themes emerged in the data, which included: 1) lighting factors, 2) shopper (task-oriented/recreation-oriented) focused, 3) store atmosphere, 4) Flynn's five subjective impressions, 5) product (handbag) focused, and 6) store image. Narratives relating to lighting factors included illuminance, color appearance, distribution, and

glare/shadow. References to store atmosphere primarily regarding space appearance, shopper focused references included shopping experience, attraction, emotion, and visual comfort. Responses relating to Flynn's five subjective impressions included visual clarity, relaxation, pleasantness, spaciousness, and privacy. Product focused references included product evaluation and modeling of product. At last, narratives concerning store image included high-end image, just-right image, and low-end image. Table 4-11 also shows examples of respondents' reasons for their most preferred and least preferred lighting choices.

Table 4-11. Qualitative themes development used to analyze participants' responses

Theme	Examples of responses	
	Most preferred	Least preferred
Lighting factors		
Illuminance (brightness)	"Not too bright, not too dark."	"Too dark; too bright."
Color appearance (warm/cool); daylight look	"I like the warm color of the lighting."	"Too yellow."
Distribution (uniform/non-uniform)	"The lighting is even."	"Light contrast too much with the dark background."
Glare; shadow	"Not glaring."	"Too many weird shadows."
Shopper (task-oriented/recreation-oriented) focused		
Shopping experience	"Puts me in the mood to get-the-job done, lit can enhance the shopping experience."	"Not feel comfortable shopping in this store, irritating lights to shop in."
Attraction	"Very welcoming."	"Looks uninviting."
Emotion	"I feel it is uplifting."	"Annoying, darkens my mood."
Visual comfort	"Doesn't hurt my eyes."	"Honestly hurts my eyes."
Store atmosphere		
Space appearance	"The most comfortable-looking atmosphere. It is much more natural looking."	"It seems a little boring. Everything look plastic like and just not appealing."
Flynn's five subjective impressions		
Visual clarity	"I can see what I am buying."	"I can hardly see anything."
Relaxation	"More relaxing mood."	"Too relaxing."
Pleasantness	"Most happy."	"It is unpleasant to the eye."
Spaciousness	"Looks bigger and more spacious."	"Looks like a cave."
Privacy	"I feel like nobody is always watching you."	N/C
Product (handbag) focused		
Product evaluation	"Light allows you to see the true colors."	"Colors are distorted."
Modeling of product	"It highlights the merchandise."	"Lighting is unflattering to the handbags."

Table 4-11. Continued

Theme	Examples of responses	
	Most preferred	Least preferred
Store image		
High-end image	"A chic and luxurious feeling."	"Too exclusive and luxurious."
Low-end image	"It looks more affordable."	"Does not give a sense of class or luxury."
Just-right image	"It is just right."	"Doesn't match the luxury of the displays."

Note. N/C indicates no comment.

The six themes were then used to number participants' mention of each theme in their responses. As shown in Table 4-12, about 38% of the participants mentioned lighting factors; about 19% of the participants mentioned shopper focused factors or store atmosphere; about 12% mentioned Flynn's five subjective impressions; about 7% mentioned product focused factors; and about 5% mentioned store image.

Table 4-12. Frequency for participants' lighting preference

Theme	Number of mentions (<i>n</i> =208)				Total
	Task-oriented (<i>n</i> =104)		Recreation-oriented (<i>n</i> =104)		
	Most preferred	Least preferred	Most preferred	Least preferred	
Lighting factors					324
Illuminance	38	63	61	65	227
Color appearance	22	23	23	17	85
Distribution	0	5	4	0	9
Glare; shadow	1	1	1	0	3
Shopper focused (task-oriented/recreation-oriented)					167
Shopping experience	30	11	15	13	69
Attraction	24	10	10	11	55
Emotion	1	11	9	12	33
Visual comfort	2	3	2	3	10
Store atmosphere					160
Space appearance	31	43	44	42	160

Table 4-12. Continued

Theme	Number of mentions (<i>n</i> =208)				Total
	Task-oriented (<i>n</i> =104)		Recreation-oriented (<i>n</i> =104)		
	Most preferred	Least preferred	Most preferred	Least preferred	
Flynn's five subjective impressions					106
Visual clarity	21	15	26	13	75
Relaxation	3	1	7	0	11
Pleasantness	5	1	2	0	8
Spaciousness	3	2	1	1	7
Privacy	3	0	2	0	5
Product (handbag) focused					60
Product evaluation	8	14	9	5	36
Modeling of product	8	2	9	5	24
Store image					45
High-end image	11	1	13	4	29
Low-end image	3	3	1	5	12
Just-right image	3	0	0	1	4

The findings of written comments were summarized based on participants' most and least preferred lighting choices. Each theme was discussed below to reveal new information beyond that obtained from the quantitative results. The examples of participants' statements were quoted in brackets. All written comments are included in Appendix F. These results are discussed further in the next chapter for comparison with the quantitative results and contradictions are explained.

Lighting Factors

A total of 324 comment phrases were made on lighting factors. Of them, 227 (70%) were about illuminance, 85 (26%) were about color appearance, 9 (3%) were about distribution, and 3 (1%) were about glare/shadow. For the most preferred lighting, in the majority of statements illuminance was the favorite brightness/darkness choice or the space was not perceived as too bright/dark [*Like the bright light; Love the dim lighting; It's bright but with a cool darkness; It's*

not too bright to the extent where you feel blinded]. Responses to color appearance involved preferences for warm/cool tones [*Warm glow softens the sharp angles; Like cool color; Edginess with white lighting*]. Comments about distribution were related to the presentation of spotlights [*Like the products are in some kind of spotlight; The lighting is even*], and glare/shadow was related to the existence of glare [*It isn't too much lighting that it glares*].

For the least preferred lighting, the participants raised objection to the brightness/darkness and they felt the space was too bright or too dark [*Don't like the darkness; Way too dim; Awkwardly bright; Intense bright light*]. Also, the participants reported dislikes for lighting of warm/cool tones [*Don't like the warmness; Prefer yellow light than white; Feeling is too cold*]. There were also several cases of dissatisfaction with the spotlights [*The bright light is contrasting too much with the furniture and shelving; Lighting is way too uneven*] and glare/shadow [*Too many weird shadows*].

Shopper Focused Factors (task-oriented vs. recreation-oriented)

A total of 167 comment phrases were about the shopper focused factors. Of them, 69 (41%) were about shopping experiences, 55 (33%) were about attraction, 33 (20%) were about emotion, and 10 (6%) were about visual comfort. The most preferred lighting choice, based on the statements regarding shopping experience, was the lighting of the store motivated and promoted their shopping activity [*Kept me motivated to look around; It makes me want to go through all of the handbags, not just a few displayed ones; It would score high in customer experience; Easy to understand and still fun; Puts me in the mood to "get-the-job done"*]. The reported attraction was from the store which appeared inviting and welcoming [*Very welcoming; Invites you in to wander around; Attract my attention*]. Besides, emotion and visual comfort comments were associated with creation of positive emotions [*I feel it is uplifting without the annoying dark mood*] and visual comfort [*Enough lighting doesn't hurt my eyes*].

In the aspect of the least preferred lighting, participants' comments on store experiences show that they would not stay and buy anything under the lighting condition [*The yellow tone makes the lighting horrible to shop in; Not a fun exciting shopping experience; It's not effective*]. Participants reported dissatisfaction with store attraction by stating the store was uninviting and unwelcoming [*Looks uninviting; It would not catch my eye at all*]. The comments about emotion and visual comfort show that negative emotions [*It darkens my mood; It is annoying and depressing*] and visual discomfort [*Gives me a headache; Honestly hurts my eyes*] were generated.

Store Atmosphere

A total of 160 comment phrases were about store atmosphere related to store ambience and appearance. For the most preferred lighting, comments included the presentation of the store was clean, elegant, modern, calm, cozy, interesting, mysterious, natural, lively, exciting, unique, professional, and sophisticated [*Lights make the store colors look nicer and more elegant; A very modern look; The lighting blends well with the surrounding; A comfortable atmosphere for browsing*]. In contrast, for the least preferred lighting, comments included dull, gloomy, indistinctive, old, snobby, creepy, boring, cold, morbid, artificial, empty, intense, awkward, and sterile [*Very grim and secretive-like; Too night club and relaxed; It reminds me of a prison/police interrogation room; Everything looks plastic and just not appealing; Too traditional and very standard; No personality, shows no attempt in merging the designs of the purse in the room*].

Flynn's Five Subjective Impressions

A total of 106 comment phrases were about Flynn's five subjective impressions. Of them, 75 (71%) were about visual clarity, 11 (10%) were about relaxation, 8 (8%) were about pleasantness, 7 (7%) were about spaciousness, and 5 (4%) were about privacy. For the most

preferred lighting choice, comments on visual clarity is that there was enough light to see all items [*The lighting allows you to be able to browse openly; You can see exactly what is in the store clearly; Easiest to navigate through;*]. Participants' descriptions regarding relaxation, pleasantness, spacious, and privacy were the store was relaxing and calm [*It allow you to relax; calm feeling*], pleasant and happy [*Aesthetically pleasant; Most happy*], looked bigger and spacious [*Not cluttered; A lot of light makes the store looks more spacious*], and not being under surveillance [*It is dark so I could shop without people watching me*] respectively.

For the least preferred lighting choice, comments on visual clarity is that customers could not accurately see merchandise [*The intricate lighting gets annoying when you can't see things throughout the whole store; Hardly see what I'd be buying*]. Descriptions related to relaxation, pleasantness, spaciousness, and privacy were the store was too relaxing [*I may fall asleep*], unpleasant [*It is unpleasant to the eye*], and looked like a cave [*Like you are in a cave*] respectively. No comment was made on privacy.

Product (handbag) Focused Factors

A total of 60 comment phrases were about product focused factors. Of them, 36 (60%) were about product evaluation and 24 (40%) were about modeling of products. For the most preferred lighting, comments on product evaluation were that lighting allowed them to see the true colors and details of the items [*It helps to identify the color of the merchandise; I want to be able to examine the merchandise*]. Regarding modeling of products, participants showed satisfaction with the presented handbags [*The bags look more luxurious and emphasizes the quality of them*].

For the least preferred lighting, participants' comments on product evaluation were that customers could not really see and tell the colors of the handbags [*It is hard to see the products features specifically its true color; Lighting distort the color*]. Also, on modeling of product,

participants showed dissatisfaction with the presented handbags [*Lighting is unflattering to the handbags*].

Store Images

A total of 45 comment phrases were about store images. Of them, 29 (64%) were about high-end image, 12 (27%) were about low-end image, and 4 (9%) were about just-right image. For the most preferred lighting choice, participants reacted positively to the high-end image [*It looks very chic; dim lights make the store seem more luxurious*], low-end image [*It looks more affordable*], and just-right image [*It's just right*].

On the contrary, participants reacted negatively to high-end image [*Too exclusive and cold*], low-end image [*Doesn't give a sense of class or luxury; Seems cheap*], and just-right image [*Doesn't match the luxury of the displays*] when it came to the least preferred lighting choice.

CHAPTER 5

DISCUSSION

The main goal of this study was to investigate the impact of different lighting conditions on subjects' emotional states (arousal and pleasure), behavioral intentions (purchasing behavior), and preferences in relation to the two different shopping motivations, task-oriented one and recreation-oriented one, in a handbag store setting. Each variable is discussed with previous theories and findings of this study. This chapter will end with the limitations of this study, a general conclusion, and suggestions for further research.

Arousal States

The results were against the expectation for showing that the effects of lighting contrast/CCT on arousal states were not mediated by shoppers' motivations in a handbag store environment. However, participants' arousal states for different lighting conditions were significantly affected by CCT and light contrast. Both groups of participants perceived cool lighting and uniform lighting as more arousing than warm lighting and non-uniform lighting. Additionally, there was a two-way interaction, CCT by light contrast was approaching statistical significance ($p = 0.061$). Cool/ low-contrast lighting was rated as the most arousal, while warm/ low-contrast lighting was rated as the second.

The findings of this study support the idea of that arousal levels are influenced by lighting which as described in the previous studies (Baumstarck & Park, 2010; Fleisher et al., 2001; Flynn, 1977; Gifford, 1988; Mehrabian, 1976; Park & Farr, 2007; Park et al., 2010). However, the lighting characteristics of these studies were limited to illumination levels (Flynn, 1977; Gifford, 1988; Mehrabian, 1976; Park et al., 2010), correlated color temperature (Flynn, 1977; Gifford, 1988; Mehrabian, 1976; Park & Farr, 2007; Park et al., 2010), and lighting direction (Baumstarck, 2008; Fleisher et al., 2001). Only Flynn's (1977) study looked specifically at the

uniform/non-uniform lighting by using relaxation as an emotional scale to assess the different lighting conditions. The current study found non-uniform lighting to be less arousing, which partially confirmed Flynn's (1977) conclusion that non-uniform lighting was more relaxed than uniform lighting because one of the four word pairs, relaxed/stimulated, was used to evaluate the arousal states.

This study's findings also confirmed what is known about the relationship between light color and emotional states (Baron et al., 1992; Park & Farr, 2007; Park et al., 2010), which described that cool color lighting is more arousing than warm color lighting. Moreover, based on the findings of manipulation checks (Appendix E), non-uniform lighting in the experiment was rated as a bright condition by participants compared to uniform lighting, which was identified as a dark condition. It can be said the findings also agree with previous studies suggesting that people feel more aroused in bright lighting conditions (Flynn, 1977; Gifford, 1988; Meharibian, 1976; Park et al., 2010). The results also align with that obtained by Custers et al. (2010) that a store with more non-uniform lighting was perceived as less tense. The relaxation versus tenseness in the M-R model's scale was suggested to be the same as the tenseness dimension, which concluded that non-uniform lighting is less arousing.

Yet, based on the finding of this study, the performance of light contrast was not correspondent with Gordon's (2003) implication that non-uniform spaces increase stimulation which produces more arousal. This may be due to the reason that Gordon's (2003) discussion is about general interior spaces, but this study looked into the space with a specific purpose (handbag store). Also, participants perceived the non-uniform lighting in the handbag store as an overall dim and calm condition instead of an exciting and energetic space. Furthermore, lighting is only one of the numerous elements contributing to the perceived ambience, and contrast level

is just one component of the lighting designs. Lighting characteristics contain illumination levels, CCT, CRI, directions, and contrast levels, any of them may have an effect on enhancing or impairing arousal levels and they should be considered as a whole.

Possible reasons for absent evidence that shoppers' motivations serve as a mediator between lighting contrast/CCT and arousal states may be that the current study only tested part of the environmental stimuli (light contrast/CCT) and the prejudices in personal variables (personal interest and preferences). Lighting contrast/CCT may not account for the most assessments of arousal states in store experiences but may be a small part of the overall assessment.

Lighting in retail stores may be unlike any previously studied environmental physical stimuli. Results from marketing studies regarding the effects of store atmospherics on arousal states have been inconsistent (Machleit & Eroglu, 2000). The semantic scales of arousal states may be low coefficient and need to be revised to measure two different types of arousal states: physical (cognitive) one and emotional (mental) one. A higher level of statistical significance may be observed between the two test groups when two types of semantic scales are used. Future researches had applied the M-R model to investigate environmental stimuli and behaviors needed to tailor their semantic scales according to their studies' foci.

Pleasure States

The relationship between the color and contrast levels of the light source as environmental stimuli and shoppers' pleasure states were not mediated by their motivations in a handbag store environment. The results were contradictory to the findings of Kaltcheva and Weitz's (2006) study which suggested that motivational orientation moderates the effect of environmental stimuli on pleasantness. One specific reason for this may be that different methodologies had been used in their study and this study. Kaltcheva and Weitz (2006) used color, complexity, and

music as physical environment stimuli, but this study focused on lighting. Also, Kaltcheva and Weitz's (2006) used a clothing store and a music store as their experimental settings, whereas the current study looked into a handbag store. It is possible that different types of stores may administer different evaluation criterion.

The light contrast did have an effect on participants' pleasure states. Participants felt more pleasant in a uniform lighting condition (this study's results indicated it is arousing), which is consistent with the statement made by Gordon (2003): "the more stimulation (arousal) provided, the more pleasant the task becomes". According to the finding, the participants reported that the uniform lighting condition was bright (high-illuminance), while the non-uniform lighting condition was dim (low-illuminance). From this point of view, this study's findings are in line with the idea of "lighting in higher illuminance is considered to be more pleasant" (Fleisher et al., 2001) and "bright light is a correlate of pleasantness" (Mehrabian & Russell, 1974), but is contradictory to the statement of "non-uniform lighting was rated as more pleasant" (Flynn et al., 1977). One specific reason for this may be the different experiment context. Flynn (1977) examined lighting pleasantness in general interior settings which may not be directly comparable to the retail interior setting in this study. In spite of those debates, the strong connection between lighting attributes and participants' pleasure levels is consistent with the Mehrabian-Russell model that suggested states of pleasure are related to environmental stimuli (Donovan & Rossiter, 1982).

Although Park & Farr's (2007) study suggested the colors of light affect states of pleasure, this study had not found any connection between light colors and pleasure states. Park and Farr (2007) focused on impacts of cultural differences on lighting perception of pleasure, and they did not consider light contrast in their test. They used a real site to present a clothing store setting.

The current study did not consider the cultural influences and used a simulated handbag store environment. Thus the influences of light colors on pleasure states may be weak in the handbag store setting compared to the clothing store. It is likely that other dimensions of lighting (illumination levels, CRI, or light direction) may have a stronger influence on states of pleasure in the handbag store.

Behavioral Intentions (Purchasing Behavior)

The result of this study partially supported the expectation that each customer's motivational orientation as a mediator of that the CCT and contrast levels of lighting as an environmental stimulus affects a consumer's behavioral intention (purchasing behavior). Only one significant two-way interaction was found in this study, which is the one between motivational orientation and light contrast. The participants assigned to the task-oriented motivation responded that uniform lighting enhanced their spending intention, while those assigned to the recreation-oriented motivation believed they will buy merchandise in the store in a non-uniform lighting condition.

The results support previous studies that stated various behaviors were produced through manipulations of lighting characteristics (Areni & Kim, 1994; Park & Farr, 2007; Summers & Hebert, 2001). However, this fact is contradictory to Kaltcheva and Weitz's (2006) study that indicated that arousal had a negative effect on task-oriented shoppers' behaviors but had a positive effect on recreation-oriented shoppers. Their findings explained the interactive effect between arousal and motivation was that a low-arousal store environment provided efficiencies, while a high-arousal store environment enhanced shopping experiences. The requirement of the task-oriented scenario was to complete the task within a limited period of time, thus task-oriented shoppers would try to shop as efficiently as possible. In this situation, task-oriented shoppers considered a low-arousal environment could achieve this goal, because it would require

less energy to complete their shopping tasks. In contrast, in the recreation-oriented scenario, participants had to kill their time, so that the main goal of their shopping activities was to seek some intrinsic satisfaction, in other words, playfulness and fun (Babin et al., 1994), and to be entertained. Accordingly, they would patronize a store that increased stimulation and create rich experiences is high-arousal. Yet, Kaltcheva and Weitz's (2006) study did not take a specific look at lighting variables.

Previously, Park and Farr (2007) had specifically explored the relationship between CCT and behavioral intentions and found higher CCT encouraged approach behaviors. Yet, this study found CCT was not a significant factor that affected behavioral intentions. As mentioned before, this may be due to the difference between the methods adopted by this study and those by Park and Farr's (2007) study. They explored the differences between cultures and used actual environments while the current study used simulated environment. Their study also used an apparel store setting and the current study addressed a handbag store.

Participants' comments revealed that the visibility of merchandise is a key focus in the retail store. Comments on visual clarity and product evaluation (more than 30% participants had made comments) highlighted the importance of the functional aspects of lighting. Most of the comments on uniform lighting were positive, revealing that all the participants required the store lighting to fulfill the basic needs to see and evaluate the products. Non-uniform lighting received a lot of negative responses in the aspect of visual clarity, most participants perceived it hindered their ability to see the products and distorted the color of the handbags.

Despite the argument about the effectiveness of arousal levels in store environments, according to the results, retailers can use different contrast levels of lighting to attract customers and cater to their tastes with different shopping motives. Supposing that a retail store's major

customers are task-oriented, the store designer should adopt uniform lighting to create the appearance, so the merchandise presentation in the store is clear at a glance. Conversely, when customers are principally recreation-oriented, the store designer can adopt non-uniform lighting to build a more complex and excited shopping environment. Moreover, if a retail store aims at customers with both motivational orientations, the lighting conditions should vary across store departments according to their dominant motivations of customers.

Lighting Preferences

To investigate the overall lighting preferences of two types of shoppers (task-oriented vs. recreation-oriented) with different motives in a retail store, the participants were asked to rate how much they like each presented lighting condition separately. The lighting preferences were re-examined by selecting the most and least preferred lighting conditions when four lighting conditions were presented in one slide view. The results showed that the subjects' retail store preferences were significantly affected by light contrast but not significantly by CCT and their motivational orientations.

For both groups, the handbag store with uniform lighting was rated as more preferable than that with non-uniform lighting. Regarding the most and least preferred retail lighting, 44.20% of the task-oriented group selected the store with cool/uniform lighting as the most favorite one, and 52.90% of them rated the warm/non-uniform lighting as the least preferred one. Comparing with the task-oriented group's response, 38.50% of the recreation-oriented group rated the warm/uniform lighting as the most favorite one, and 59.60% of them rated the warm/non-uniform lighting as the least preferred one. Although both groups preferred store lighting to be warm/uniform and cool/uniform than warm/non-uniform and cool/non-uniform, it seemed that recreation-oriented participants showed higher preference for store with warm/non-uniform and cool/ non-uniform lighting than task-oriented participants. Interestingly, the task-oriented group

considered cool/ non-uniform lighting as their second least preferred one, while cool/uniform was the second least preferred lighting condition for the recreation-oriented group.

Kaltcheva and Weitz (2006) applied the M-R model to study shoppers' motives and discovered a strong connection with states of arousal and pleasure, which in turn affected behavior intentions. They suggested that task-oriented shoppers found a low-arousal retail environment to be pleasant, this type of environment positively affected behavior intentions, whereas recreation-oriented shoppers found a high-arousal retail environment to be pleasant. Hence, by associating the findings of this study, it is found that both groups perceived uniform lighting as high arousal. In Kaltcheva and Weitz's study, it was expected that task-oriented shoppers would prefer uniform lighting and recreation-oriented ones would prefer non-uniform lighting. Now it appears that the findings of this study did not reinforce Kaltcheva and Weitz's (2006) study. One possible reason may be that Kaltcheva and Weitz manipulated environmental stimuli involving complexity, colors, and music, while this study focused on lighting. The role of lighting in a retail store is more complicated than other environmental characteristics. Lighting entails the accomplishment of visual clarity, ambient production, emotional satisfaction, and product evaluation (Gordon, 2003; Quartier et al., 2008; Rea, 2000). According to Rea (2000), the three primary goals of lighting in a retail environment are to attract customers, to allow customers to evaluate merchandise, and to facilitate completion of sales. Cognitive needs could not be neglected while emotional needs were fulfilled during purchase process. Also their store settings were a clothing store and a music store, whereas current study is associated with a handbag store. Regardless of motivational orientation, consumers all felt uncomfortable when they assumed the consumptive environment was not in a sound circumstance to examine products.

Finally, individuals may have specific preferences for different lighting conditions and products (handbags). For example, some commented that the non-uniform lighting was chic and cool; while others said it made their eyes hurt and they did not prefer it. Warm light was perceived as having a nice yellow tone but also bring a sense of being unnatural and out-of date to things under it. The same result was observed for uniform lighting and cool lighting. Participants' comments showed some awareness of the effects of light contrast and preference for uniform lighting. Uniform lighting received a plurality in the positive comments whereas comments for non-uniform lighting were more negative. The findings suggested that if retailers and designers would like to employ non-uniform lighting to create a lively store environment, the lit environment should be maintained perfectly visible.

Park and Farr's (2007) study suggested cool color lighting was more preferable than warm one. However, this study revealed no effect of CCT on preferences. Again, this may be resulted from the difference in methods between this study and Park and Farr's (2007) study (store types, experimental settings, and cultural differences). No empirical study had been conducted to determine the relationship between the motivational orientations and lighting preferences within a retail store setting. The present study showed there was no significant connection between those two.

Although there was no quantitative support for the connection between motivational orientations and lighting preferences, according to the comments, participants with recreation-oriented motivation showed higher preference for non-uniform/white lighting than those with task-oriented motivation. Some participants said this lighting condition was very modern, exciting, and unique. The dim light helped them to relax. In contrast, participants with task-oriented motivation perceived it as lighting in a jail, and being very pretentious and superficial.

People may focus on different variables with a stronger effect on their perception and preferences. Thus further study may investigate effects of lighting on preferences along with other influences in the store in order to determine whether there is a strong difference between shoppers with different shopping goals.

Limitations

There were some limitations in this study regarding the research methods. First, in this study, the test was conducted using a simulated environment instead of a real retail store. Although many studies have successfully used photographs and digital images to assess people's reactions to a built environment (Chayutshakij, 1998; Hendrick et al., 1977; Kaltcheva & Weitz, 2006; Marsden, 1999; Park et al., 2010), this method could have implied some drawbacks. For instance, it was possible that people may experience the physical attributes of slides in one way and perceive that in real physical environments in another way. Also, there may be a discrepancy between being in a lit environment and simply observing a lit scene. The second limitation is that this study only looked into consumers' reactions on one single site; the study did not include other handbag stores to evaluate differences in stores. Participants' appreciations of particular product styles may affect ratings they give, as well as their life styles. It may not be proper to assert that self-reported emotion in the store is as a result of the lighting characteristics only. Thirdly, the current study manipulated participants' shopping motivational orientations by requesting them to imagine themselves as either a task-oriented or recreation-oriented shopper. To increase their cognition of having the respective motivations, participants wrote down their presumptive situations of the hypothetical shopping occasions. These two manipulations were further tested and the result showed reasonable effectiveness (Appendix E). However, it cannot be sure that each participant remained in the hypothetical situation constantly throughout the

process. It was likely that more powerful results would be obtained by assigning them to the motivational orientations inherent in their nature.

Furthermore, the sample population may have affected the results. Due to the nature of the lab's recruitment, participants were mostly business school students, meaning that the sample diversity was limited. In addition, this study only examined the reactions of young female students; different results may be obtained for shoppers who are older, male, with different cultural backgrounds, or of other occupations.

Conclusions and Implications

This study provides a preliminary understanding of the roles of CCT and light contrast within a retail setting. The results clearly show that light contrast had a significant effect on people's arousal states, pleasure states, retail preferences, and purchasing behaviors. Generally, uniform lighting was preferred and was more arousing and pleasant in the handbag store. It is assumed that this is why the lighting strategy of existing high-end handbag stores is to use neutral colors and uniform lighting to create a clean-looking and easy-browsing environment. Although uniform lighting is the most favorite lighting for both shopper typologies, recreation-oriented consumers were more likely to shop in a store with non-uniform lighting, whereas task-oriented shoppers would shop in a store with uniform lighting. This finding is contradictory to studies that had proposed pleasant shopping environments positively affect the “approach” shopping behavior (Baker et al., 1992; Donovan & Rossiter, 1982; Hui & Bateson, 1991; Sherman et al., 1997). The reason could be that Mehrabian and Russell's (1974) model may not be applicable to evaluate consumers' behaviors within a retail setting without considering motivational orientations. This information could be useful if it is adapted by retailers to create their store environments according to shopping motivations of their targeted customers. For example, customers in an office supply store may be mostly task-oriented. Owner of this store

should adapt a uniform lighting solution to clearly present their merchandise. In contrast, motives of customers of a high fashion store may be recreational. Owner of this store should use non-uniform lighting to create an excited ambient where consumers can still evaluate products. Besides, the results of this study could benefit designers and retailers by offering a direction of evaluating existing store environments and future store designs in terms of lighting arrangement as a design component to fulfill consumers' cognitive and emotional requirements.

In order to investigate the effects of retail lighting on consumers' behaviors, this study created a simulated environment, a replication of real-world context with manipulated factors, to observe reflective interactions which would actually occur in the real world (Groat & Wang, 2002). Indeed the simulation research design brought several strengths to this study. For example, simulation was more economical and more controllable comparing with conducting a test in a real retail store. It helped to eliminate the unwanted distractions and accomplish the manipulation of study variables. Secondly, this research method allowed the experiment to be conducted in the behavioral lab which provided a systematic and organized setting throughout the one-month research period. It also allowed the researcher to acquire a sample of satisfying size in an efficient and flexible manner.

The researches and knowledge in lighting's effects on human responses are scarce (Davis, 2011). Also, affective and behavioral responses to light contrast are a new topic and require more future research attention. On the other hand, environmental stimuli have been investigated in a retail context to explore the relationships among store atmosphere, customers' emotions, and buying behaviors, but only few of the studies involve in customers' shopping motives. This study is limited by one of the environmental factors, 'lighting', and its relationship to consumers. For

these reasons, motivational orientations and other aspects of store atmosphere should be considered in future researches.

Future studies adopting the M-R model in a retail store context must consider various retail settings (e.g., apparel store, grocery store, and electronic store) and target population (e.g., gender, age, and work status) which are different from the present ones. There is also a need to investigate the same product categories (e.g., women's clothing) in different price ranges (e.g., low-end and high-end). In addition, this research was conducted at the UF Behavioral Research Lab, meaning that the same procedure could lead to different results if the test was performed in another experimental setting. Therefore, further research may be conducted in actual environments with on-site shoppers to capture more real-world characteristics. As suggested by Kaltcheva and Weitz (2006), other aspects of lighting (e.g., CRI, direction, and intensity) and sensory cues (e.g., scent and color) can be tested in future studies to further explore their relationship with consumers' motivational orientations, emotional responses, and retail outcomes.

It is recommended that further comparative researches can be conducted in different contexts (e.g., hospitality, workplace, and healthcare) and different demographics (e.g., different genders, ages, cultures, income, and locations). Knowing the involvement and influence of those variables may help to produce more significant results which can contribute to the body of knowledge of interior design.

APPENDIX A
IRB APPROVAL

UF Institutional Review Board
UNIVERSITY of FLORIDA

PO Box 112250
Gainesville, FL 32611-2250
352-392-0433 (Phone)
352-392-9234 (Fax)
irb2@ufl.edu

DATE: March 31, 2011

TO: LeeHsuan Liao; Hyunjoo Oh
3880 NW 23rd Terrace Apt. #201
Gainesville, FL 32605

FROM: Ira S. Fischler, PhD; Chair 
University of Florida
Institutional Review Board 02

SUBJECT: **Approval of UFIRB # 2011-U-0295**
Customer Preference of Retail Store Lighting

SPONSOR: None

I am pleased to advise you that the University of Florida Institutional Review Board has recommended approval of this protocol. Based on its review, the UFIRB determined that this research presents no more than minimal risk to participants. Your protocol was approved as an expedited study under category 7: *Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.*

Given this status, it is essential that you obtain signed documentation of informed consent from each participant. Enclosed is the dated, IRB-approved informed consent to be used when recruiting participants for the research. If you wish to make any changes to this protocol, *including the need to increase the number of participants authorized*, you must disclose your plans before you implement them so that the Board can assess their impact on your protocol. In addition, you must report to the Board any unexpected complications that affect your participants.

It is essential that each of your participants sign a copy of your approved informed consent that bears the IRB approval stamp and expiration date.

Your approval is valid through **March 15, 2012**. If you have not completed the protocol by this date, please telephone our office (392-0433), and we will discuss the renewal process with you. It is important that you keep your Department Chair informed about the status of this research protocol.

ISF:dl

APPENDIX B
CONSENT FORM

Customer Preference of Retail Store Lighting

Please read this consent document carefully before you decide to participate in this study.

Purpose of the research study: The study is to understand the effects of store lighting on consumers' preferences. The results will be used to make recommendations to retailers to improve the retail shopping experience.

What you will be asked to do in the study: You will view eight lighting conditions of store environment in PowerPoint presentation format. After that, you will be asked to complete a set of questionnaire which is organized to answer each page of questions for each store lighting condition. Overall, the study should take no more than 20 minutes to complete.

Risks and Benefits: There are no expected risks or benefits associated with the study.

Compensation: You will receive one point of extra credit in the approved class of your choice (MAR3023 or QMB3250) for your participation. Extra credit for participation you can earn will be no greater than 2% of your final grade of each course. The alternative to earn extra-credit is to submit a summarizing report of an academic journal regards marketing and/or consumer behavior. You will receive one extra-credit point for each paper report you submit.

Confidentiality: You will NOT be asked to give your name or contact information. Any personal demographic information will only be used to compare your answers to other participants. Your responses will be anonymous.

Voluntary participation: Your participation is completely voluntary and you are under no obligation to complete this survey.

Right to withdraw from the study: You have the right to withdraw from the study at any time without consequence. You do not have to answer any questions that you do not want to answer. If you choose to withdraw, please inform the survey administrator and your survey will be destroyed.

If you have questions about the study, please contact:

LeeHsuan Liao, Graduate Student, Department of Interior Design
313 Architecture Building, (352) 222-3887

Nam-Kyu Park, Assistant Professor, Department of Interior Design, Graduate Thesis Chair
344 Architecture Building, (352) 392-0252 ext.338

Whom to contact about your rights as a research participant in the study:

UFIRB Office, Box 112250, University of Florida, Gainesville, FL 32611-2250; ph 392-0433.93

If you agree to participate, please click the continue button below.

Principal Investigator's Signature
(Lee Hsuan, Liao)

Participant's Signature

APPENDIX C
SURVEY INSTRUMENT 1

Instruction:

In this study, you will be asked to evaluate a couple of stores within an imagined scenario. Please read the following scenario and try to imagine yourself in this situation.

Task-oriented situation

Imagine that you have a very important job interview in New York city. You arrive one day before your interview to buy a professional-looking suit and a handbag for your job interview. You go to a nice shopping mall.
Because you need to prepare for the tomorrow's job interview and have a good rest, all you want to do is to find one suit and one bag and leave.

Recreation-oriented situation

It is a weekend. None of your friends are around. You find what's on TV too dull to watch. You feel very, very bored.
So, you decide to visit some stores to relieve your boredom. You stop by a nice shopping mall. You find new stores just opened a few days ago. You are curious about these stores.

Please write what you imagined with this scenario.

APPENDIX D
SURVEY INSTRUMENT 2

Scene#1&2

Please answer the following questions under your imagined scenario.

1. What would you do if you entered this store?

	<i>Strongly Disagree</i>				<i>Strongly Agree</i>		
I definitely would shop in this store.	-3	-2	-1	0	+1	+2	+3
I would be willing to buy merchandise at this store.	-3	-2	-1	0	+1	+2	+3
I would be willing to spend more time.	-3	-2	-1	0	+1	+2	+3

2. How would you feel in this lighting condition?

Wide awake	1	2	3	4	5	6	7	Sleepy
Relaxed	1	2	3	4	5	6	7	Stimulated
Excited	1	2	3	4	5	6	7	Calm
Unaroused	1	2	3	4	5	6	7	Aroused
Uncomfortable	1	2	3	4	5	6	7	Comfortable
Satisfied	1	2	3	4	5	6	7	Dissatisfied
Pleasant	1	2	3	4	5	6	7	Unpleasant
Unhappy	1	2	3	4	5	6	7	Happy

3. Please rate your perception of lighting in this store.

Warm	1	2	3	4	5	6	7	Cool
Bright	1	2	3	4	5	6	7	Dim
Uniform	1	2	3	4	5	6	7	Non-uniform

4. On this shopping occasion, I would:

	<i>Strongly Disagree</i>				<i>Strongly Agree</i>		
be task-oriented.	-3	-2	-1	0	+1	+2	+3
be recreation-oriented.	-3	-2	-1	0	+1	+2	+3
try to get things done.	-3	-2	-1	0	+1	+2	+3
Try to have fun.	-3	-2	-1	0	+1	+2	+3

5. How much do you like this store lighting condition?

Not at all	1	2	3	4	5	6	7	Very much
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Scene#3

1. Which lighting condition do you **MOST** prefer?
(1) Store A (2) Store B (3) Store C (4) Store D
1.2 Please, explain why you do you *most* prefer this.
2. Which lighting condition do you **LEAST** prefer?
(1) Store A (2) Store B (3) Store C (4) Store D
2.1 Please, explain why do you *least* prefer this.

Background Information

1. Do you have a visual impairment (such as color blindness) that cannot be corrected by your glass or contact lenses? (1) Yes (2) No
2. In general, do you consider yourself as?
(1) a task-oriented shopper
(2) a recreation-oriented shopper

APPENDIX E
MANIPULATION CHECKS RESULTS

Table E-1. Mean and standard deviation (SD) scores for subjects' lighting perception of correlated color temperatures

Source	<i>n</i>	<i>Mean*</i>	<i>SD</i>	<i>p-value</i>
Motivational Orientation (MO)				.530
Task-oriented	104	3.77	1.99	
Recreation-oriented	104	3.60	2.19	
Correlated Color Temperatures (CCT)				.000
Warm	104	2.98	1.83	
Cool	104	4.38	2.10	
Light Contrast				.486
Non-uniform	104	3.59	2.07	
Uniform	104	3.78	2.11	
MO by CCT				.944
Task-oriented x Warm	52	3.06	1.61	
Task-oriented x Cool	52	4.48	2.08	
Recreation-oriented x Warm	52	2.90	2.04	
Recreation-oriented x Cool	52	4.29	2.14	
MO by Light Contrast				.210
Task-oriented x Non-uniform	52	3.85	1.96	
Task-oriented x Uniform	52	3.69	2.03	
Recreation-oriented x Non-uniform	52	3.33	2.16	
Recreation-oriented x Uniform	52	3.87	2.21	
CCT by Light Contrast				.676
Warm x Non-uniform	52	2.83	1.72	
Warm x Uniform	52	3.13	1.94	
Cool x Non-uniform	52	4.35	2.12	
Cool x Uniform	52	4.42	2.10	
MO by CCT by Light Contrast				.577
Task-oriented x Warm x Non-uniform	26	3.00	1.55	
Task-oriented x Warm x Uniform	26	3.12	1.71	
Task-oriented x Cool x Non-uniform	26	4.69	2.00	
Task-oriented x Cool x Uniform	26	4.27	2.18	
Recreation-oriented x Warm x Non-uniform	26	2.65	1.90	
Recreation-oriented x Warm x Uniform	26	3.15	2.19	
Recreation-oriented x Cool x Non-uniform	26	4.00	2.23	
Recreation-oriented x Cool x Uniform	26	4.58	2.04	

*7 point Likert-type scale: 1 = Strongly Disagree and 7 = Strongly Agree

Table E-2. Mean and standard deviation (SD) scores for subjects' lighting perception of uniform/non-uniform

Source	<i>n</i>	<i>Mean*</i>	<i>SD</i>	<i>p-value</i>
Motivational Orientation (MO)				.828
Task-oriented	104	4.57	2.04	
Recreation-oriented	104	4.62	1.96	
Correlated Color Temperatures (CCT)				.220
Warm	104	4.43	2.04	
Cool	104	4.76	1.95	
Light Contrast				.000
Non-uniform	104	4.06	2.06	
Uniform	104	5.13	1.78	
MO by CCT				.664
Task-oriented x Warm	52	4.35	2.09	
Task-oriented x Cool	52	4.79	1.99	
Recreation-oriented x Warm	52	4.52	2.01	
Recreation-oriented x Cool	52	4.73	1.92	
MO by Light Contrast				.018
Task-oriented x Non-uniform	52	3.71	2.11	
Task-oriented x Uniform	52	5.42	1.58	
Recreation-oriented x Non-uniform	52	4.40	1.97	
Recreation-oriented x Uniform	52	4.85	1.93	
CCT by Light Contrast				.348
Warm x Non-uniform	52	4.02	2.14	
Warm x Uniform	52	4.85	1.86	
Cool x Non-uniform	52	4.10	2.00	
Cool x Uniform	52	5.42	1.66	
MO by CCT by Light Contrast				1.000
Task-oriented x Warm x Non-uniform	26	3.62	2.28	
Task-oriented x Warm x Uniform	26	5.08	1.60	
Task-oriented x Cool x Non-uniform	26	3.81	1.96	
Task-oriented x Cool x Uniform	26	5.77	1.51	
Recreation-oriented x Warm x Non-uniform	26	4.42	1.94	
Recreation-oriented x Warm x Uniform	26	4.62	2.10	
Recreation-oriented x Cool x Non-uniform	26	4.38	2.04	
Recreation-oriented x Cool x Uniform	26	5.08	1.77	

*7 point Likert-type scale: 1 = Strongly Disagree and 7 = Strongly Agree

Table E-3. Mean and standard deviation (SD) scores for subjects' lighting perception of bright/dim

Source	<i>n</i>	<i>Mean*</i>	<i>SD</i>	<i>p-value</i>
Motivational Orientation (MO)				.041
Task-oriented	104	4.00	2.22	
Recreation-oriented	104	3.59	2.07	
Correlated Color Temperatures (CCT)				.000
Warm	104	3.32	1.93	
Cool	104	4.27	2.27	
Light Contrast				.000
Non-uniform	104	2.38	1.43	
Uniform	104	5.20	1.81	
MO by CCT				.198
Task-oriented x Warm	52	3.65	2.09	
Task-oriented x Cool	52	4.35	2.32	
Recreation-oriented x Warm	52	2.98	1.71	
Recreation-oriented x Cool	52	4.19	2.24	
MO by Light Contrast				.026
Task-oriented x Non-uniform	52	2.37	1.39	
Task-oriented x Uniform	52	5.63	1.61	
Recreation-oriented x Non-uniform	52	2.40	1.49	
Recreation-oriented x Uniform	52	4.77	1.91	
CCT by Light Contrast				.000
Warm x Non-uniform	52	2.42	1.51	
Warm x Uniform	52	4.21	1.89	
Cool x Non-uniform	52	2.35	1.36	
Cool x Uniform	52	6.19	1.01	
MO by CCT by Light Contrast				.272
Task-oriented x Warm x Non-uniform	26	2.42	1.42	
Task-oriented x Warm x Uniform	26	4.88	1.93	
Task-oriented x Cool x Non-uniform	26	2.31	1.38	
Task-oriented x Cool x Uniform	26	6.38	.64	
Recreation-oriented x Warm x Non-uniform	26	2.42	1.63	
Recreation-oriented x Warm x Uniform	26	3.54	1.63	
Recreation-oriented x Cool x Non-uniform	26	2.38	1.36	
Recreation-oriented x Cool x Uniform	26	6.00	1.27	

*7 point Likert-type scale: 1 = Strongly Disagree and 7 = Strongly Agree

Table E-4. Mean and standard deviation (SD) scores for subjects' task-oriented motivational orientation (on this shopping occasion, I would be task-oriented)

Source	<i>n</i>	<i>Mean*</i>	<i>SD</i>	<i>p-value</i>
Motivational Orientation (MO)				.002
Task-oriented	104	5.08	1.82	
Recreation-oriented	104	4.33	1.72	
Correlated Color Temperatures (CCT)				.060
Warm	104	4.93	1.78	
Cool	104	4.47	1.81	
Light Contrast				.529
Non-uniform	104	4.62	1.96	
Uniform	104	4.78	1.64	
MO by CCT				.345
Task-oriented x Warm	52	5.19	1.86	
Task-oriented x Cool	52	4.96	1.79	
Recreation-oriented x Warm	52	4.67	1.67	
Recreation-oriented x Cool	52	3.98	1.71	
MO by Light Contrast				.529
Task-oriented x Non-uniform	52	5.08	1.96	
Task-oriented x Uniform	52	5.08	1.69	
Recreation-oriented x Non-uniform	52	4.17	1.88	
Recreation-oriented x Uniform	52	4.48	1.54	
CCT by Light Contrast				.694
Warm x Non-uniform	52	4.81	1.93	
Warm x Uniform	52	5.06	1.61	
Cool x Non-uniform	52	4.44	1.99	
Cool x Uniform	52	4.50	1.63	
MO by CCT by Light Contrast				.099
Task-oriented x Warm x Non-uniform	26	5.35	1.83	
Task-oriented x Warm x Uniform	26	5.04	1.91	
Task-oriented x Cool x Non-uniform	26	4.81	2.08	
Task-oriented x Cool x Uniform	26	5.12	1.48	
Recreation-oriented x Warm x Non-uniform	26	4.27	1.91	
Recreation-oriented x Warm x Uniform	26	5.08	1.29	
Recreation-oriented x Cool x Non-uniform	26	4.08	1.88	
Recreation-oriented x Cool x Uniform	26	3.88	1.56	

*7 point Likert-type scale: 1 = Strongly Disagree and 7 = Strongly Agree

Table E-5. Mean and standard deviation (SD) scores for subjects' task-oriented motivational orientation (on this shopping occasion, I would try to get things done)

Source	<i>n</i>	<i>Mean*</i>	<i>SD</i>	<i>p-value</i>
Motivational Orientation (MO)				.000
Task-oriented	104	5.17	1.62	
Recreation-oriented	104	4.27	1.61	
Correlated Color Temperatures (CCT)				.015
Warm	104	4.99	1.74	
Cool	104	4.45	1.57	
Light Contrast				.256
Non-uniform	104	4.60	1.80	
Uniform	104	4.85	1.54	
MO by CCT				.861
Task-oriented x Warm	52	5.46	1.73	
Task-oriented x Cool	52	4.88	1.46	
Recreation-oriented x Warm	52	4.52	1.64	
Recreation-oriented x Cool	52	4.02	1.57	
MO by Light Contrast				.138
Task-oriented x Non-uniform	52	5.21	1.79	
Task-oriented x Uniform	52	5.13	1.46	
Recreation-oriented x Non-uniform	52	3.98	1.60	
Recreation-oriented x Uniform	52	4.56	1.59	
CCT by Light Contrast				.600
Warm x Non-uniform	52	4.92	1.79	
Warm x Uniform	52	5.06	1.71	
Cool x Non-uniform	52	4.27	1.76	
Cool x Uniform	52	4.63	1.34	
MO by CCT by Light Contrast				.024
Task-oriented x Warm x Non-uniform	26	5.81	1.67	
Task-oriented x Warm x Uniform	26	5.12	1.75	
Task-oriented x Cool x Non-uniform	26	4.62	1.72	
Task-oriented x Cool x Uniform	26	5.15	1.12	
Recreation-oriented x Warm x Non-uniform	26	4.04	1.46	
Recreation-oriented x Warm x Uniform	26	5.00	1.70	
Recreation-oriented x Cool x Non-uniform	26	3.92	1.77	
Recreation-oriented x Cool x Uniform	26	4.12	1.37	

*7 point Likert-type scale: 1 = Strongly Disagree and 7 = Strongly Agree

Table E-6. Mean and standard deviation (SD) scores for subjects' recreation-oriented motivational orientation (on this shopping occasion, I would be recreation-oriented)

Source	<i>n</i>	<i>Mean*</i>	<i>SD</i>	<i>p-value</i>
Motivational Orientation (MO)				.057
Task-oriented	104	4.39	1.90	
Recreation-oriented	104	4.88	1.71	
Correlated Color Temperatures (CCT)				.284
Warm	104	4.50	1.94	
Cool	104	4.77	1.70	
Light Contrast				.093
Non-uniform	104	4.42	1.84	
Uniform	104	4.85	1.78	
MO by CCT				.592
Task-oriented x Warm	52	4.19	1.96	
Task-oriented x Cool	52	4.60	1.84	
Recreation-oriented x Warm	52	4.81	1.88	
Recreation-oriented x Cool	52	4.94	1.54	
MO by Light Contrast				.939
Task-oriented x Non-uniform	52	4.17	1.94	
Task-oriented x Uniform	52	4.62	1.86	
Recreation-oriented x Non-uniform	52	4.67	1.72	
Recreation-oriented x Uniform	52	5.08	1.69	
CCT by Light Contrast				.444
Warm x Non-uniform	52	4.38	1.92	
Warm x Uniform	52	4.62	1.96	
Cool x Non-uniform	52	4.46	1.78	
Cool x Uniform	52	5.08	1.57	
MO by CCT by Light Contrast				.251
Task-oriented x Warm x Non-uniform	26	3.92	1.98	
Task-oriented x Warm x Uniform	26	4.46	1.94	
Task-oriented x Cool x Non-uniform	26	4.42	1.90	
Task-oriented x Cool x Uniform	26	4.77	1.80	
Recreation-oriented x Warm x Non-uniform	26	4.85	1.78	
Recreation-oriented x Warm x Uniform	26	4.77	2.01	
Recreation-oriented x Cool x Non-uniform	26	4.50	1.68	
Recreation-oriented x Cool x Uniform	26	5.38	1.27	

*7 point Likert-type scale: 1 = Strongly Disagree and 7 = Strongly Agree

Table E-7. Mean and standard deviation (SD) scores for subjects' recreation-oriented motivational orientation (on this shopping occasion, I would try to have fun)

Source	<i>n</i>	<i>Mean</i> *	<i>SD</i>	<i>p-value</i>
Motivational Orientation (MO)				.047
Task-oriented	104	4.61	1.81	
Recreation-oriented	104	5.09	1.71	
Correlated Color Temperatures (CCT)				.380
Warm	104	4.74	1.84	
Cool	104	4.95	1.70	
Light Contrast				.006
Non-uniform	104	4.51	1.88	
Uniform	104	5.18	1.60	
MO by CCT				.873
Task-oriented x Warm	52	4.52	1.77	
Task-oriented x Cool	52	4.69	1.86	
Recreation-oriented x Warm	52	4.96	1.91	
Recreation-oriented x Cool	52	5.21	1.49	
MO by Light Contrast				.338
Task-oriented x Non-uniform	52	4.15	1.90	
Task-oriented x Uniform	52	5.06	1.60	
Recreation-oriented x Non-uniform	52	4.87	1.79	
Recreation-oriented x Uniform	52	5.31	1.60	
CCT by Light Contrast				.151
Warm x Non-uniform	52	4.58	1.85	
Warm x Uniform	52	4.90	1.84	
Cool x Non-uniform	52	4.44	1.91	
Cool x Uniform	52	5.46	1.28	
MO by CCT by Light Contrast				.576
Task-oriented x Warm x Non-uniform	26	4.31	1.87	
Task-oriented x Warm x Uniform	26	4.73	1.66	
Task-oriented x Cool x Non-uniform	26	4.00	1.96	
Task-oriented x Cool x Uniform	26	5.38	1.50	
Recreation-oriented x Warm x Non-uniform	26	4.85	1.83	
Recreation-oriented x Warm x Uniform	26	5.08	2.02	
Recreation-oriented x Cool x Non-uniform	26	4.88	1.80	
Recreation-oriented x Cool x Uniform	26	5.54	1.03	

*7 point Likert-type scale: 1 = Strongly Disagree and 7 = Strongly Agree

APPENDIX F
PARTICIPANT WRITTEN COMMENTS

Table F-1. Participant written comments

MO	Most Preferred		Least Preferred
T	Store		Store
A	It's warm & bright. But not overly stone cold white	C	It looks like lights they would have in jail.
B	It's somewhere in between too bright and too dim that doesn't hurt my eyes. It's most comfortable.	C	Lighting is way too uneven and hurts my eyes.
B	Because it is the most amount of brightness and it is the warmest and most comfortable-looking atmosphere.	C	It is way to non-uniform with the lighting, plus it looks cold and uninviting.
D	I like to see best when I shop. Though C's lighting is the coolest, when I shop I would prefer D.	A	Too dark; warm dim colors.
D	It makes me more "awake" and "aroused" and puts me in the mood to "get-the-job done."	A	It's too dark. I find it annoying. Plus it's hard to see the true colors of purses.
B	Bright, but not too bright. Feels welcoming but not overwhelming.	C	Too dark.
C	Because there is such a small number of merchandise on the shelves, I think a dimly-lit setting is more appropriate. However, the white, bright light adds to a chic atmosphere.	D	The brightness makes the store look extremely empty to me.
B	Very warm colors, good lightings to observe the bags.	A	Although it looks very chic, it would be difficult to understand how the bags look in the day time.
D	It has the brightest light so you can see the clothes.	A	You can't really see the clothes properly.
D	I think this lighting is open and inviting.	C	It reminds me of a prison/police interrogation room-the light contrast too much with the dark background.
A	It looks more exclusive.	D	Looks like the lighting is boring, doesn't look exciting.
D	It is the brightest and easiest to browse and see details.	A	It is too dark to really see the collections.
D	The lighting in D is much more natural looking than the other rooms. It is not too dark and doesn't have a yellow tint like B.	C	It is too dark. It makes ot difficult to see and is dim and sleepy. It feels uninviting.
B	I just feel most comfortable looking at this image-it is a nice balance.	C	It is harsh light in certain area, but remains dim in others.
D	It is bright and welcoming and really accentuates the design of the store. In turn, it makes me want to look at all of the handbags, not just a few on display.	B	The lighting of the store makes the objects appear an unnatural color and I would not want to enter this store.
B	It is bright enough to see detail in the handbags and be awake.	C	Much too dark.
B	I like the warm color of the lighting and how it evenly fills the room. It is also the perfect level of brightness, not too bright such as store D and not too dim, like store C.	C	The lighting in store C is not only cold but it is too dim. This would put me to sleep in the store.
A	Store A's lighting is warm, comfortable and invites you in to wander around, browse and enjoy the ambience.	D	Store D's lighting is too bright. The store feels uninviting and cold.
B	I most prefer store B because it is lit enough to see the products and has a nice, warm yellow tone.	A	The darkness with the yellow tone makes the lighting horrible to shop in. Too dark.
D	I like to be bright, so I can see what I'm	A	I think it distorts the true colors, when you go

	looking at.		out in the sun it's going to look different than you thought.
B	I like that it's well lit, but still warm. Store D is too bright, it seems cold, like a hospital. B is bright but still welcoming.	A	It feels dark, and I feel like it would be alone. It doesn't feel welcoming.
B	Store B has just enough lighting. I liked D too become it looks really lively, but it is too bright that I'd feel intimidated buying there.	C	It looks dark and morbid.
D	I prefer this lighting condition most because the clean, bright light allows you to see the true colors and details of the handbags.	A	I least prefer this lighting condition because it has a dark-orange hue to it that is both unflattering to the handbags and the customers.
A	It just looks the nicest. You can clearly see all the merchandise, but the lighting adds something extra.	D	It's just too bright, makes everything look plastic like and just not appealing.
B	It has a warm, comforting feeling while maintaining it's elegance.	C	It is too cold feeling.
D	I like lighting I am a bright person.	A	It is too dark. I can't see anything well.
B	It is warm, not too dark, but not really light like D. Allows to see the products from a distance.	D	It is too light, does not give a sense of class or luxury.
D	It's bright and lively and keeps me awake and alert while I'm browsing.	C	The bright light is contrasting too much with the furniture and shelving.
B	The lighting is suggestion of the important factors but still allows you to be able to browse openly. Very welcoming.	C	It does nothing extra for the store. It does not provide any welcoming feeling.
D	It's lighting and lively.	A	It's very dark and gloomy.
B	Because it is just right. It isn't too dark and it isn't too bright.	A	Because it is way too dark. You want something that is bright and cheerful.
C	The lighting is still bright, but it doesn't wash out the room.	B	The yellowish lighting is not very enticing to shop in.
D	The other stores just seemed too dark for me and I didn't like how it seemed only the merchandise had lights on them. I want to choose what I'm most attracted to.	A	I didn't like how everything had a spot light and it seemed sort of yellowish and not bright.
D	It is the brightest of the four lighting options. I would feel awake in this store and ready to buy a purse. It is definitely more welcoming, and I can see the handbag I would be purchasing.	A	Because I can hardly see anything in this type of store. I would feel very unmotivated to buy something in this store as well.
D	Brightest- feels lively, more vibrant, and happier.	A	Much too dark.
B	It still looks luxurious because it is not cluttered but it's not as intimidating and pretentious.	C	Seems very pretentious and superficial.
B	There is enough light for me to see clearly without being too harsh.	A	Way too dark.
B	I was between B & D, but because the furniture is such a streamlined look and more "futuristic", the extra-bright white light would make it too trendy. Adding a warm glow softens the sharp angles and makes it look more inviting (B).	A	The warm lighting contrasted with the dark spots and furniture makes for too much darkness. Everything sort of blends in together and looks indistinctive (too little contrast). With the darker setting, the more sparse white light in D is much more attention-grabbing.
B	Not too bright, not too dark.	A	It looks dark and it might distort the color visually.
B	A - looks like a stage, not conducive to shopping. B - is warm and inviting C - same as A, too dark. D - too bright and clean, not my taste.	A	It's so dark and could hardly see what I'd be buying.
D	It is easier for me to see what I'm purchasing. I hate shopping in dark store.	A	You can't even tell the color of the handbag.

B	The lighting in this store is just right. It is bright enough to strike interest but not too bright to create a discomfort.	A	The lighting is too dim in this store for my liking. I would not feel comfortable shopping in this store because although the lighting is relaxing, it is not welcoming.
D	I like the brightness of the store because it feels more inviting and stimulating.	A	It is too dark. It is hard to see the products and the store seems very unwelcoming.
B	The lighting is enough to see items but not too bright and artificial. It's a pleasant medium of lighting.	A	Too dark, wouldn't be able to see all items as I would use them in every life.
D	The use of lighting is better you can explore, and see the products better.	B	They use a yellow light that I don't really like this makes me feel sleeping and can't see very well the products.
D	Because it is brighter than the other store.	B	It looks dull, boring, and yellow.
B	It's light, but warm.	C	It's gloomy.
D	Brighter looks cleaner out me in a better mood.	A	Too dark, can't see anything well darkens my mood.
D	It makes everything look elegant, sophisticated yet young, lively, and classy. Sweet as well.	A	Dim, brown, old, dark, gloomy, too snobby.
C	It looks very hip, exclusive, and fun. It's dark but not too dark, like store A. It has a calm feeling to it but also would keep me interested in browsing.	A	Too dark and dull.
B	The store is bright enough to see all the merchandise, but it is not overwhelming. Stores A&C are too dark. Store D is too bright.	C	The store is too dark. I feel like I couldn't see the detailing in the merchandise accurately.
D	It is what we are the most used to seeing it. It looks like there aren't lights and it's the sun lighting the store.	A	It's way too dark, especially for shopping. It feels like a night club.
D	I like the brightness because I like seeing what I'm shopping in. I like knowing what color the item is, as opposed to being deceived by dim lighting.	A	Too dark, you can't see. Colors are distorted.
D	It is bright and makes me stimulated and excited to shop. It also looks more affordable.	A	It is too dark. It makes me think the store is too exclusive and luxurious.
B	It has warm lighting, which creates a more relaxing mood and matches the professional and classy clothing.	C	It is too dark and doesn't provide a warm tone.
D	It's bright and clean looking. It provides the best lighting for the bags and wakes me up. The darker stores A&C make me want to go to sleep, store B makes me bored for some reason. I like that store D seems bright and fresh.	A	It makes me really tired and honestly hurts my eyes. It's almost like you are in a cave or something.
D	It is bright, balanced, easy to see everything and would allow me to use the bright lights everywhere to see the details of each handbag.	A	Hard to see detail of purposes. Not bright at all, very grim and secretive-like.
B	Not too bright, but not too dark, very inviting.	D	Too many gray tones. I don't like how dead the store looks.
D	The lights are bright enough so I can take everything in and see which goods I am attracted to right away.	A	The lighting is way too dim, and I would have trouble viewing the merchandise clearly.
D	You can see everything perfectly so you can focus on the products as opposed to the lighting. And it is the most welcoming.	A	It is too dark, almost gloomy can't see the bags as well as most seems deceiving.
D	This is a very colorful and bright store. Therefore, the lights should be bright, too.	A	Too brown of a color.
D	It is the brightest, the rest put me to sleep.	A	It is way too dark.
D	It shows the merchandise the best and is the	A	I don't like the look of for the sepia

easiest to navigate through.

- | | | | |
|---|---|---|---|
| B | I like the lights you can see the items clearly but it is not so bright that you feel unnatural. | A | The lighting is too dim and it would be difficult to see whether or not the color truly appears to you. |
| D | The brighter it is , the easier it is to see the merchandise you are interested in buying. | A | I don't like the yellow tone and the darkness. I want to be able to see items that I am buying. |
| D | Because it's so bright. | C | Because it's so dim and dark. |
| D | Very well lit and does not make me sleepy and tired. Keeps me stimulated. | A | Too warm and dark. This would make me too relaxed making me fall asleep and not buying anything. |
| C | The bags are clearly highlighted so they appear very bright, but the dim lights make the store seem more luxurious. | B | You can't see the real colors of the bags. It looks old fashioned. |
| B | It reminds me of a department store-spacious with nice merchandise-it's lively. The bags stand out and attract my attention. | A | Too dark, gloomy-it doesn't highlight the handbag products. |
| B | Compared to A and C it is brighter, which I like more but the white brightness of D would hurt my eyes. Store B is the most welcoming and aesthetically pleasing. | D | It's too bright and lighting is irritating. |
| C | I feel like the purses are more lit up so you can see the product yet it still gives that chic feeling. | B | It's very plain, nothing really exciting about it. |
| A | No specific reason. | C | Least professional. |
| B | It's not too dark but not too bright. | C | Dark areas and light areas make weird shadows. |
| C | Still have dim lighting but more mystery, less prestige implied. | A | I didn't want to squint to see the bag. |
| B | Looks less intimidating, but still luxurious. | D | Looks harsh and cheaper. |
| D | It makes me more awake and excited to shop. | A | The lighting, while calming and relaxing, seems a little boring. |
| D | It looks modern, clean, and happy. | B | The tint in the light almost makes it seem like you have sunglasses on. |
| B | The store is bright and nice, but not too space-age. | C | Too dark and I can't see the merchandise. |
| C | The bags look beautiful and the store looks welcoming. | A | It is entirely too dark. |
| A | I really like the darkness in luxury stores because I feel like nobody is always watching you. | B | It's all a yellow tint and that's one of my least favorite colors. |
| D | Bright "cool" lighting, looks bigger and more spacious. | C | Too dark. |
| D | It is bright and luxurious and you can see exactly what is in the store clearly. | A | It is not bright enough. It appears to be way too dim. |
| B | The lighting is warm-not too dark, not too bright. | D | Way too bright. This lighting would make me want to leave the store quickly. |
| D | L like being in a room/ store where there is light so I can see what I am buying. | A | Too dim in there, it makes me feel strange. |
| D | The bright lights make me feel excited and ready for a day of shopping. They also make the merchandise appear much more approachable and "down-to-earth". | A | It is much too dark and the "warmth" of the lights distort the colors of the merchandise. The store seems "stuck-up". |
| B | It's not too light, like D, that I would feel cold in, but with B there is a warm feeling about it that makes me want to shop. | A | This lighting is not only dark but is off-sets the actual color of the purses which would put me in a very difficult position to shop in. |
| D | Store D seems more welcoming. The lighting in stores A and C are too dim. | A | The yellow lighting is annoying to me. |

D	It is bright, attractive and welcoming.	A	It is too dark and I would feel uncomfortable.
C	The darkness excites me, making em want to explore.	A	It's brown and too warm, not a fan at all. I would want to leave quickly. I like cool lighting.
C	A -don't like the foggy, yellowish lighting. B -don't like the yellowish lighting. D -lighting is okay, but not the best pick.	A	It's very bad lighting overall.
C	C -creates a better shopping mood. Because it is darker so I could shop without people watching me.	B	The bright and gloomy yellow.
A	Although it may be too dark to actually shop through, it certainly has a very elegant look to it. I would definitely shop through this store, just because I believe it would be fun. It would score high in customer experience.	D	Too traditional and very standard. Lighting is just one level above Walmart.
D	It is lit up the most, allowing your eyes to focus on the products, rather than the mood lighting.	C	Everything is dark except for the area where a product is. It is unpleasing to the eye and dreary looking
D	It is very bright, not dull and keeps you awake.	C	Very dark, dull and kind of depressing.
B	I think this is the best lighting for this type of nice handbag store. It makes the bags look more luxurious and emphasizes the quality of them. it is warm and created a comfortable and atmosphere for browsing. It is not too dark and not too bright.	A	It is too dark and dim. This makes it look as though the store is hiding something.
B	It has a lot of lighting but it looks warm and comfortable.	C	It's too dark, and I like the yellow lights better than white.
A	It's bright but still tasteful. It really highlights the merchandise.	C	To dark in the room, too many weird shadows.
B	The lighting is slightly dimmed, but just enough so you get the dull appeal of the purses. Store A&C are too dark and do not accentuate and make the quality and look at the purses stand out. I would be most happy and productive at store B.	D	It looks too artificial, very black and white. Dull.
D	Exciting, pump me up for my interview, doesn't have the expensive feel.	A	Too night club and relax, not a fun exciting shopping experience.
B	Warm lighting, not too bright or too dim.	D	Intense, bright light.
B	Looking at them side by side, it's just the I was most drawn to.	A	Look a little creepy to me, and tasteless-reminds me of Abercrombie & Fitch and Hollister when I relate to being trashy.
B	It isn't too much lighting that it glares yet. It isn't too dark so you think it's right time, it's relaxed.	A	It looks like a cave.
B	Because it appears more welcoming and easier to browse. It's lively and I would spend much time in there.	C	It is too dark and seems a little complex. It would not catch my eye at all.
D	It is not too bright or too dark. It seems like a relaxing environment and isn't yellow lighting.	B	It is too bright and yellow.

MO	Most Preferred	Least Preferred	
R	Store	Store	
D	I feel the merchandise is really exhibited well and lit can enhance the shopping experience.	A	It feels too dark and takes away from the merchandise that is an display.
C	It is a very modern look. The dark furnishing and spot lighting makes the store unique and exclusive. Almost as if you'd feel special to be able to shop there.	D	The lighting is too bright for what the store is trying to accomplish. An exclusive high class store, I feel should be darker.

- B The store is the most bright and the yellow tint of lighting is warming.
- B This feels the most natural.
- D The lighting is bright making the store appear more "clean" and neat.
- B Not too harsh or too dark, but warmer than the others and well-lit. D looks like harsh, ugly fluorescent lighting. A&C are just too dark.
- B The lighting is bright so it is easy to see merchandise, price tags, etc.
- B Because it's bright but with a warm light to it which make it welcoming.
- C Seems chic and exciting. Adding bonus is having white light so I can see colors clearly. Very unique.
- A It dim yet I can clearly see the merchandise.
- B The lighting seems welcoming and makes shopping for items enjoyable and easy.
- B This store has a significant amount of light. Although store D is brighter, this store has warmer, more calming lights. People are probably more willing to spend more money when they are calm and relaxed.
- B It's warm and lit make the store colors look nicer and more elegant.
- D Bright and shopping stimulating atmosphere.
- B It's not too dark but not too bright either.
- B It's comfortable, not too dark so i can't see things, but not too annoyingly light.
- D Although D can be seen as harsh, I feel like you can best see the product in which you're buying with this lighting.
- A I imagined a pleasant, relaxing store, so I would prefer the first one.
- B I prefer a lot of lighting. It makes the store look more spacious.
- B It's not too dark but not too bright makes me feel warm and comfortable.
- B It's not too bright to where you feel blinded and open to where everyone can plainly see you. When I shop, I want to be able to see the merchandise and not stick out for everyone to see me as I browse.
- B It is not too bright or dull.
- B The lighting just warm and bright enough to feel comfortable and stimulate my interests. I would more likely go in and buy something here.
- B I like how it is calm and relaxed, not too dark and no too bright. It's soothing to look at.
- B The lighting is not too bright and not too dull.
- B I like the warm tone and it's brighter.
- C I chose C because it's light enough for the shopper to enjoy the merchandise, but not too light to overwhelm them.
- C It is very dark and gloomy.
- A Too dark for the products. You can barely see them.
- A The store appears to be uninviting due to the dark yellow tinted lighting.
- D Fluorescent makes everything look horrible, especially women. When I look in the mirror to model each bag, don't I want to feel attractive with the bag and thus more likely to buy it?
- A It is too dark to be able to see the merchandise clearly and easily which would lead to a stressful shopping experience.
- C Because it looks very gloomy and scary. I wouldn't want to going a store like that.
- D Too bright/ impersonal feel. Looks blinding.
- D Much too bright.
- A The intricate lighting gets annoying when you can't see things throughout the whole store. Too dark.
- A It looks like the store is closed and might be difficult to see things.
- C Bright and cold.
- D N/C
- A It's so dark, it almost looks dirty.
- A You can see the product the least with this lighting while it looks high class, it's just not effective.
- C It was bright and had annoying kids.
- A Too dark and morbid.
- A Too dark and tinted.
- C The white lighting makes me feel like I'm at an art gallery and cannot touch any of the merchandise because it is only for display.
- A It is too dark to see the merchandise.
- A It is too artificial for me.
- A I really don't like the darkness at all, I think all stores should have a decent amount of light in them. The dark look makes me feel uncomfortable.
- A That is too dull and boring.
- A It's too dim.
- D The lighting is too overwhelming and would stress out the shopper.

C	I like the edginess with white lighting. It is more modern.	A	It makes it seem more geared towards older women.
B	Great balance highlights the architecture, great floors, etc.	A	Too dark like a cave.
A	It seems warm and energetic. The spot lights put more emphasize on the products than the entire store, which seems less snobby/exclusive.	B	The monotone lighting and simple display make the entire store seemed aimed at "high class" audiences. It seems cold and exclusive.
A	It isn't too bright like Store B&D, and something about store C isn't as appealing to me.	D	It is too bright. None of the merchandise is as showcased as in STORE a.
B	It makes me feel the most comfortable and I think it is the most inviting.	A	The lighting is way too dark for my preference.
B	Warm and bright.	A	Too warm and dark. Not welcoming.
D	A&C are too dark and look like the store is closed. B looks like lighting would give me a headache or make me look bad in the dressing room.	A	It looks like the store is trying too hard to be exclusive and chic. Also it looks like it would be hard to really see the merchandise.
B	I hate darkness, it's unwelcoming. B is like normal good stores but not harsh.	A	Dark, unwelcoming, can't accurately see merchandise.
D	The lighting in this store is a lot brighter than the other three, and it would make me feel more invited into this store since I would actually be able to see the merchandise.	A	It has the duller light compared to the other three.
A	Because most relaxing, chic and still has enough light to see everything while highlighting their products.	D	Too bright and irritating lights to shop in. Doesn't seem as high-class and exclusive.
A	Not too bright. Cozy.	D	Super bright.
D	Bright, can see colors and options better. Lively instead of sleepy.	A	Too dark and gloomy to shop in.
D	Bright, light colors.	A	Gives me a headache. Too dark.
B	It is not too dim and not too bright. I want to be able to examine the merchandise in the light but not be blinded by it either.	A	This store looks too dim and not as inviting as the others.
A	It really highlights the merchandise.	D	It's way too bright.
B	It's not too dark nor too bright. I can see the merchandise clearly. Looks warm and inviting.	A	Way too dark to see the products.
C	It has burst of light that are bright but has a cool darkness to it. It's relaxed and elegant and young.	A	I feel like I'm in an oven, or wearing sunglasses inside.
C	It's not too bright, and I just like how the products seem as if they're in some kind of spotlight.	A	I don't like the tint, and how everything seems to be brown.
C	It lights up the merchandise nicely and makes the room have an elegant and distinctive feel.	B	It is unflattering light and doesn't make anything stand out.
D	I enjoy the bright lights make you feel warm and awake.	A	It is too dark and would make me feel sleepy.
D	I like that it is very bright.	A	The lighting is definitely way too dark.
C	lit makes it stand out and look luxurious.	B	Not very inviting.
C	I think the lighting blends well with the surrounding. It creates a luxurious feel while still being able to clearly see the product.	B	The tint makes everything look bland. Although it seems warm, I do not find it inviting.
A	B&D are lifeless. It was hard to choose between A&C, but I chose A because though I get tired by looking at it. It reminds me of the warm sun or a beach.	B	Boring, dull, lifeless, dim.
C	It looks very chic. The black brightens the rest of the room because the handbags are different colors.	A	It is too hazy, can't really tell what is what in the store.

D	So I can actually see the merchandise.	A	It is dark to walk around, and the lights placed on the items don't even show their true color.
D	I like bright when I'm doing a task so this is the best lighting.	A	This is not just dark but the yellow makes it dim and dark . A weird felling.
B	Not too bright but easy to understand and still fun.	A	Way too dark.
D	Makes me feel like I would be more energized to shop.	A	Takes away from the merchandise and makes the store look boring.
C	It's not too warm or bright.	B	It is awkwardly warm and bright. It doesn't mix.
C	Brookstone is a "comfort" store so the lighting is a little more dim, allowing you to relax.	B	I do not prefer it, it is just less personal feeling, because of its brightness.
D	I can easily see everything and I don't have to guess what the items are going to look like in daylight.	A	It is dark and yellow. It doesn't present the products best.
C	The dim setting for the overall room is good because it creates a more professional and sophisticated look. However, the merchandise is highlighted providing the true colors and emphasis on the product.	D	Department store lighting-shows no attempt in merging the designs of the purse with the room. There is no personality.
A	The lighting was bright enough so I could see every item in the store and kept me awake and motivated to look around.	D	This store had very dim lighting and wore me out to the point where I didn't want to shop anymore.
D	Light, you can see merchandise. Not in a dark dungeon. A is more mood lighting for a club.	A	More like a date night lighting.
A	N/C	D	N/C
C	It isn't too bright or dim, and the light represents the colors well. Scenes A&B might give things a yellow tint.	B	It makes things look yellow and dull.
D	It is bright and easy to see, as well as a happier atmosphere.	A	Too dark and warm.
B	Store D is too bright, it is no longer relaxing and comforting. Store A and C are a bit too dark to be able to see and the detail in the items.	A	It looks yellow and uninviting. It is hard to examine the detail of the products. It looks unwelcoming.
D	I like bright, cool colors. I like that the entire store is lit up, not just the handbags.	A	The store feels too dark and gloomy to me. I don't like the warmness of the colors.
B	Not too bright but it's warm and comfortable. Easy to see merchandise..	D	Way too bright. Too casual-feeling.
B	It's inviting, calm and warm lighting but bright enough to be able to properly see all of the items.	D	The lighting is too bright and makes the store feel very clinical and almost sterile.
B	Not too bright, but dim enough to feel comfortable and can still see all the products.	A	Really dark and tinted, makes me feel sleepy and a bit discouraged about shopping there.
B	There is enough light to see clearly, but is not too bright or glaring.	D	It is too bright and looks very artificial.
A	N/C	D	N/C
A	It is very warm and expensive looking.	D	It is way too bright.
D	Has lot of light.	A	Too dark.
B	Bright enough while still warm-looking	C	Way too dark and gloomy.
D	Bright, inviting, easy to see merchandise.	A	Dark. Uninviting. It feels too exclusive and almost as if they're hiding something.
D	It's very bright, lively, and welcoming. The bright lights make the products stand out more.	C	Dark, depressing, boring.
D	I can see everything. Bright lighting makes me excited about buying something.	A	Too gloomy.
B	The lighting is bright enough to see while still being dim enough to relax the shopper.	A	With lighting like this, it is hard to see the products features, specifically its true color.
D	I like store D because it is brightly lit. I like	A	I don't like store A because it is very dark. The

	the white light.		yellowish tint is also unattractive makes me uncomfortable.
D	I think the bags should have more life to them.	A	Too dim for a bag store.
C	Because the light condition. Although it is dim, the items are highlighted well and are easily seen.	D	It is too bright and makes the store look stiff.
B	It is not as bright as D, so there is still "mood" lighting present. The fact that it isn't as dim as A&C makes the merchandise more shoppable and less of an art exhibit.	D	It's too bright! It doesn't match the luxury of the displays.
B	The lighting adds some ambience without being too over or overwhelming. It seems most welcoming.	D	I feel like I wouldn't have the confidence to go into this store knowing I wouldn't buy anything. The sales associates probably pester shoppers more with this lighting. Lighting seem s stiff. Nasty, dark, annoying, not welcoming. Show me the door!
D	Lights, lights, lights! Bright, modern, rewarding, uplifting white.	A	It looks very unwelcoming, very sterile.
A	I prefer warm tones and interesting lighting presentation.	D	
C	It is calm yet highlights its merchandise.	B	It is too yellow and bright.
C	It is dim but not too dim, it offers a bit or privacy and calming atmosphere.	B	It is an awkward stage or lighting. It should either be well lit or dim, the in between seem cheap.
D	Bright-stimulating.	A	Too dark.
B	Because there's not too much light to make it seem to lively, but it's dim enough to create a nice calm atmosphere.	A	It seems too dark, it reminds me of Hollister.
B	It is a good in between among the four. If it is too dark, I would get tired and maybe get a headache.	A	It would give me a headache. It'd make it hard to see prices of merchandise.
C	Makes the store look exclusive and it focus on products only.	A	The colors do not seem to blend.
B	It's not too dark and not too light.	A	It's really dark.
B	Not too bright, not too dim. Just right. Seems lively and I can see everything crystal clear!	A	I would take a nap there. Too dark. I'd barely be able to see the difference in clothing. The fitting room would be unbearable.
D	It is easiest to see the merchandise.	A	Although C is just as dark, it's not darker. I do not like the warm color tones that distort the colors of the bags.
D	I most prefer this because it is easy to see the products. The lighting and presentation is still upscale without the annoying dark mood. I feel it is uplifting.	A	It is too different to see in this store. It makes me sleepy and irritated.
D	It helps to identify the color of the merchandise.	A	It is too dark and I can't see the items clearly.
A	It is warm and dark. It reminds me of the lighting situations. I would be wearing the handbags.	D	It reminds me of Kmart or Walmart. Cheap and not food quality.
D	N/C	A	N/C
D	It isn't too bright, like store B. The lighting is even, unlike store C. And it isn't romantic and weird like store A.	A	I feel like this is how lighting is done on a romantic restaurant, not a store!
B	It's not too dark, like A&C. Or too bright like D.	D	It is too bright.
A	Love the dim lighting, while areas where the items are lit up.	D	It looks the dullest.
D	N/C	A	N/C
B	I think the lighting is perfectly visible. Not too dark where you can't explore the merchandise, and not too bright where you	A	Too dark, feel like you're entering a cave.

can see every imperfection.

Note. MO = motivational orientation, T = task-oriented, R = recreation-oriented, A = warm/non-uniform, B = warm/uniform, C = cool/non-uniform, D = cool/uniform, N/C indicates no comment.

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BIOGRAPHICAL SKETCH

Lee Hsuan, L. was born in Taipei, Taiwan in October 1982. In June of 2006, she obtained a Bachelor of Art in fashion design from Shih-Chien University, Taipei, Taiwan. After working as an costume designer in Taipei, Taiwan, Lee Hsuan decided to go to the University of Florida to earn her Master of Interior Design. Her main research interest focuses on retail store environment but she is always interested in and eager for more knowledge related to the design field.